

TAC Committee

Total Allowable Catch Committee

Report and Determination for 2011/12

ROCK LOBSTER FISHERY

June 2011

SUMMARY

Management issues

The New South Wales rock lobster has experienced a steady recovery, with catch per Unit Effort (CPUE) approximately doubling between 2000/02 and 2007/08 and exceeding the 1998/99 benchmark by nearly 50%. The 2009/10 catch was worth \$6.8 million, a record high. The market price for shares has almost tripled between 2000/04 and 2007/08 but appears to have stabilised for the last four years and has drifted downwards slightly to around \$2,000 per share. Demand is strong to both purchase and lease quota/shares. CPUE across the fishery in 2009/2010 showed a slight increase and during the last three years represents the greatest rates of catch calculated in the past 37 years.

The Committee again notes that the recent rapid increase in 'raw' CPUE (the catch rate experienced by operators) is unlikely to be a direct reflection of an overall increase in the abundance of lobster. Catch rates appear to have also been affected by changes in fishing patterns (more fishing effort in deeper water) and gear (larger pots).

The ITQ system operating in the rock lobster fishery is working effectively, with the total commercial catch in the fishery once again constrained by the annual Total Allowable Commercial Catch (TACC). The transfer and sale of shares and quota is leading to rationalisation within the industry. Over the past ten years, the total number of shareholders in the fishery has contracted leaving 38% less shareholders in the Fishery since its commencement in 2000 (174 down to 106). Significantly, in 2009/10 about 75% of the commercial lobster catch is now being taken by about 30% of the shareholders in the fishery (33 fishing businesses). This trend has broadly continued into the 2010/11 season.

The number of input controls that are likely to be acting as a barrier to more effective operations continue to be reduced. The current maximum quota holding is scheduled to increase from 350 to 40% of the total number of shares in the fishery (currently 3,890 shares). The Committee supports initiatives by the NSW Department of Primary Industries to consider and, where appropriate, remove input controls and address quota and share transfer processes which hamper the performance of the fishery.

As noted in previous years, the Committee is of the view that updated estimates of illegal, unreported and recreational catches are required.

In previous years the assessments and population projections assume a 25.8t recreational catch. The 25.8t recreational catch is based on estimates provided by previous studies and surveys. This estimate requires updating and the Committee notes that a project to address this issue will commence in December 2011 and conclude in 2014.

Up until last year (i.e. the 2010 assessment) an unreported catch of 17% of the total commercial catch was assumed to allow for unreported retained catch from the lobster fishery and mortality from incidental fishing related. In 2010 after considering advice from industry and the Compliance Operations Branch the allowance for total unreported catch was reduced to 12% of the reported catch. This year recreational catch is assumed by the Committee to be 10% of the total (reported and unreported) commercial catch and the unreported commercial catch is assumed to be 8.5% of the total commercial catch.

Some consideration was given this year to an alternative recreational and unreported catch scenario which implies that a much lower catch than previously assumed has been taken from the population in recent years, which would aid any recovery but

also tend to result in over-estimation of the populations productivity. When dealing with a population that is seriously depleted and in need of recovery, it is appropriate to use high estimates of the unreported catch because that is precautionary. However, as the population begins to recover to above the limit reference point it would be appropriate to relax this precautionary approach. The Committee suggests that efforts be taken to more accurately determine the components of the illegal and unreported catch.

Legislative changes have occurred to recognize the spiritual, social and customary significance to Aboriginal persons of fisheries resources and to protect and promote Aboriginal cultural fishing. These include the creation of an Aboriginal Fisheries Advisory Council and management changes aimed at improving access for the purpose of cultural fishing; these changes are in addition to the current arrangements for the harvesting of lobsters for cultural events. Because the quantity of lobsters that can be taken under these provisions remains relatively small, the Committee does not see that there is currently a need to make an allowance for this in the TACC setting process.

The Committee considers that given the relatively small size of sanctuary zones within marine parks in NSW, in depths preferred by adult rock lobsters (generally 10 to 150m), and the migratory nature of rock lobsters, it is unlikely that the presence of existing sanctuary zones has a significant influence for the stock assessment and TACC setting process. The current Commonwealth process for developing marine reserves in the east marine bioregion may increase the area of sanctuary zone in mid shelf and slope waters and this, in turn, may influence future TAC setting deliberations.

As the commercial viability of the commercial sector has improved, there appears to be less concern over the level of charges that apply to the fishery. Management costs as reported by the Department have continued to contract by such means as reductions in on-costs and the apportionment of some management costs to the recreational sector. There was a substantial reduction in management charges in 2010/11 (22%). This was largely due to the removal of dedicated compliance salaries and the carry-over of funds from the previous period. The impact of the reduction in compliance staff and activity as a result of the saving will need to be monitored carefully.

As the stock recovers, long term targets designed to maximise the economic yield from the resource will be required as the fishery moves away from an emphasis on avoiding limit (biological) reference points and focusing on an agreed target (economic) reference point for the rebuilding for the fishery, within a given time frame.

Consideration should be given to approaches including a spatially structured TACC and different combinations of TACCs and size limits. Such measures could reduce catches in the north, but protect the spawning stock, enable higher TACCs than would otherwise be available, allow access to oversize stock in southern waters and give greater overall benefits to the lobster fishing industry.

Communication and consultation processes in the industry remain effective and the Committee continues to be impressed at the sophistication of the debate and the valuable exchanges with industry that occurred at the annual TAC Open Forum meeting. Departmental staff (managers and researchers) and industry are to be congratulated on their high level of involvement and support for the TAC setting process and their collaborative approach to this fishery.

The Committee urges LobMAC to remain active in discussing with the Department the issues and recommendations raised in this report and, where deemed appropriate, to find ways and means to address them.

Economic issues

While the lack of information on the net return from lobster fishing means that only tentative conclusions about the economic status of the industry are possible, the evidence available to the Committee suggests that the lobster industry in NSW is economically viable. Share prices almost tripled between 2004/05 and 2008/09 indicating that economic viability has been improving and the future outlook for the fishery is positive. The increase in viability is a result of a number of factors including an increase in stock abundance and catch per unit effort, the latter believed to have been influenced partly by an improvement in the efficiency, and practices of lobster fishers.

Since 2008/09 share prices have fallen marginally, possibly reflecting a slightly more dampened future outlook for the fishery. However, over the same period quota prices have increased suggesting improvements in short run profitability.

There has been significant restructuring in the lobster fishery with fewer fishers landing a higher proportion of the catch. This structural change is desirable in order to allow for the most efficient fishers to land the majority of the catch, and to ensure the continued viability of lobster fishing businesses. However, the current management arrangements for the lobster fishery, which prevent shareholders from owning more than 350 shares in the fishery, limits the extent to which further restructuring can occur. The Committee notes, and supports, the amendment of the maximum shareholding to allow shareholders to hold up to 40 per cent of the total number of shares in the fishery.

There remains limits on the maximum amount of quota that can be transferred by lobster fishers and the Committee urges the lobster industry to maintain a watching brief on the extent to which this limit becomes binding, thereby impeding the ability of quota to be transferred from less to more efficient fishers.

The Committee has made a number of recommendations in this report that are aimed at providing improvements in the economic viability of the lobster fishery in the future. These include: that lobster fishers make further efforts to report price information for quota transfers; that the Department and Industry undertake a study to investigate the relationship between length and economic yield in the lobster fishery; that data is collected on the costs of fishing; and, connected to this, that a decision is taken on whether the collection of this data is funded by industry, government or some combination of the two.

The Committee notes that a review of the management plan for the lobster fishery is being undertaken in 2011 and the community contribution charge currently payable in the lobster fishery is due to be reviewed in early 2012. To assist the Department in undertaking these tasks it is imperative that better economic data be obtained on the structure and costs of fishing. The Committee has recommended that the Department place more importance on the gathering of economic data in order to better understand the impacts of management decisions it makes on the financial well being of industry.

The Committee has recommended that industry consider investing more heavily in compliance activities to assist in reducing illegal catch in the fishery. The Committee has also recommended that the estimate of illegal and unreported removals from the rock lobster fishery be refined and that a joint industry/Departmental working group be established to assist with this task.

The Committee notes that efforts are being made to collect better recreational and indigenous catch data. The Department acknowledges that further efforts need to be made to obtain more robust time-series estimates of recreational and indigenous catch. The Committee recommends that this be done as soon as possible such that it can be used to develop a resource-sharing model for the lobster fishery.

The Committee's conservative determination for 2011/12 is based on strengthening the prospect of restoration of the spawning stock and maintenance of an appropriately sized available biomass. By leaving stock in the water, this TAC strategy also offers improved prospects for the further economic recovery of the fishery, again over the longer term. Collection of data on the costs of fishing, and the establishment of economic targets and management strategies to achieve them, will also be necessary to optimise the economic viability of the fishery into the future.

Biological issues

Data from the fishery show a strongly increasing trend in catch rate for 7 years, peaking in 2007/08, followed by stabilisation and a relatively constant catch rate during the past 3 years 2007/08 to 2009/10.

The exploitable biomass was expected to decrease following the recent increases in TAC, but while the catch rate has been slightly lower in the last 2 years this appears more consistent with a general stabilisation than a decrease. While the reasonably stable catch rate in the last few years is widespread across depths, persistent decreases have been seen in the shallow area of the mid-north coast (lat 31-32°), consistent with the relatively weak puerulus settlement 3-5 years ago there, and the catch rate in the deep areas of the central and mid-north coasts (lat 33-32) have reduced substantially in the past 1-2 years.

The incomplete data from 2010/11 indicate similar catch rates to recent years in most areas, but some extremely high catch rates have been recorded in the 10-30m depth areas in the far-north coast and the southern coast. The increase in the far-north is particularly encouraging as it implies an expansion of the breeding stock into this area.

Overall the catch and catch rate data support interpretations that the stock is broadly stable and slowly increasing, with inshore catch rates of small lobsters fluctuating in response to patterns of recent puerulus settlement and deeper catch rates of maturing lobsters showing continued recruitment into the spawning stock.

A substantial decrease in the catch rate of all sized lobsters occurred across both the far-north and mid-north coasts between 200/01 and 2003/04 creating concern for the level of the spawning stock. This led to reductions in the TAC and a decrease in the maximum legal size from 200mm to 180mm in 2004/05. Catch rates of all size classes remained low in the following 2 years and started to show rebuilding in 2007/08 and 2008/09. Rebuilding of the spawning stock on the north coast has increased substantially since then and by 2010/11 the catch rates of all sizes are at the highest since monitoring started in 1998/99.

The cause of the abrupt decline in catch rate and collapse of the spawning stock that started in about 1999/00 is unclear. The interpretation currently considered most plausible is that in the northern zones a period of low abundance of predominantly juvenile lobsters in depths less than 10m, due to previous weak puerulus settlement, resulted in a transfer of fishing effort during 2000 and 2001 to deeper water where the larger lobsters occur. The shift in effort and catches towards the spawning stock and the resultant reduction arising from a relatively small catches suggest that at the time the absolute size of the spawning stock was quite low.

The subsequent response of the stock to the reduced TAC and maximum size limit is consistent with the interpretation of excessive fishing on the spawning stock having been responsible for the abrupt reduction of mature lobsters in 2000 and 2001. The mature stock has slowly rebuilt under these management interventions, with rebuilding first occurring in the pre-mature lobsters in the deep-water parts of the fishery in the south, then feeding into the mature and premature lobsters in the deep water parts of the mid-north coast and latterly into the far-north coast.

The Committee again considers there is a need to ensure a high probability of avoiding the spawning biomass limit reference point, given the increasing evidence from puerulus settlement and indices of spawning biomass that the average recruitment was systematically reduced as the spawning biomass was reduced. This approach is supported by a number of additional factors including: the particular life history of the eastern rock lobster, the current stock-wide management arrangements, and the recent experience of significant reductions in recruitment to lobster populations in other Australian fisheries jurisdictions, despite the spawning stocks of these populations being above levels at which reduction in recruitment was expected.

It is not clear if the depletion threshold of the spawning stock to avoid recruitment overfishing is higher than the recent level of spawning stock depletion (i.e. between 25% and 30% depletion). Monitoring the settlement as the spawning stock continues to rebuild will allow resolution of this issue, inform decisions around the management of the risk of recruitment overfishing and provide information on the fishery returns from further spawning stock rebuilding and the size of the long-term sustainable yield that is possible.

The model estimated median total biomass is very slightly down and the spawning biomass is very slightly up. The differences are so small that there is really no basis for a conclusion on the model results alone. The non-model data are more optimistic for the spawning biomass and on balance consistent for the total biomass. But these differences are not worth differentiating in a higher level summary. If these patterns persist through the next few years however, it would be a different matter.

The exploitable biomass is predicted to remain very similar to the present level for the next 5 years under catches of 150t per year, and to decrease under catches of 175t per year, despite the stability in the spawning stock. This is mainly because of the recently restricted size range available for harvesting. For catches of 175t per year the exploitable biomass is predicted to reduce to about 0.85-0.89 of its current level.

The current stock assessment clearly estimates the spawning stock to be at or below the limit reference point as defined by the Committee, irrespective of the assumptions made in the assessment. The uncertainty in assessment is mainly reflected in how close the spawning stock currently is to the limit reference point and whether that stock has continuing to recover or has stabilised under recent catches. Similarly the stock predictions show that the expected result of continued total annual catches at the recent level of 175t is approximately 'status quo' for the spawning biomass. The uncertainty in predictions is mainly reflected in a wide range of possible outcomes around this expected result, from continued strong spawning stock recovery through to its decline to the point of again causing recruitment collapse. Overall the analysis shows significant recovery toward the limit reference point but great uncertainty as to whether that recovery will continue or not. For the recent total catch of 175t there is almost exactly equal probability that the spawning stock will continue to increase or show decrease. A decrease in spawning stock is highly undesirable because the relationship observed between spawning stock and settlement implies that a significant decrease in average settlement would be expected.

At this time it is considered appropriate to reduce the total catch of 165t. The reasons for this reduction in the total catch are (i) to give a slightly higher probability of 'rebuild' and less of 'status quo' or 'decline', (ii) to provide precaution against possible sensitivity of the analysis to the unreported catch history, particularly given that only one arbitrary history and future has been examined, and (iii) because the fishery independent survey of the spawning stock, which gives a direct measure of the spawning stock and is arguably the most sensitive indicator of it available, will not be conducted for 2 years. This total catch is predicted to give *on average* a modest increase of the spawning biomass. There is also a reasonable probability of faster rebuilding of the spawning stock under this catch. However there is also an appreciable probability that recovery of the spawning stock will stall and reverse under this catch. Also this catch level may result in excessively reduced catch rates from the exploitable stock. Progress will be monitored closely in coming years and a change in management settings would be necessary if the spawning stock changes at a rate much different from the average that is predicted (i.e. if it increases much faster than the average prediction or if it decreases). Resumed annual fishery interdependent monitoring of the spawning biomass would be valuable during the next few years as a part of this monitoring.

For a total allowable catch (TAC) of 165t there remains the question of what levels of unreported and recreational catch to apply in converting the TAC to a total allowable commercial catch (TACC). The TACC is equal to the reported commercial catch. In keeping with the alternative unreported catch history approach used in the stock assessment and projections the recreational catch is assumed to be 10% of the total (reported and unreported) commercial catch and the unreported commercial catch is assumed to be 8.5% of the total commercial catch.

Applying these removals to the TAC of 165t results in a TACC of 137.3t (rounded to 137t).

This TACC is a 6 tonne (4.6%) increase on last year. There were some requests from industry for a 10% increase in the TACC to test the productivity of the resource to 'see what it can deliver'. However it is considered that the productivity of this resource has been thoroughly tested at low spawning biomass levels, to the point that it is now clear that average settlement decreases significantly at spawning biomass levels lower than the current level. It is highly undesirable to again reduce the spawning biomass, or to significantly risk such a reduction, because that would be expected to reduce the productivity of the resource and again cause recruitment overfishing.

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**TOTAL ALLOWABLE CATCH COMMITTEE
ROCK LOBSTER FISHERY
REPORT AND DETERMINATION FOR 20011/12**

1. INTRODUCTION

The Total Allowable Catch Review and Setting Committee (the Committee) is established by Section 26 of the *Fisheries Management Act 1994*. In 2011 it consisted of:

- Mr Ian Cartwright – Chairman
- Dr Keith Sainsbury – fisheries science
- Dr Jessica Hartman – natural resources economics
- Mr Bill Talbot – fisheries management

The Committee was provided with Secretariat services by Ms Sharn Miller, Executive Officer.

The Committee is required to determine the Total Allowable Commercial Catch (TACC) for the commercial sector of the rock lobster fishery and, in doing so, to give effect to the objectives of the *Fisheries Management Act 1994*, as amended by the *Fisheries Management Amendment Act 1997*. It is not subject to the control or direction of the Minister, but in reaching its decision, the Committee is required to have regards to:

- all relevant scientific, industry, community, social and economic factors;
- the need to ensure that the rock lobster resources are exploited in a manner that will conserve stocks in the long term;
- the impact of fishing on other species and the environment; and
- the precautionary principle as set out in Section 30(2)(c) of the Act.

The Committee is also consulted out of session concerning a range of management issues.

The Committee produces a stand-alone report each year as background to, and in support of, the TACC determination. The report includes a number of recommendations for the management of the fishery as they relate to the TACC, based on the experience and background of the Committee members. The Committee finds it helpful when NSW Department Primary Industries (the Department) and LOBMAC provide views on the recommendations and their associated logic, creating a dialogue on a range of issues directly related to the TAC in a whole-of-fisheries context. As stated above, however, the Committee can only make a determination on the Total Allowable Commercial Catch and the degree to which its suggestions and recommendations are accepted is a matter entirely for the Department.

To meet its statutory obligations, the Committee must consider the full extent of rock lobster exploitation. Total removals from the stocks of rock lobster are made up of:

- the quota allocated to commercial fishers;
- the legal catch of recreational fishers (the sum of catches taken by individuals within bag limits); and

- other catches (by both commercial and non-commercial fishers) not sanctioned by the Regulations controlling the fishery and not recorded in the statistics.

The legal and illegal components of the recreational fishery are currently estimated as a single figure, and the unreported commercial catches are estimated as a percentage of the actual commercial catch.

The Act defines, in Section 30(2)(c), how the Committee should apply the precautionary principle, namely:

'if there are threats of serious irreversible damage to fish stocks, lack of scientific certainty should not be used as a reason for postponing measures to prevent that damage.'

The Committee views the word 'threat' in this context to mean an 'indication of probable harm to come'. Thus it believes that where the evidence before it indicates probable future harm to the fishery or the stocks, but there is some scientific uncertainty surrounding that evidence, it must not postpone action to prevent that harm occurring. The rationale and measures suggested by the Committee concerning the maintenance of an adequate spawning biomass in the north of the fishery is an example of the application of the precautionary principle. It is again helpful if the Department and the MAC provide feedback on the suggested rationale and measures made by the Committee in relation to the application of the precautionary principle in its Report and Determination.

The Determination of the Committee is to be published in the Gazette by the Minister. In the light of the Determination, the Minister is required to review the regulations and any other instruments under the Act. The Determination is to be implemented in accordance with the Management Plan.

2. PROCEDURES

2.1 Public Consultation by TAC Committee

The Committee called for public submission on the appropriate total allowable catch under the requirements of Section 31 Division 4 of the *Fisheries Management Act* 1994. Lobster fishers, relevant industry bodies, environmental groups and the community generally were encouraged to make submissions on the total allowable commercial catch. The details of this consultative process are set out in Appendix 1.

The Committee interviewed and received reports from:

- NSW Department Primary Industries, Fisheries Research;
- NSW Department Primary Industries, Commercial Fisheries Management;
- NSW Department Primary Industries, Fisheries Compliance;
- representatives and members of the former Lobster Management Advisory Committee¹; and
- industry members.

Mr Daryl Sykes, a New Zealand consultant experienced in rock lobster fisheries, again attended the Open Forum on the 11 April 2011, representing industry interests.

A summary of submissions and the issues raised in the written submissions is provided in Appendix 2.

¹ The Committee has been informed by Departmental Staff that the LobMAC is not currently formally in place Industry Working Group

As occurred in 2010 submissions to the Committee were provided in an open forum, with an option for the Committee to call on *in camera* submissions where appropriate. During the forum, the Committee and industry were able to ask questions of clarification. This year, no requests were received to provide submissions in camera.

2.2 Matters considered

Before reaching its determination the Committee considered:

- the documentation available on the fishery and the submissions it received;
- the management objectives set out in the draft management plan;
- the current state of the fishery;
- advice on the status of management of the fishery provided by the Department;
- advice on the economic status of the fishery as assessed by the Department and by industry representatives;
- the stock assessment for rock lobster provided by the Department;
- the spatial nature of the fishery, particularly in relation to the spawning biomass;
- comments and commentary provided at the TACC Open Forum;
- the issues raised by Mr Daryl Sykes on behalf of industry; and
- the compliance situation as assessed by the Department and by industry representatives.

This report covers the three key areas affecting the management of the fishery, including the TACC setting process. These are:

- management considerations;
- economic considerations; and
- the status of the stocks.

The Determination of the Committee for the annual TACC for rock lobster for the 20011/12 season is provided at the end of the report.

3. MANAGEMENT CONSIDERATIONS

3.1 Introduction

This section of the TACC report provides background information on the New South Wales Rock Lobster Industry, focusing on the commercial component of the fishery. The Department has been the key information source for data on the fishery, through its submission to the TAC Committee. In the context of TACC setting, the status and effectiveness of the current management regime and areas where improvements could be made are considered. Some overall conclusions are drawn.

3.2 Background to the Management of the Commercial Fishery

Rock lobsters have been commercially harvested in New South Wales since the 1800s. The fishery is based almost exclusively on the Eastern rock lobster (*Jasus*

verreauxi). Occasional landings of southern rock lobster and painted rock lobster occur, but these amount to less than 1% of the catch.

Sustainable management of the commercial fishery for Eastern rock lobster is more challenging than is the case with other Australian lobster fisheries because of the fact that the larger, mature lobsters that make up the breeding stock of the fishery are found in the north of the state. In southern waters, smaller immature lobsters that have yet to breed are harvested.

Since 1994, the setting of an annual Total Allowable Commercial Catch (TACC) and the allocation of transferable, individual fishery catch quota (shares) to licence holders have been the most important management measures for the fishery. These measures are augmented by input controls, including minimum and maximum size limits.

Lobster fishers in New South Wales traditionally operated in more than one commercial fishery. However it is now apparent that an increasing proportion of the total catch is being taken by a smaller group of operators who fish predominately for lobsters. Over the past ten years, the total number of shareholders in the fishery has contracted, leaving 38% less shareholders in the Fishery since its commencement in 2000 (174 down to 106 in 2010/11).

The transfer and sale of shares and quota are an important and integral part of the management of an output-controlled fishery, and are encouraged by the management arrangements that the Department has in place for the fishery. The proportion of shareholders that hold less than the minimum shareholding (55) has reduced by 81% (94 to 18). This suggests a general trend of share reallocation from small (<55) to large (>100) shareholdings. This is consistent with the management objectives for the fishery and is an encouraging sign for the future. Transfers in shareholdings seem to have stabilised over the last three years.

The NSW commercial fishery for rock lobster is very small by comparison to similar fisheries in other States. Total annual landings for all lobsters in Australia exceed 15,000 tonnes, with the NSW catch making up about 1% of the total. While other lobster fisheries are strongly dependent on export markets, the NSW fishery has an established market within the State and only small quantities are exported, although there is anecdotal information that an increasing number of NSW lobsters are being exported live to the Chinese market. Eastern rock lobsters are clearly sought after by consumers (particularly by the Chinese community) and attract and maintain relatively high prices and strong demand on local domestic markets. The strong current price (around \$60 per kilo at the time of writing) and relative lack of volatility suffered by mainly export fisheries are strengths for the fishery into the future.

3.3 The Commercial Fishery

The total commercial catch in the fishery is effectively constrained by the annual TACC. Concerns that have been expressed in the past about the capacity of the commercial sector to take all of the allocated TACC are now largely redundant, with annual landings above 96% (98.3% in 2008/09) of the TACC for the past five years. Industry representatives were confident that, as in recent years, nearly all of the TACC would be taken before the end of June 2011. The end of the fishing year coincides with the time when the highly productive deepwater gear is accessible, thereby lifting catch and catch rate. The Committee is very supportive of extending the season as a one-off event and changing the season dates to help ameliorate end of season issues and uncertainty.

The TAC Committee has drawn attention to industry concerns about the high transaction costs for quota leasing which inhibits the transfer of small amounts of

quota at the end of the fishing season. The inability to fish right up to the full TACC due to small 'residual' holdings of quota being shared among all quota holders is not unusual in quota fisheries. It appears that this matter is now being dealt with through the web-based FishOnline/Fisher Direct program, which will assist by having all quota for lease or sale in one place, providing an open and transparent market for leasing and transferring quota. This initiative is very much in line with previous Committee recommendations and should provide very useful for increasing industry returns since online transfers will not incur a transaction charge..

The 2004 decision to reduce the maximum size for lobsters from 200 to 180 mm was reviewed by LobMAC at the suggestion of the Department in 2007 and there continues to be strong support for retaining the current maximum size. This initiative has provided a greater level of protection for the adult spawning stock which is a priority management objective for the fishery, which in turn underpins decisions of the Committee.

The *Fisheries Management (Lobster Share Management Plan) Regulations of 2000* set out the arrangements that are in place for the day-to-day operation of the commercial fishery. The Fishery Management Strategy (FMS) for the NSW Lobster Fishery provides detailed information on management arrangements for the fishery. Objective 5.1 of the Plan is (in part) to promote the long-term economic viability of the fishery.

Since the introduction of the Share Management Plan in 2000, the number of shareholders in the fishery has contracted from 174 to 106. Advice from the Department shows that some 79 shareholders have actually reported fishing activity for lobsters so far during the current quota period. Significantly, in 2009/10- 50% of the report catch was landed by 15 fishing businesses, while 75% of the catch was landed by 33 fishing businesses. The figures for 2010/2011 are likely to be similar to the previous year.

The Department continues to support a reduction in the number of active operators as distinct from the number of shareholders in the fishery through some form of assisted restructuring. Apart from the fact that this will lead to greater economic efficiency, it should also lead to significant reductions in management and compliance costs for the fishery. For these reasons, and to prevent the activation of latent effort as the fishery recovers, the Committee supports the minimum share holding requirements in place for this fishery.

Currently, shareholders who held less than the minimum shareholding of 55 shares at the time of introduction of quota are eligible for an endorsement to fish. This exception (to the current 55 share minimum) was reviewed by LobMAC on the 30 September 2009, which unanimously supported its retention. It is noted that the proportion of shareholders that hold less than minimum shareholding has reduced by 81% (94 to 18).

Approximately one third of quota is leased on an annual basis and is invariably acquired by one of the specialised lobster fishers who are developing a viable basis for their operation. Annual lease prices for quota that range between \$15 and \$18 a kilo in the last five years are clearly not a deterrent to this.

Fishermen should have the option of obtaining additional quota by purchasing more shares rather than having to rely on leasing additional quota on an annual basis if this better suits their business operations.

The purpose of maximum share or quota holdings is unclear but they were probably developed to prevent monopoly holdings across the fishery. Whatever the intention was, it now appears that they have become redundant and in the view of the Committee may be counter-productive by acting as a barrier to more efficient

operations. In principle and subject to availability, operators in the fishery should be able to buy or lease the amount of quota that is relevant to their individual fishing circumstances and this may well exceed what is specified in the current maximum quota holdings.

The Committee is pleased to note that with LobMAC support, the maximum shareholding limit is scheduled to be increased from 350 shares to 40% of the total number of shares in the fishery. As the fishery evolves thus and becomes more profitable, this should lead to a reduced number of operators who are more efficient. These operators can be expected to be more compliant, resulting in reduced compliance costs.

It seems to the Committee that the process of restructuring the fishery is proceeding at a steady rate and with the introduction of web-based trading, this further efficiencies should be recognised.

3.4 Illegal Catch

A key objective of the Share Management Plan for the fishery is to minimise the number of offences that occur in the fishery. Commercial sector compliance rates for the 2009/10 period were determined by the Department to be at 82%, which is well above the trigger point of 70%. Preliminary data from the 2010/11 period indicates that overall compliance rates will remain relatively high and are currently running at 86%.

In the past, falsifying log-book information, non-tagging of lobsters and the use of holding pens are all mechanisms that have been used by unscrupulous operators to defeat the quota system and increase their returns from the fishery to the detriment of other operators. The Committee notes that the issue of carry-over of lobster between quota periods has also been a serious compliance issue. The success of initiatives to discourage and prevent these activities is of direct relevance to the TACC setting process.

The Department's Statewide Operations and Investigations Group (SOIG) continues to complement the fisheries compliance operations rolled out through the 18 coast districts. In common with other fisheries jurisdictions, the Department is placing additional effort into targeting areas suspected of high levels of non-compliance, as identified by intelligence. The Committee is very supportive of this approach, and notes the high level of cooperation between industry and compliance officers in the supply of intelligence.

These combined efforts have resulted in the position where it is estimated by Compliance managers that the illegal take and sale of lobsters is 'low and stable'. For commercial rock lobster fishers there are considerable incentives to operate within the law. These incentives include higher penalties, the risk of share forfeiture, and increasing shareholdings resulting in fishers having more to lose in the event of non-compliance. It is believed bellowed that most non-commercial legal activity is on a smaller scale and is done on an opportunistic basis.

Up until last year (i.e. the 2010 assessment) an unreported catch of 17% of the total commercial catch was assumed to allow for unreported retained catch from the lobster fishery and mortality from incidental fishing related. In 2010 after considering advice from industry and the Compliance Operations Branch the allowance for total unreported catch was reduced to 12% of the reported catch. This year recreational catch is assumed to be 10% of the total (reported and unreported) commercial catch and the unreported commercial catch is assumed to be 8.5% of the total commercial catch.

Significantly, the Committee notices that in the current reporting period the lobster industry withdrew funding for the dedicated rock lobsters position. Comments in the Compliance Report to the Committee suggest that this action may result in a 'missing link' in maintaining good compliance in the future, in that while good compliance rates have been achieved, it is necessary to maintain adequate assets to ensure that non-compliance is kept at acceptable levels in the future. The IVR process discussed below provides an opportunity in this regard.

The committee notes the reduction in the time required to submit daily catch sheets from 7 days to 48 hours and is aware that negotiations are continuing regarding pre-fishing, pre-landing and post-landing reporting. These efforts have apparently been held up due to the time required to make the necessary amendments to the *Fisheries Management Act 1994*.

The Committee recommends that the Department and the industry continue efforts to develop pre-fishing, pre-landing and post-landing IVR reporting and implement processes that will manage compliance costs and assist in reducing over-quota fishing.

3.5 The Recreational Catch

There are about one million people in New South Wales who partake in some form of recreational fishing and they pay some \$12,000,000 by way of licence fees. Collecting rock lobsters is popular with recreational fishers who, if are not exempt need a recreational fishing licence to use a single pot (in waters less than ten metres) or take their catch by hand (i.e. diving) without any assistance from scuba or hookah equipment. A daily bag and total possession limit of two applies, and recreational fishers are subject to the same minimum and maximum size restrictions as the commercial sector.

Estimating the number of people who target rock lobsters and what they catch is the subject of regular and ongoing discussion at the TACC setting forum. Anecdotal information suggests that the use of recreational pots is contracting in popularity, with recreational diving for lobsters becoming more popular. The Committee have noted comments made in the recent past by commercial fishers that recreational fishers appear to be enjoying improved rock lobster catches in NSW and that tight restrictions on commercial harvest may not result in the intended gains to the rock lobster stock due to increasing recreational fishing harvest. There is no quantitative evidence available which would support or refute either contention.

Goal 4 of the Fishery Management Strategy for the NSW Lobster Fishery is about sharing access to the resource by the various interest groups (predominately the commercial and recreational sectors). Obtaining information on the extent of the recreational catch is a challenge that faces all State agencies that manage rock lobster fisheries. The introduction of a specific licence or endorsement system as is used in some states, possibly supported by the prescribed tagging of recreationally caught lobsters, are options that are regularly canvassed at the TAC forums.

The Committee is pleased to note that some progress has been made in the estimation of the recreational catch. The dated nature of the last national recreational fishing survey has been acknowledged and the Department has commissioned a report to outline implementation strategies for a state-wide recreational fishing survey. This report has been completed and a number of recommendations made on survey design, partly based on the experience of Tasmania and South Australia. A project has subsequently been approved that seeks to develop and test cost effective methods for monitoring recreational fisheries at large regional and statewide scales. .

The Committee recommends ongoing development of survey and other method determine the extent of the recreational rock lobster catch in NSW, as a priority.

3.6 Indigenous Fishing for Rock Lobster

Amendments have been made to the Fisheries Management Act to formally recognise the spiritual, social and customary significance to Aboriginal persons of fisheries resources and to protect and promote Aboriginal cultural fishing.

These new arrangements include the creation of an Aboriginal Fisheries Advisory Council (AFAC) which will provide advice to the Minister on matters concerning aboriginal fishing interests, and improving/streamlining access for the purpose of cultural fishing. Other changes include formal recognition of the significance of fisheries resources to aboriginal persons, a definition of cultural fishing, exemption from a recreational fishing fee and provision under Section 37 of the Act for issuing permits for cultural events where fishing activities are not consistent with current regulation.

A new lobster tagging system has been developed for use with Section 37 permits for Aboriginal cultural and ceremonial fishing as a tool to more closely monitor catch from this sector.

Cultural permit issued in 2010 allowed for the take of just over 1,000 lobsters at a total of seven events. It is noted that reporting under special permits has been irregular and where harvest has been reported, it is generally lower than permitted.

Because the quantity of lobsters that can be taken under these provisions is relatively small, the Committee does not see that there is currently a need to make an allowance for this in the TACC setting process. If new management provisions result in a substantial increase in real or potential catch from the Aboriginal community then this will have to be factored into TACC setting arrangements.

3.7 Marine Parks

All five coastal NSW marine parks include sanctuary zones over reef area likely to provide habitat for rock lobsters. In four of these parks lobster shares were purchased in amounts estimated to be proportional to catch from grounds lost to the fishery (507 shares in total). In response the TACC and management charges were adjusted accordingly.

The existence of sanctuary zones raises two primary considerations for the rock lobster stock and fishery management. 1) the extent to which these areas reduce fishing mortality by an amount that allows juveniles to make an appreciable contribution to the adult spawning stock, and 2) the degree to which the spawning biomass protected from fishing mortality within sanctuary zones makes a significant contribution to recruitment.

Sanctuary zones make up less than 7% of state waters and cover a range of estuarine and marine habitats including those with mud, sand and rocky substrates. Well under half the area of sanctuary zone would include habitat suitable for rock lobsters and these areas would cover a range of depths from the intertidal to around 80 metres.

Evidence from a range of published studies indicates that there would be an increase in the number and size of lobsters in sanctuary zones; however these increases may decline over time due to the effects of intraspecific competition and foraging and migration into fished areas. It is expected that juvenile rock lobsters settling in sanctuary zones may benefit from protection for a period, but would then enter the

fishery as they reach sexual maturity, forage more widely and move into deeper waters.

The Committee considers that given the relatively small size of sanctuary zones in NSW, the small percentage of these zones in depths preferred by adult rock lobsters (generally 10 to 150m), and the migratory nature of rock lobsters it is unlikely that the presence of existing sanctuary zones has a significant influence for the stock assessment and TACC setting process. The Committee notes that the current Commonwealth process for developing marine reserves in the east marine bioregion is close to finalisation. The final result may increase the amount of sanctuary zone in mid shelf and slope waters and this, in turn, may influence future TAC setting deliberations.

3.8 Fishery Management Costs

Category 1 share management fisheries are subject to cost recovery of government services. Charges for management services provided by the Department are payable in proportion to the shareholding. Implementation of full cost recovery in the fishery was staged over three fishing periods from the 1998/1999 fishing period, as indicated in Table 1.

Table 1: Catch, structure and value of the Lobster share management, including management charges

Fishing period	TACC (tonne)	Reported catch (tonnes)	% of TACC caught	Management charge (inc. EIS charge)	Average price (\$/kg)	Est Value (\$m)
1998/99	125	110	88.0	\$38	\$34.76	3.8
1999/00	140	117	83.6	\$48	\$39.16	4.6
2000/01**	150	102	68.0	\$58	\$42.98	4.4
2001/02	150	102	68.0	\$58	\$46.33	4.7
2002/03	135	121.3	89.9	\$59.70	\$44.77	5.4
2003/04	135	107.9	79.9	\$61.70	\$38.83	4.2
2004/05	102	98.1	96.2	\$58.60	\$38.30	3.8
2005/06	102	100.5	98.5	\$63.09	\$41.30	4.1
2006/07	112	109.4	97.7	\$62.06	\$47.46	5.2
2007/08	124	121.6	98.1	\$57.91	\$45.81	5.6
2008/09	128	121.8	95.2	\$64.04	\$54.67	6.7
2009/10	128	122.1	95.4	\$64.70	\$55.49	6.8
20010/11#	131	83.8	63.9	\$52.64	\$59.52	TBD

*** Commencement of full cost recovery

Incomplete year's data

While fishers appear to be, on average, earning rents from the fishery, the contribution of management charges to total costs continues to be significant, even though it is contracting as a share of GVP from the fishery (currently 9.4%). The commercial sector did not express the degree of concern over level of charges that apply to the fishery as it has done in previous years. The Committee continues to support a transparent system of cost recovery where services received by industry against management and other charges are fully justified and delivered efficiently. In considering 'management', the totality of fees applying to the fishery should be

considered. These fees are a combination of management fees, a community charge and the environmental assessment charge. The cost recovery model that is applied to this fishery does not include all Departmental costs. For instance, the effort that fisheries officers attribute directly to patrols targeting the commercial lobster fishery are not levied against industry as part of the management charges.

Against this, management costs as reported by the Department, have continued to contract by such means as reductions in on-costs and the apportionment of some management costs to the recreational sector. There was a substantial reduction in management charges in 2010/11 (22%) (Table 1). This was largely due to the removal of dedicated compliance salaries and the carry over of funds from the previous period. The Department's efforts in obtaining significant reductions in industry costs are acknowledged.

While the desire by fishers to reduce the size of management charges is understandable, the likely reason for the current cost structure could be the relatively small size of the industry compared to those in other jurisdictions. A larger industry might enjoy lower costs per share due to economies of size. It is unlikely that similar economies of scale will occur in NSW even when full stock recovery has occurred.

There remain significant costs in running this fishery, particularly in the areas of research and compliance. It is important that both areas are properly resourced, given that the fishery remains in the recovery stage. It is difficult to see how further substantial reductions in government costs can be achieved, without prejudicing the performance of the fishery.

As the stock recovers, the fishery will be faced with options concerning the frequency (and cost) of stock assessment and level of monitoring. Elsewhere in this report it is recommended that maintaining the fisheries independent survey to better inform the rebuilding of the spawning stock. It would be appropriate to review costs and look at ways of developing an overall management package (including science and compliance) that has costs appropriate to the scale of the fishery. This review could be usefully done in conjunction with the setting of economic targets for the fishery, as previously discussed.

Decisions on targets and the TACC will need to be made on the basis of balancing i) a lower risk, more conservative TACC (with associated loss in gross revenue), and ii) lower assessment costs vs. maintaining a higher TACC (higher gross revenue) with higher assessment costs. The net benefit will depend on the level of costs necessary to provide an acceptable level of risk.

The Committee recommends that a review of the costs of management be conducted, especially with reference to consideration of balancing risk and cost.

3.9 Industry Consultation

Section 2.1 and Appendix 1 of this report detail the industry consultation processes that are in place for the fishery and lists the details of submissions that were made by the commercial sector to the Committee.

The Committee continues to be confident that the open forum process that has now been in place for several years is working effectively and appears to have the ongoing support of commercial fishers. The Committee finds the level of discussions at the open forum to be very positive and constructive. As raised elsewhere in this report, the Committee welcomes direct feedback from industry and LobMAC on its recommendations and report.

None of the attendees at the forum opted to hold discussions with the Committee in camera. This facility, along with the ability to keep submissions confidential, will continue to be offered, but wherever possible, industry is urged to make their views known to all stakeholders. Other than commercial-in-confidence catch and other data which would not be appropriate for the forum, resolution of the more general concerns involved generally benefited from wider discussion.

The Committee was encouraged by the ongoing strong representation at the Forum from LobMAC members including the Chairman, Mr Alan Dodds. We note the increasing effectiveness of LobMAC, and the fact that fewer and fewer items are being brought to the TAC Committee that would best be dealt with at LobMAC.

The Committee again requests that LobMAC considers the TAC determination and the associated rationale, and recommendations of the Committee and provides feedback to assist in its further deliberations.

The Committee recommends that a LobMAC meeting be held following the TAC determination to allow discussion of the TACC and the associated rationale, and recommendations made by the Committee.

Industry representatives have mentioned in the past that licence holders do not, as a matter of course, receive copies of the TAC Committee's determination and report. The Committee suggests that the Department could at least send these documents to LobMAC members. Such an action would be necessary in support of the above recommendation.

The fact that LobMAC members and the industry generally continue to support a precautionary approach to the TACC reflects the fact that they understand and appreciate that the fishery is still in a re-building phase.

3.10 EPBC Act Assessment of the NSW Rock Lobster Fishery

The NSW lobster fishery has now been assessed under the *Environment Protection and Biodiversity Act 1999* (EPBC) Act. This basically means that the Commonwealth Government is satisfied that the fishery is being managed in an ecologically sustainable way. As a consequence, approval has been given for the continued export of lobsters that are taken from the fishery under an exemption from species listed under Part 13 of the EPBC Act for the period up to 30 March 2012.

3.11 Fishery Management Strategy (FMS)

The Minister for Primary Industries approved the FMS for the fishery in February 2007. The plan lists visions and goals for the fishery and focuses on ensuring that fishing activities, including recreational fishing, are conducted in an environmentally sustainable way.

The Committee agrees with the Management Report that... 'long term targets for the fishery designed to maximise the economic yield from the resource are required', particularly as the fishery moves away from an emphasis on limit (biological) reference points towards an agreed target (economic) reference point for the rebuilding for the fishery.

The Committee recommends that the Department and industry work to develop a harvest strategy, including target reference points relating to maximising economic yield, to provide guidance on TACC decisions in relation to stock rebuilding.

The Department has indicated in its response to the Committee's reports in the past that it is examining the type of economic data that it considers needs to be collected from the fishery and has had some discussions on this with LobMAC. The lack of

economic data on the fishery was raised at the industry forum, and it is clear that improvements to the long-term management arrangements for the fishery are being inhibited by the lack of economic input.

The Committee continues to be of the view that management arrangements for this fishery could be enhanced by greater recognition of the spatial structure of the fishery.

3.12 Gear Conflict

The Committee did not receive submissions from industry members concerned about the perceived loss of habitat, including large areas of soft corals, due to trawling operations. The Committee notes that LobMAC supports the development of 'gentlemen's agreements' at port level between trap and trawl operators. In the past, licensed fishers have been concerned about the potentially damaging impact that other fishing methods such as trawling can have on fragile soft coral beds that are key lobster habitat. It is unclear if these "conflicts" involve Commonwealth licensed trawl operators as well State licensed vessels.

3.13 Conclusion

A steady recovery of the New South Wales rock lobster fishery has occurred. Catch per Unit Effort (CPUE) has more than doubled since 2000/02 and now exceeds the 1998-99 benchmark by nearly 50%. CPUE did, however, decline slightly (around 7%) between 2007/08 and 2008/09, only to increase slightly (around 4%) in 2009/10. The market price for shares has almost tripled in the past four years, with the price now appearing stabilise and demand is strong to both purchase and lease quota/shares.

Whilst there is a lack of up to date, precise information on the extent and impact of illegal activities, these do not appear to pose a threat to the fishery. The ongoing effect of the reduction in compliance services will need to be monitored carefully however, to ensure the current relatively low level of illegal fishing is maintained.

While the Committee is receptive to the submissions of industry, recovery in the breeding stock remains a priority. From the assessment, it is clear that the spawning stock was fished to a very low level and until rebuilding has occurred to the point where recruitment is not unduly impacted by the spawning stock level, a conservative management approach is considered to be the best option. The Committee notes that the rapid increase in 'raw' CPUE experienced by operators is indicative of an increase in abundance of lobster. Catch rates appear to have also been affected by changes in fishing patterns (more fishing effort in deeper water) and gear (larger pots).

Reduced Departmental costs and the ongoing commitment to research and monitoring for the fishery are tangible indications of the Department's commitment to returning this fishery to its former status. The Committee continues to be impressed by the high level of co-operation between the Department and the commercial sector for both the research and compliance programs. The engagement and work of LobMAC also merits mention.

The communication and interaction between the Department, industry and the TACC is excellent in this fishery, in direct contrast with the abalone fishery. The Committee acknowledges the way in which its recommendations are considered and feedback provided.

Recreational lobster fishing continues to be popular and the Committee looks forward to receiving better quality information on the status of this activity over the coming years.

To conclude, the TAC Committee would again like to emphasise that a change in the management approach to the fishery should be seriously considered. Such an approach should recognise:

- the need to consider targets for the fishery that incorporate economic, rather than solely biological considerations;
- the unique north/south characteristics of the fishery; and
- the need to continue to address the vulnerability of the spawning biomass,

4. ECONOMIC CONSIDERATIONS

4.1 Introduction

In this section of the report, the economic status of the NSW Rock Lobster industry is described, consistent with the requirement that the Committee have regard to economic and social issues the making its determination. In comparison to last year, the information made available to the Committee by the NSW Department Primary Industries (the Department) with which to prepare the economic section of the report for this year's determination was limited. As such, the information presented in this section of the report is less detailed than for the 2010 determination.

Economic considerations focus on gross returns to the industry rather than net returns due to the absence of information on fishing costs. Further, this analysis is undertaken for the rock lobster fishery only, rather than for the fishing business as a whole, and as such, does not consider returns from other types of fishing. A summary of quota and share market prices is presented as an indicator of both short and long run industry profitability. Analysis of other data affecting the economic performance of the fishery, such as export prices and catch per unit effort, is also presented.

The absence of timely and relevant data on fishing costs means that it is not possible to make a complete analysis of the economic performance of the NSW Rock Lobster industry. Focussing on gross returns alone means that changes in costs, and the impact of this on profitability, is not taken into account in determining economic performance. Further, as returns from other types of fishing, especially in the far north of the fishery, contributes to overall economic performance of a fishing business, only considering the returns from rock lobster fishing provides an incomplete picture of the impact of changes in gross returns from lobster fishing on the economic performance of fishing businesses.

Social considerations, such as the non-pecuniary lifestyle benefits fishers derive from the activity of fishing itself, influence the return from lobster fishing. Data on the lifestyle factors associated with fishing, the demographic profile of fishers and the profile of the regions within which fishers live and work were collected through a survey by Roy Morgan Research in 2001 (Roy Morgan, 2001a). However, more up to date information is required.

An understanding of the economic impacts of the fishery at the state and regional level would also be useful in terms of understanding the contribution of the lobster fishery to the economy more broadly. Work in this area was undertaken by Roy Morgan Research in 2001 for NSW Commercial fisheries, but it requires updating as economic conditions and the structure of the fishery have changed since then (Roy Morgan 2001b).

4.2 Volume and value of production

The volume of reported catch of rock lobster in 2009/10 was over 122 tonnes, a slight increase from 2008/09 where 121.8 tonnes was caught (Figure 2). This catch

accounts for around 95 per cent of the TACC. The reported ability of industry to catch virtually the full TACC over a number of consecutive years, reportedly with less effort, suggests that recovery of the stock continues, as is suggested elsewhere in this report.

The value of reported catch increased by 15 per cent between 2007/08 and 2008/09, from \$6.1 million to \$7.0 million in real terms, and has remained at the same level in 2009/10 (Figure 3).

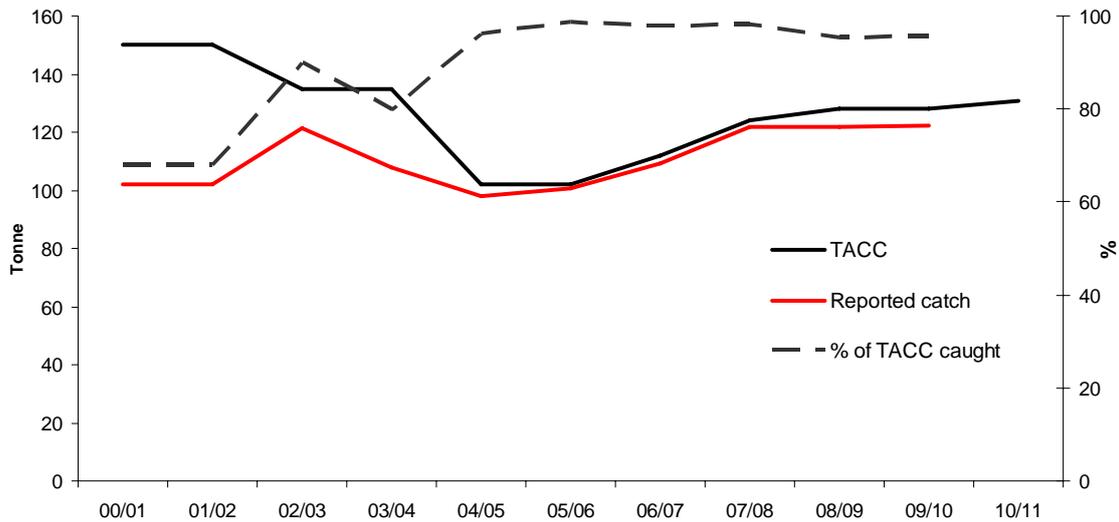


Figure 2: Catch, TACC and percent of TACC caught, 2000/01 to 2010/11

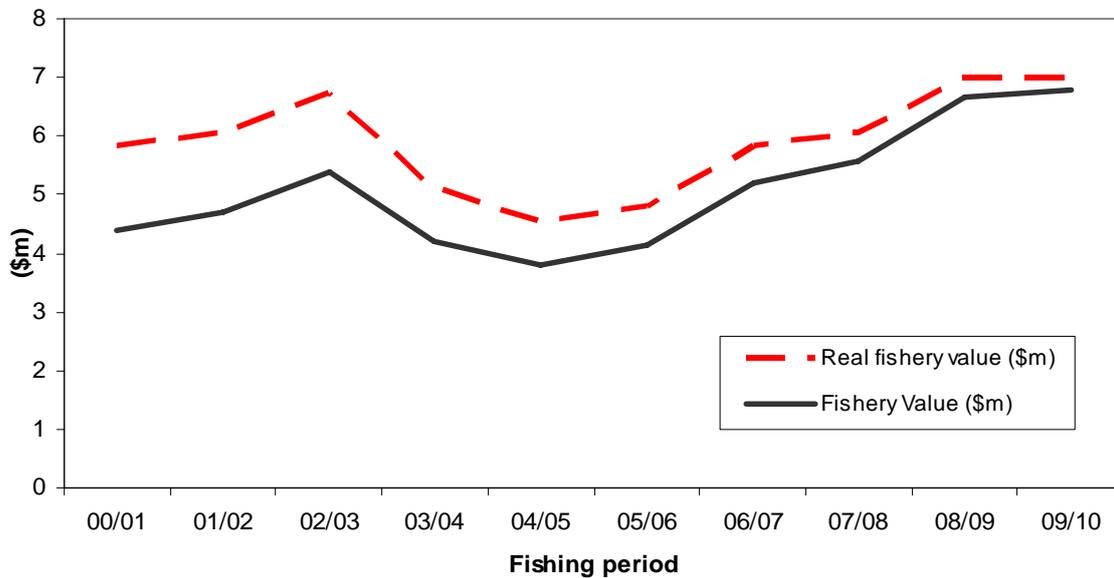


Figure 3: Value of production, 2000/01 to 2009/10

4.3 Prices

Beach prices increased by 16 per cent between 2007/08 and 2008/09 from \$49.8/kg (in real terms) to \$57.3/kg (Figure 4). Prices fell slightly in 2009/10 to \$57/kg. Prices have still to exceed those prevailing from 2000/01 to 2002/03. For the first eight months of 2009/10 the average beach price has been \$59.5/kg, suggesting that the final price for the year will be similar to the previous year (the current 'high' average price is influenced by Christmas and the Chinese New Year and is expected to fall over the remainder of the financial year).

Prices are based on daily average prices of lobster landed at the Sydney Fish Market. These prices provide only a guide as to price movements for lobster in NSW as a significant quantity of lobster (around 40 per cent) is sold through other registered fish receivers and restricted registered fish receivers in Sydney and along the NSW coast. Price information for lobster sold through these outlets is not publicly available; however anecdotal evidence suggests that prices all along the coast follow the Sydney Fish Market Price (NSW DPI, 2004).

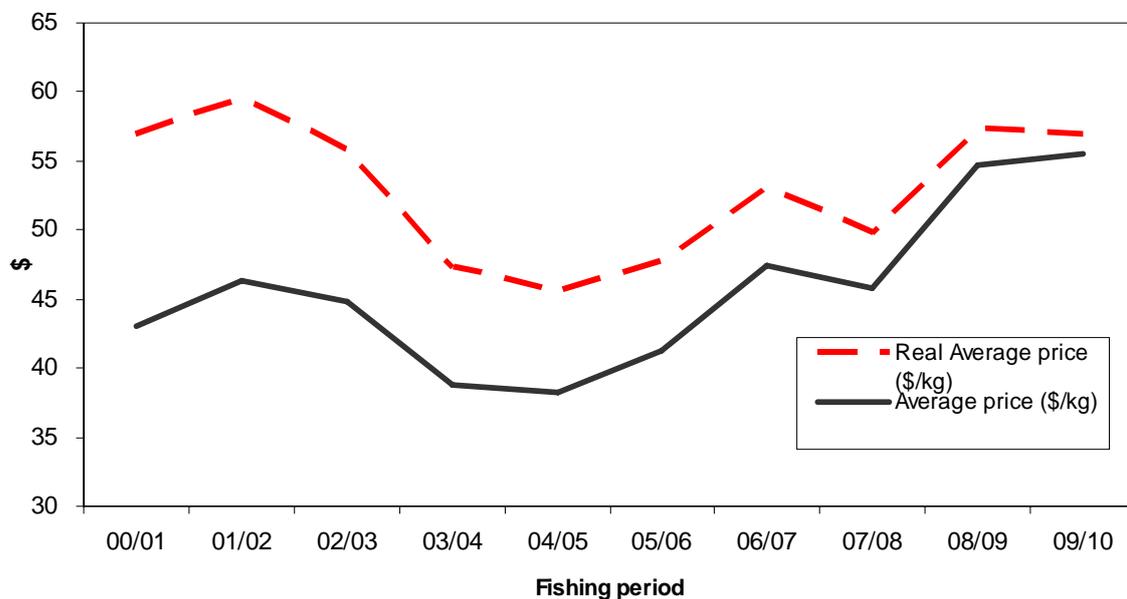


Figure 4: Beach prices in real and nominal terms, 2000/01 to 2009/10

4.4 Catch per unit effort

Catch per unit of effort has increased markedly over the period since 2001/02. Catch rates in 2007/08 and 2008/09 represent the greatest and third greatest rates of catch over the past 36 years. Catch per unit effort in 2008/09 was 8 per cent lower than in 2007/08. Catch per unit effort in 2009/10 was 4 per cent higher than in 2008/09. It is likely that CPUE for 2010/11 will be similar to that achieved in 2009/10. Higher catch rates reflect a number of factors including greater stock abundance, a reduction in the number of trap lifts by deep water fishers at times when stock is less abundant and an increase in the size of vessels and the size of traps used. In part, these changes indicate that lobster fishers are taking measures to improve their efficiency, and, hence, their return from lobster fishing.

4.5 Rock lobster markets

As indicated, NSW is a minor contributor to the total output of lobster in Australia, with the bulk of production coming from Western Australia, South Australia and

Tasmania. In recent years, total Australian rock lobster production has dropped considerably relative to the 2003/04 peak of 19,000 tonnes. In 2008/09 total Australian production of rock lobster was 11,700 tonnes; it has fallen more since then. The main driving factor behind the production decline has been a large reduction in catch in Western Australia in response to the introduction of Individual Transferable Quotas (ITQ's)². Production in the one of the other major producing states, South Australia, has also fallen as a result of the introduction of ITQ's. These lower levels of production are expected to remain for some time (ABARES 2011).

NSW product competes with Western Australian and South Australian product at the Sydney Fish Markets, however there is no identification of NSW product to set it apart from its competitors. Better branding of NSW product at the Sydney Fish Markets may help consumers wishing to buy local product to identify these lobsters.

NSW product attracts higher prices during the first quarter of the financial year, as other states are not producing lobster at this time. Industry also reports that there is a premium paid for larger sized lobsters at the Sydney Fish Markets. As will be discussed later, the Committee believes this is an issue that warrants further investigation.

Only a small proportion of rock lobster from NSW is exported. Industry reports that in 2008/09 it represented around 10 per cent of catch, and in 2009/10 it represented about 13 per cent of catch. To date in 2010/11 it represents around 3 per cent of catch.

The largest markets for Australian exports of rock lobster are Hong Kong and China, closely followed by Japan. Hong Kong and China have been the strongest growth markets for Australian fisheries products and for rock lobster and abalone in particular. The total value of Australian exports of fisheries products to these destinations has almost doubled over the past 10 years, with rock lobster accounting for well over half of the total value of fisheries product exported (ABARE, 2010b).

Prices for rock lobster on overseas markets have been high because of strong demand and reduced supply. However, late in 2010 prices fell due to action taken by Chinese authorities to ensure all Australian lobster imports into that country are subject to established tariffs. However, the overall effect on prices in the 2010/11 financial year is uncertain due to record high export prices in the first quarter of 2010/11 (ABARES, 2011).

Despite the fact that only a small proportion of NSW rock lobster is exported the Committee urges the Department and Industry to keep abreast of any further developments in the Chinese tariff situation.

Despite a currently strong Australian dollar against the US dollar and Japanese Yen, over the medium term ABARE (2010) forecast that the Australian dollar will depreciate. This, coupled with strong demand and continued high prices for rock lobster on international markets, is expected to result in an increase in prices received for rock lobster exports by Australian fishers. These higher prices are likely to be exacerbated by continued lower supply from Western Australia over the medium term (the majority of Western Australian rock lobster production is exported) (ABARE, 2010). The China tariff issue is yet to be fully resolved.

NSW lobster fishers who export a large proportion of production are likely to benefit from higher prices on international markets, subject to some degree to a satisfactory outcome on tariffs. Those fishers who currently don't export much or any of their

² Production of rock lobster in Western Australia in 2010/11 has been capped at 5,500 tonnes (down from a peak of 14,000 tonnes in 2003/04). This lower production is a result of measures introduced by the Western Australian Government to reduce total catch in response to concerns about stock abundance (ABARE, 2010).

production may also be able to take advantage of any higher prices on international markets by exporting a greater proportion of their catch. An understanding of the size preference/price relationship on Chinese and Hong Kong markets would be useful in the context of understanding the opportunity for exported product from NSW to satisfy increased demand on these markets.

4.6 Management charges

Management charges in the lobster fishery are lower in 2010/11 than in 2009/10; \$45.15 per share as compared to \$57.21 per share (Figure 5). This decrease is largely attributable to no compliance salaries being recovered in 2010/11. Industry is of the opinion that they should not pay for a dedicated compliance officer if the abalone industry is not funding one. They also believe that the lack of a dedicated compliance officer will not compromise compliance. However, compliance officers believe that this has compromised their ability to do their job well. As will be demonstrated later in this section of the report, illegal fishing results in lost economic value to the fishery. Investing more heavily in compliance activities will assist in returning this lost value to the fishery.

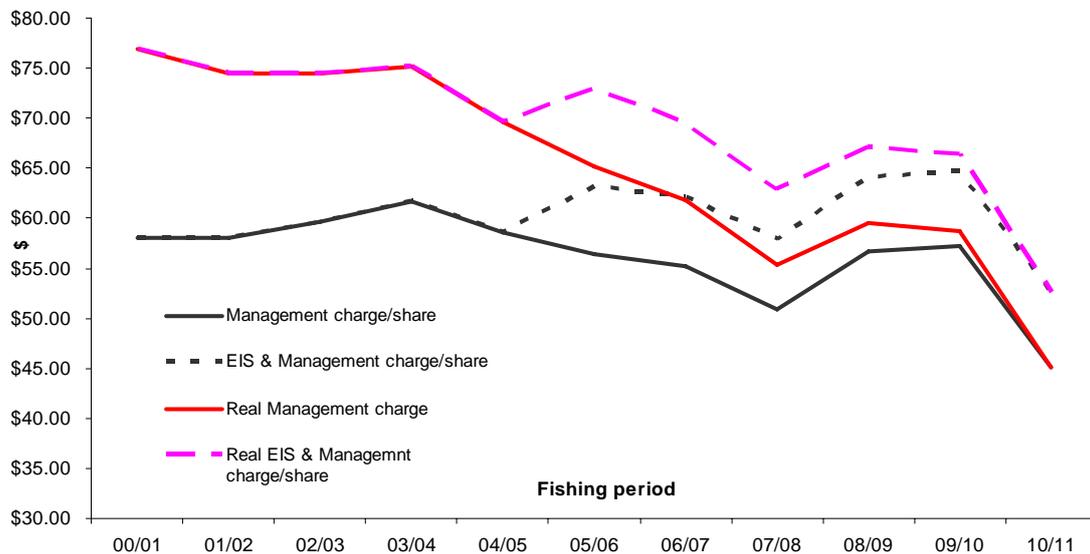


Figure 5: Management charge/share, nominal and CPI adjusted value (real price) for each fishing period from 2000/01 to 2010/11.

4.7 Income from fishing

Traditionally, nearly all lobster fishers have held endorsements in several different fisheries, though the extent to which they have gained income from each of them has varied. According to reports from the lobster industry, there is a trend towards specialisation in the lobster fishery, particularly among larger shareholders.

The most common endorsement to be held in conjunction with a lobster endorsement is an Ocean Trap and Line endorsement for the purpose of fish trapping.

Given the trend towards specialisation in the lobster fishery, it is likely that changes in returns from lobster fishing will have a significant impact on the economic performance of the fishing business as a whole. In the instance where lobster fishing

makes up a small proportion of total fishing business income, a substantial change in income from lobster fishing has the potential to affect overall business income.

4.8 Fisher net income

Without an understanding of the changes in fishing costs over the last few years, it is difficult to ascertain the extent to which increases in gross revenue from lobster fishing have resulted in higher net incomes. It is almost certain that net incomes have risen over the past few years, mainly as a result of substantial improvements in catch per unit effort and lower fuel costs. Results from ABARE's most recent fishing survey indicates that fuel prices, one of the main input costs, fell in 2009/10 and 2008/09 when compared to 2007/08 (ABARE, 2010). However, trends in share prices, which are an indicator of both short and long run industry profitability, suggest that economic returns may have flattened out since 2007/08.

As discussed at length in last year's report, better information on the costs of fishing would allow for the net return from lobster fishing to be calculated more accurately. It would also avoid speculation on the basis of a subset of input costs and movements in share and quota prices, which, as discussed above, can provide different conclusions about industry profitability. Information on the costs of fishing would also place industry in a much more informed position regarding setting of the TACC in order to maximise profits, and setting of the community contribution charge such that it does not extract less, or more, economic rent³ than is present in the fishery.

Data on the costs of fishing would also place the Department in a much more informed position regarding the review of the management plan for the lobster fishery that is being undertaken in 2011. It would also be helpful in assisting the Department to develop a more meaningful set of economic performance indicators for the fishery.

In last year's report the Committee recommended that in order to collect cost data a survey should be conducted, similar to that which was run by EconSearch (2008). An example of the type of data that would need to be collected for a typical fishing business holding a lobster endorsement is again provided as an attachment to this report.

It is unclear if a survey of the type mentioned above should be an ongoing role of government, or if it should be funded by industry. This issue needs to be resolved as a matter of urgency. Other States and the Commonwealth generally use government funding for economic surveys of the fishing sector⁴.

The Committee recommends that a survey of the costs of fishing be undertaken to inform both: (i) the process through which the TACC is set in order to maximise profits from lobster fishing; and (ii) the process for setting the community contribution charge. This survey should commence as soon as possible and should be conducted every three years.

The Committee also recommends that the issue of funding for the cost survey, (government, industry or some combination), should be resolved as a matter of urgency.

³ Economic rent is profit in excess of normal returns on capital. Estimates of normal returns on capital in commercial fisheries vary, but can be as high as 10 per cent.

⁴ See for example Econsearch (2008), Economic Indicators for the SA Southern Zone Rock Lobster Fishery 2006/07, Report prepared for Primary Industry and Resources South Australia.

4.9 Shares

There are currently 106 shareholders in the lobster fishery who are eligible for a lobster fishing endorsement. Of these, 79 have reported fishing in the current fishing period. The number of shareholders in the fishery has fallen over time from 174 shareholders at the commencement of the Share Management Plan in 2000. Between 2006/07 and 2008/09 the number of shareholders in the fishery, and the total number of shares, declined significantly from 142 shareholders and 10,051 shares to 106 shareholders and 9,727 shares. The reduction is mainly due to shares surrendered through the Batemans Bay and Port Stephens-Great Lakes Marine Parks buy out programs.

The number of shares per fisher ranges between 14 and 350 shares. The average number of shares per shareholder is 89. This has increased from 54 in 1996/97. There has been an increase in the number of shareholders who hold large shareholdings and a redistribution from small to large shareholders. Evidence of this can be seen in Figure 6 where there has been a reduction between 2000/01 and 2009/10 of 81 per cent in the proportion of shareholders who hold less than 55 shares.

Changes in the structure of the fishery have resulted in fewer fishers landing a higher proportion of the total reported catch. Fifty per cent of the 2009/10 reported catch was landed by 15 fishing businesses, while 75 per cent of catch was landed by 33 fishing businesses. The transferability of quota is helping to facilitate this change; however there are high transaction costs associated with transferring small parcels of quota that is resulting in some quota remaining unfished at the end of the season. The implementation of an on-line quota transfer system will assist in lowering the transaction costs associated with quota transfers.

It should be noted that under current management arrangements for the lobster fishery, individual fishers are prevented from owning more than 350 shares in the fishery. This limits the further restructuring and economies of scale that can be achieved in the fishery. It is proposed to amend the maximum shareholding to 40 per cent of the total number of shares in the fishery as consistent with other NSW share managed fisheries. The Committee supports this amendment.

As would be expected, with a heavier reliance on the lobster component of the fishing business in the south of the fishery due to relatively higher stock abundance, the average number of shares held by fishers in the south is higher than in the north of the fishery.

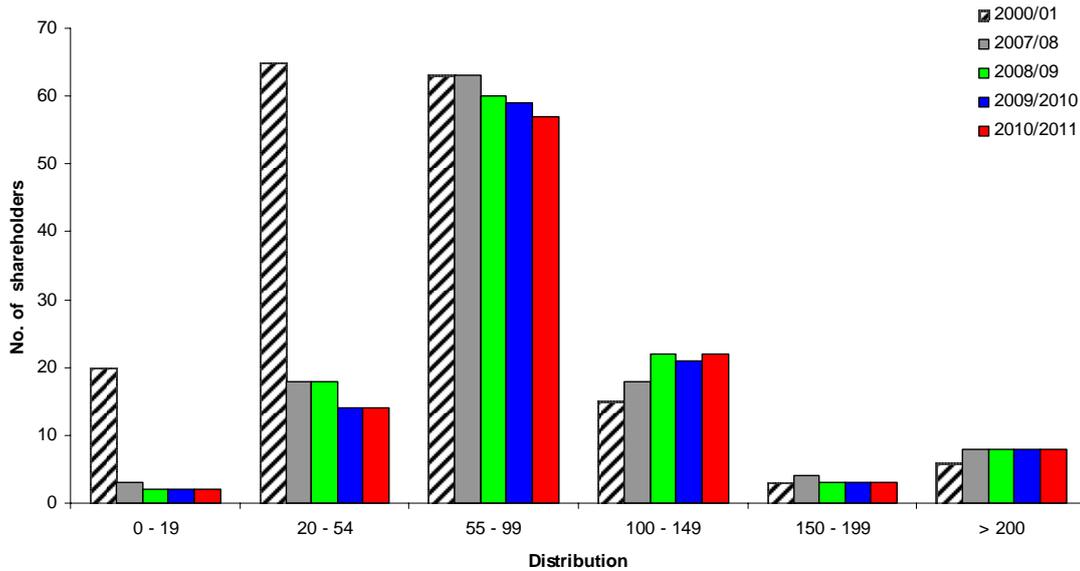


Figure 6: Distribution of shareholders by size of holding

The Department has indicated, and the Committee agrees, that structural change in the industry is desirable in order to ensure the continued viability of lobster fishing operations, to promote stewardship and to allow for greater efficiency in both fishing effort and the administration of the fishery. The ultimate aim of restructuring is to improve the long-term sustainability of the fishery. The Committee remains of the opinion that market forces, particularly through the market for shares, rather than regulatory intervention, offer the best way to achieve the benefits of restructuring. In this regard, care must be taken that regulation of the share market does not impede desirable structural change.

4.10 Share trading, transfers and values

In accordance with the *Fisheries Management (Lobster Share Management Plan) Regulation 2000*, shares can be traded in packages of 10. The ability to trade shares allows existing shareholders to structure their operations based on performance during the year and, to some extent, the availability of lobsters. Industry reports that the reason for the minimum size of package is as a result of the need to reduce the incentive for illegal activity that tends to occur at smaller shareholdings.

In 2009/10, five share transactions took place at an average real price of \$2005. This is lower than in 2008/09 when the average real share price was \$2094.3. In 2010/11 five share transactions have taken place at an average price of \$2005.4 (Figure 6). Given the structure of the industry (e.g. family and other links between shareholders), the extent to which average share prices reflect 'true' market values is not clear.

Share transfer prices provide an indication of the economic health of the lobster fishery and of expectations of industry participants on the future outlook of the fishery. In this sense, price rises between 2004/05 and 2008/09 can be interpreted as reflecting improved economic conditions and rising expectations concerning the future economic and biological health of the industry; during this time share prices almost tripled in real terms. However, reasonably flat share prices since this time indicate that the future outlook for the fishery is 'status quo'. That said, share prices are not necessarily perfect indicators of industry profitability. ABARE (2000) note

that share prices can also reflect factors that are not necessarily associated with a healthy fishery; for example, over-capacity and over-fishing. Further, the role of expectations concerning the future economic well-being of the industry indicate that, as was suggested in the Committee's 2008 report, there might be a tendency for the share price to 'overshoot' and to be influenced by external factors such as interest rate fluctuations and poor overseas markets. However, in the absence of other data, such as would be provided by obtaining information on the costs of fishing, and fishers net returns, share prices remain the only robust, verifiable indicator of the economic health of the fishery.

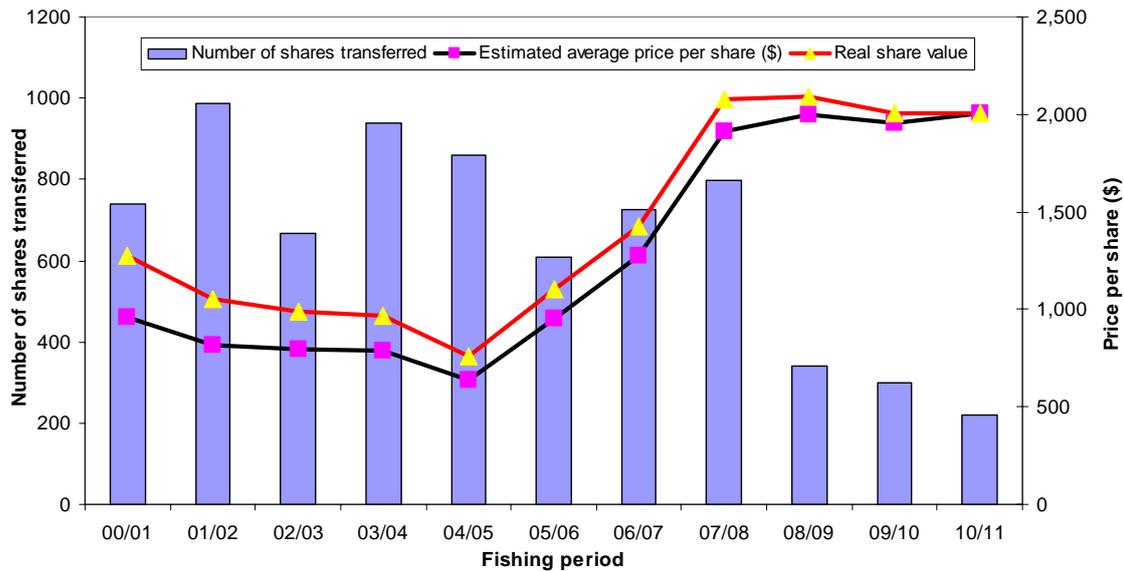


Figure 7: Number of shares transferred, estimated share price and CPI adjusted (real share price) by fishing period from 1999/00 to present.

Note: 2010/2011 data is incomplete.

Positive share prices can reasonably be taken as indicating that incomes exceed, and are expected to continue to exceed, what is needed to retain resources in the industry. Increasing share prices suggest an improved outlook for the industry, at least in the minds of those involved in the share market.

4.11 Quota

Quota is allocated to shareholders in proportion to their shareholding. The Department reports that there is no longer a minimum quota transfer volume. Quota can only be transferred within the current fishing period and cannot be transferred between fishing periods. Under the Share Management Plan, shareholders may not acquire, by any such transfer, more than twice the amount of the shareholder's initial quota for the fishing period. According to the Department, this clause was included in the Plan to encourage shareholders to buy shares, in order to promote restructuring of the industry, rather than allowing small shareholders to buy large quantities of quota without a longer-term commitment to the fishery. The benefits of this policy must be set against the cost of the loss of flexibility it imposes on the industry. The Committee urges industry to maintain a watching brief on the extent to which this limit becomes binding, thereby restricting the ability of fishers to take advantage of favourable catching conditions/stock abundance by leasing in quota.

4.12 Quota transfers and values

Quota trading in 2009/10 was slightly lower than that in the previous year, with a total of 80 quota transactions that comprised a total of 39.7 tonne of quota (31 per cent of the TACC), which is above the long-term average for the fishery (Table 1). Fishers indicate that the ability to lease quota helps improve efficiency by providing them with greater flexibility in handling fluctuations in catches. The restrictions on the amount of quota that can be transferred could, however, impede full attainment of these efficiency gains. Further, industry reports that the high fee paid on quota transfers is inhibiting trade in small parcels of quota. The Committee notes that the on-line system, which is scheduled to start in 2012, will assist in reducing transactions costs associated with quota transfer and should, therefore, increase the efficiency of these transfers.

Table 2: Total quota transferred, number of quota transferors and transferees, amount of TACC transferred and average price paid for quota

Fishing period	Total quota transferred (t)	Quota transferors	Quota transferees	TACC transferred (%)	Average Price (\$/kg)
2000/01	17.0	31	29	11%	
2001/02	30.6	40	24	20%	
2002/03	44.0	77	60	28%	
2003/04	29.3	56	41	22%	\$7.17
2004/05	34.5	68	47	33.8%	\$10.89
2005/06	30.1	64	45	29.5%	\$13.15
2006/07	35.6	59	23	31.8%	\$15.64
2007/08	42.3	60	32	34.2%	\$17.9
2008/09	42.2	48	36	33%	\$15.9
2009/10	39.7	52	43	31%	\$14.7
2010/11	28.9	32	31	22%	\$17.5

In last year's report the Committee suggested that the ongoing trend in the number of quota transferors exceeding the number of transferees suggested progressive reallocation of quota from smaller to larger operators. However, the information presented in Table 3 suggests that, for example, in 2009/10 there was a reasonable level of quota transfers, both in and out of businesses of all sizes.

Table 3: Quota transfers presented by the number of shares held by transferring businesses.

Number of Shares in Business	Number of Businesses	Total Shares	Total quota allocated (tonnes)	Quota Transferred Out	Quota Transferred In
<55	11	472	6	64%	23%
55-59	27	1882	25	38%	24%
60-89	14	1214	16	42%	16%
90-109	11	1183	15	40%	46%

110+	16	4976	65	15%	30%
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There is a relationship between the percentage of TACC caught and the percentage of quota transferred, albeit an imperfect one. It appears that license holders are more willing to lease (invest) in additional quota where there is a strong expectation that the additional quota will be caught under a constraining TAC. For example, in 2000/01 when the percentage of TACC caught was around 68 per cent, the percentage of quota transferred was only 11 per cent. Conversely, since 2004/05 when the percentage of TACC caught has been close to 100 per cent, the proportion has been around 30 per cent.

About 26 per cent of quota transferees provide data on the price of quota transfers. The available information, while possibly not representative, indicates that quota prices in 2009/10 were 9.5 per cent below those in 2008/09, in real terms, continuing the downward trend in quota prices (Figure 8). To date in 2010/11 quota prices have risen by 16 per cent to around the same level as in 2006/07, in real terms. Industry was unable to provide an explanation for the higher quota prices. However, it is possibly an indication of an improvement in the short run profitability of the industry, despite this being at odds with current share prices.

In last year's report the committee reported that the price per kilogram of transferred quota appears to be strongly related to the levels of reported catch (and perhaps more significantly, catch rate and beach price) for a given fishing period, much more so than are share prices. When catches and catch rates are high, the price of quota has tended to increase as the demand for quota rises. However, the strong upward trend in quota prices for 2010/11 to date appears to be at odds with this theory. Both catch rates and beach prices are at similar levels to 2009/10, but quota prices have increased. The Committee is of the opinion that this sudden upward trend in quota prices warrants further investigation.

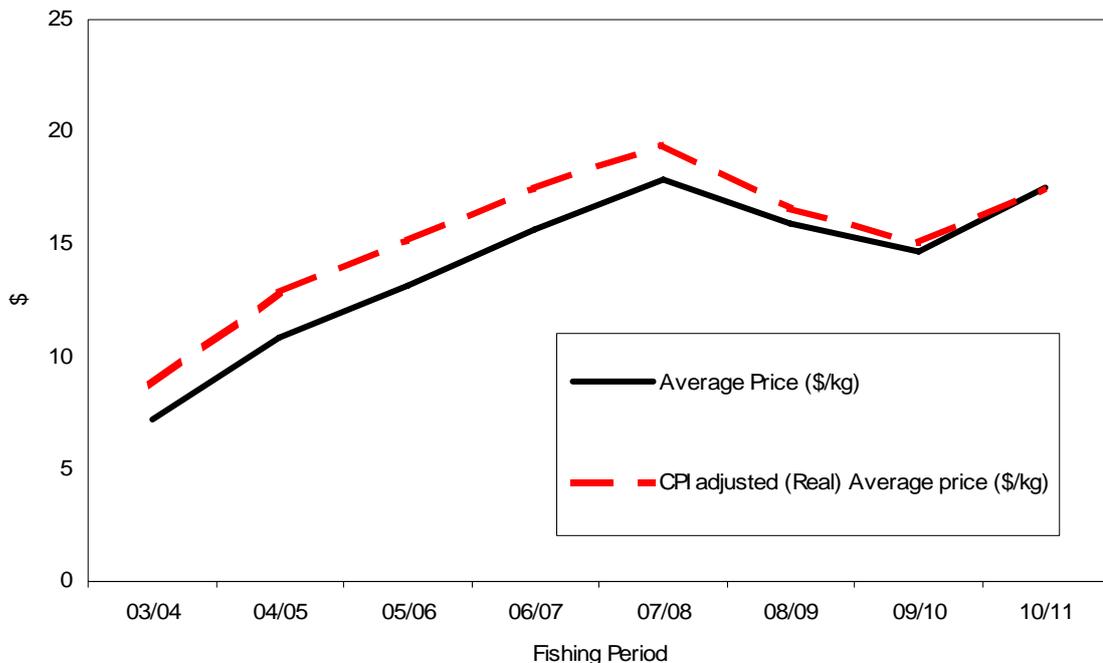


Figure 8: Average quota price per kilogram

Unfortunately, information on the price at which quota is transferred is not reported for all transfers. Given the advantage of having access to it, this information should be reported and made generally available. The Department and LobMAC have investigated the feasibility of requiring fishers to provide price information and it was found that this is not possible. As such, information on quota trading will continue to be provided on a voluntary basis. The Committee notes that the move towards an on-line system for transferring quota will facilitate better reporting of quota transfer prices; however, in the short term it is recommended that fishers continue to be encouraged to provide price information.

The Committee recommends that the Department and LobMAC encourage fishers to make further efforts to report price information for quota transfers.

In the absence of robust data on the prices at which quotas are traded, the quantity of quota transferred in a year arguably provides some indication of the economic health of the fishery.

4.13 Impact of illegal and unreported removals

Earlier in this report the Committee noted that industry had decided not to fund a dedicated compliance officer. However, as discussed in previous reports by the Committee, illegal activity results in lost economic value to the fishery that could be reduced through the use of a dedicated compliance officer. Illegal take is estimated at 17 per cent of total take in the fishery, which in 2009/10 represents around 21 tonnes. At prices prevailing in 2009/10 illegal take in the fishery is estimated to be worth \$1.2 million.

Given the substantial lost economic value to the fishery as a result of illegal activity, the Committee recommends that industry consider investing more heavily in compliance activities.

The Committee is aware that discrepancies exist between the different estimates of illegal take within the Department. This makes it difficult for the Committee to place a figure on the illegal take. Given that illegal take is factored into TACC decisions, a more accurate estimate of illegal should be pursued. In previous reports the Committee suggested that the return on investment to determine the real extent of illegal catch (which may or may not result in an increase in TACC) would be high. The Committee believes that this matter should be re-examined, possibly through the establishment of a joint industry/DPI working group.

The Committee recommends that Industry consider investing more heavily in compliance activities to assist in reducing illegal catch in the fishery.

The Committee recommends that the estimate of illegal and unreported removals from the rock lobster fishery be refined and that a joint industry/Departmental working group be established to assist with this task.

4.14 Recreational and indigenous catch

As with illegal catch, there is the possibility of lost economic value from the fishery due to high levels of recreational and indigenous catch. Current estimates of recreational catch are unreliable; hence it is not known how much of the TAC should be apportioned to recreational fishers. The Committee notes that Recreational Trust funded fisher surveys are currently being conducted by the Department that should improve the information on recreational catch. The Committee also notes that

compliance officers have been collecting recreational data to assist in estimating the size of the recreational take. However, the Department acknowledges that more robust time-series estimates of recreational and indigenous catch are needed. At the TAC Committee meeting held last year it was suggested by the Department that as a starting point in collecting better data on the level of recreational take, the conditions on the recreational fishing licence could be amended to require that people identify whether they are taking lobster. The Committee would like to be updated on how this is progressing.

Departmental compliance officers report that indigenous permits can be problematic and that they need to get a better handle on how many lobster are being taken through indigenous permits.

As the lobster stock continues to increase in abundance, there is a risk that a great number of animals could be taken by the recreational and indigenous sectors and through illegal take, reducing the additional catch that could be taken by commercial fishers. At the 2011 TAC Committee meeting it was suggested that the Department should direct resources towards developing a resource-sharing model as is currently occurring in the WA lobster fishery. The Committee supports this.

The Committee recommends that the Department continue to invest resources in obtaining more robust time-series estimates of recreational and indigenous catch.

The Committee recommends that the Department direct funding towards developing a resource-sharing model for the lobster fishery.

4.13 Economic data

As indicated earlier in this report, authoritative comment on the economic performance of the lobster fishery is restricted to interpretation of changes in share and quota prices. However, as discussed earlier, a survey of costs of fishing would allow for the net return from fishing to be calculated and would place industry in a much more informed position regarding setting of the TACC in order to maximise profits, and setting of the community contribution charge.

The level of the TACC at which profits (net returns) from lobster fishing are maximised for the fishery as a whole is known as the maximum economic yield (MEY). At MEY the TACC is lower than it would be if it was set with reference to stock abundance only, i.e. at maximum sustainable yield (MSY). The TACC is currently set with reference to MSY.

Data on net returns from lobster fishing may be incorporated into the current biological model used to estimate the status of the stock, and set the biological MSY. Using the model, net returns could be estimated for different rates of stock recovery.

As the stock is recovered an appropriate target reference point should be considered and selected. The target reference point should include socioeconomic as well as biological considerations. This issue was discussed in the section of this report addressing state of the stocks.

With TACC set with reference to MEY, there will be economic rent in the fishery and a political decision can be made on whether to collect all or part of this rent, or to leave it with fishers. As part of the economic rent in the fishery is attributable to the

skill of the fisher, there is a strong argument for not appropriating all of the economic rent in the fishery⁵. Costs of collection are also a consideration.

Economic rent may be returned to society through a resource rent charge (in NSW commercial fisheries this is known as the community contribution charge). An estimate of economic rent in the fishery should be made to avoid too much rent, or too little rent, being appropriated from the fishery through a community contribution charge. If the community contribution charge is set too high many fishers will leave the industry.

The current community contribution charge of \$115 per shareholder is set to change in February 2012. The community contribution charge will then be based on estimates of net returns and economic rent in the fishery from a study by Hassall and Associates in 1999. Undoubtedly, net returns in the fishery have changed since this study was undertaken. As a result, it is imperative that more up to date information on net returns from fishing is collected prior to commencement of the new community contribution charge in 2012.

As discussed earlier in this report, information on the net returns of lobster fishers would also place the Department in a much more informed position regarding the review of the management plan for the lobster fishery that is being undertaken in 2011.

Earlier in this report the possibility of a price premium being paid for larger sized lobsters on the Sydney Fish Markets was raised as an issue that warranted further investigation. The Committee recommends that the Department and Industry undertake a study to look at the relationship between length and economic yield in order to understand the impact of the size composition of lobster in the catch on the economic return of fishers. The Fisheries Research and Development Corporation could possibly fund this study.

The Committee recommends that the Department and Industry undertake a study to investigate the relationship between length and economic yield in the lobster fishery.

As mentioned earlier in this report, the economic information made available to the Committee by the Department with which to prepare the economic section of the report for this year's determination was more limited than in previous years. Notwithstanding the economic information provided to the Committee in the past, the economic data available to the Committee on which to base its recommendation is still lacking. As has been said in previous determinations, in the absence of economic data, the Committee remains concerned about the possible consequences of its determination for the profitability of the industry and the financial well being of those in it. The Department should also be concerned about the implications of having poor economic data on which to assess the impacts of management decisions it makes on the financial well being of industry. As has been emphasised in previous reports of this Committee, the Department should place more importance on the gathering of economic data to underpin management decisions in the fishery and setting of the TACC.

The Committee recommends that the Department place more importance on the gathering of economic data in order to better understand the impacts of management decisions it makes on the financial well being of industry.

5 Rents attributable to the skill of fishers are termed 'intra-marginal' rents. Intra-marginal rents should be left with fishers. Intra-marginal rents can be as high as 36 per cent of total economic rent in the fishery (ABARE, 1990)

The TAC Committee is still waiting for formal communication from the Department on how it can meet the needs of the Committee with respect to economic data. The Department undertook to see what could be done to better meet the needs of the Committee with respect to economic data following a meeting between the TAC Committee and Departmental economists in April 2008. Informal communication indicates that the Department is not in the position to expand its support of the Committee in its endeavours to meet its statutory obligation regarding the economic circumstances of the industry.

It appears that the current reluctance to undertake or contribute to economic surveys (or assessments) of the industry is based on the concerns over precedent (as it relates with other fisheries and industries) and funding. While the Committee is aware that gathering data from industry can be a costly and labour intensive exercise, it believes that there are cost-effective avenues available for obtaining the necessary data.

As discussed above, a survey of the costs of lobster fishing should commence as soon as possible and should be conducted every three years (with annual updates) on an ongoing basis to ensure that fishers are able to maximise economic returns from fishing over time

4.14 Conclusion

While the lack of information on the net return from lobster fishing means that only tentative conclusions about the economic status of the industry are possible, the evidence available to the Committee suggests that the lobster industry in NSW is economically viable. Share prices almost tripled between 2004/05 and 2008/09 indicating that economic viability has been improving and the future outlook for the fishery is positive. The increase in viability is a result of a number of factors including an increase in stock abundance and catch per unit effort, the latter believed to have been influenced partly by an improvement in the efficiency and practices of lobster fishers.

Since 2008/09 share prices have flattened out possibly reflecting expectations of 'status quo' in the future economic outlook for the fishery. However, over the same period quota prices have increased suggesting improvements in short run profitability.

There has been significant restructuring in the lobster fishery with fewer fishers landing a higher proportion of the catch. This structural change is desirable in order to allow for the most efficient fishers to land the majority of the catch, and to ensure the continued viability of lobster fishing businesses. However, the current management arrangements for the lobster fishery, which prevent shareholders from owning more than 350 shares in the fishery, limits the extent to which further restructuring can occur. The Committee notes, and supports, the amendment of the maximum shareholding to allow shareholders to hold up to 40 per cent of the total number of shares in the fishery.

The Committee notes that there are limits on the maximum amount of quota that can be transferred by lobster fishers and urges the lobster industry to maintain a watching brief on the extent to which this limit becomes binding, thereby impeding the ability of quota to be transferred from less to more efficient fishers.

The Committee has made a number of recommendations in this report that are aimed at providing improvements in the economic viability of the lobster fishery in the future. These include: that lobster fishers make further efforts to report price information for quota transfers; that the Department and Industry undertake a study to investigate the relationship between length and economic yield in the lobster

fishery; that data is collected on the costs of fishing; and, connected to this, that a decision is taken on whether the collection of this data is funded by industry, government or some combination of the two.

The Committee notes that a review of the management plan for the lobster fishery is being undertaken in 2011 and the community contribution charge currently payable in the lobster fishery is due to be reviewed in early 2012. To assist the Department in undertaking these tasks it is imperative that better economic data be obtained on the structure and costs of fishing. The Committee has recommended that the Department place more importance on the gathering of economic data in order to better understand the impacts of the management decisions it makes on the financial well being of industry.

The Committee has recommended that industry consider investing more heavily in compliance activities to assist in reducing illegal catch in the fishery. The Committee has also recommended that the estimate of illegal and unreported removals from the rock lobster fishery be refined and that a joint industry/Departmental working group be established to assist with this task.

The Committee notes that efforts are being made to collect better recreational and indigenous catch data. The Department acknowledges that further efforts need to be made to obtain more robust time-series estimates of recreational and indigenous catch. The Committee recommends that this be done as soon as possible such that it can be used to develop a resource-sharing model for the lobster fishery.

Similar recommendations concerning better information on unreported commercial and recreational catch was made in the section of this report addressing state of the stocks.

The Committee's conservative determination for 2010/11 is based on strengthening the prospect of restoration of the spawning stock and maintenance of an appropriately sized available biomass. By leaving stock in the water, this TAC strategy also offers improved prospects for economic recovery of the fishery, again over the longer term. Collection of data on the costs of fishing, and the establishment of economic targets and management strategies to achieve them, will also be necessary to optimise the economic viability of the fishery into the future.

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Since 2008/09 share prices have fallen slightly possibly reflecting a slightly more dampened future outlook for the fishery. However, over the same period quota prices have increased suggesting improvements in short run profitability.

There has been significant restructuring in the lobster fishery with fewer fishers landing a higher proportion of the catch. This structural change is desirable in order to allow for the most efficient fishers to land the majority of the catch, and to ensure the continued viability of lobster fishing businesses. However, the current management arrangements for the lobster fishery, which prevent shareholders from owning more than 350 shares in the fishery, limits the extent to which further

restructuring can occur. The Committee notes, and supports, the amendment of the maximum shareholding to allow shareholders to hold up to 40 per cent of the total number of shares in the fishery.

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5. STATE OF THE STOCKS

5.1 Introduction

In making its determination of a TACC for rock lobster, the Committee is required to consider the current and predicted status of the stock. This section considers the major features of a range of data from fishery operations and fishery independent

surveys and monitoring, and estimates of illegal unreported and recreational catches. The analysis undertaken by DPI using a length-based model is reviewed. Finally, a number of conclusions concerning spawning stock rebuilding are drawn and a TACC for 2011/12 is recommended.

5.2 Data

5.2.1 Data from fishery operations

As in previous years two different time-series of data are available from the fishery.

The first series of data covers the period 1884-1958. The data from the fishery in this period is limited to catch and fishing effort and the data sources are poorly understood, fragmentary, variable and often coarse. These data provide a valuable historical perspective for the fishery and assessment, but they are open to many interpretations. Old reports and records have been examined previously in attempts to clarify these interpretations. From these examinations it was concluded that the catches were probably reasonably accurate but that fishing effort was unreliable.

The second series of data covers the period 1969 to the present. The data for this period are better understood, are more detailed and cover a wider range of issues than just catch and fishing effort. In particular, voluntary logbooks since 1994 record the size of lobsters and the breeding condition of females, and a standardised observer program since 1998 has independently measured the size composition of lobsters caught.

Historically, commercial catch rates have not been formally standardised for changes in details such as the gear, area, depth or time of fishing operations; reported catch rates are calculated as the total catch divided by the total effort in the area/time of interest. This year and last year catch rates are reported both in the 'raw' form and with a simple standardisation to account for the gross effects of recent shifts in fishing effort from shallow (less than 30m) to deeper pot sets. The deeper sets use larger pots and longer soak-times, and have greater catch per pot-lift, than shallow sets. The standardised catch rates are considered to be a more realistic reflection of lobster abundance than the unstandardised catch rates.

The total catches are shown in Figure 8. The total catch, effort and catch rates since 1969/70 are shown in Figure 9. The detailed catch, effort and catch rate by area and depth since 1997/8 are shown in Figure 10. These figures provide data from the most recent complete catching year (2009/10) and a preliminary estimate of the catch rate in the current incomplete catching year (2010/11). Although data from 2010/11 is incomplete it comprises a reasonable fraction of the available TACC. The remaining fishing period includes the season when high catch rates are traditionally obtained from depths greater than 30m on the mid-north coast (see Fig 10) and so the annual catch and aggregate catch rate for 2010/11 are expected to be higher than the incomplete figures indicate.

The overall fishery catch rate (Fig 9) shows a strongly increasing trend during the 7 years 2000/01 to 2007/08, followed by stabilisation and a relatively constant catch rate during the past 3 years 2007/08 to 2009/10. The exploitable biomass was expected to decrease following the recent increases in TAC, but while the catch rate has been slightly lower in the last 2 years this appears more consistent with a general stabilisation than a decrease. The reasonably stable catch rate in the last few years is widespread across depths (Fig 10). However, persistent decreases have been seen in the shallow area of the mid-north coast (lat 31-32°), consistent with the relatively weak puerulus settlement 3-5 years ago there, and the catch rate in the deep areas of the central and mid-north coasts (lat 33-32) have reduced substantially in the past 1-2 years. The incomplete data from 2010/11 indicate

similar catch rates to recent years in most areas, but some extremely high catch rates have been recorded in the 10-30m depth areas in the far-north coast and the southern coast. The increase in the far-north is particularly encouraging as it implies an expansion of the breeding stock into this area.

This overall trend and interpretation of the catch rates is consistent across the standardised and the raw catch rate data. However the standardised catch rates account for the effects of increased use of deep-set traps in recent years are increasingly lower than the unstandardised catch rates. The standardised catch rates indicate a stable or very slowly increasing abundance of exploitable sized lobsters since 2005/06 when the recent series of TAC increases began.

Overall the catch and catch rate data support interpretations that the stock is broadly stable and slowly increasing, with inshore catch rates of small lobsters fluctuating in response to patterns of recent puerulus settlement and deeper catch rates of maturing lobsters showing continued recruitment into the spawning stock.

The size composition of the catch from logbooks and augmented by observer data on the mid-north and far-north coast are shown in Figure 11. This is the area the area occupied by the mature lobsters. This size composition was updated in 2010/11 as part of monitoring every second year. Historically a substantial decrease in the catch rate of all sized lobsters occurred across both the far-north and mid-north coasts between 200/01 and 2003/04. This led to reductions in the TAC and a decrease in the maximum legal size from 200mm to 180mm in 2004/05. Catch rates of all size classes remained low in the 2 years following these management interventions, but started to show rebuilding in 2007/08 and 2008/09. Rebuilding of the spawning stock on the north coast has increased substantially since then and by 2010/11 the catch rates of all sizes are at the highest since monitoring started in 1998/99. This includes significant accumulation of lobsters larger than the maximum legal size limit, which provides a component of the spawning stock that is protected from harvest. These patterns and interpretations are consistent with the results from surveys that measure the catch rates of mature female lobsters from standardised, fishery independent trap sets in the mid and far-north coasts. These surveys indicate that the number of mature females in the population has increased from the low point in about 2003/04. The increase was very slow until 2007/8, but has been rapid in the last few years and in 2010/11 catch rate of mature females was the highest since monitoring started in 1998/99.

There are several particularly significant features and interpretations from these data.

1. The aggregate catch rate in Fig 9 shows a general decline with increasing effort between about 1977 and 1993, followed by a sharp reduction in effort and increase in catch rate just before and during the introduction of Individual Transferable Quotas in 1994/5. To some extent the increase in catch rate may be due to reduction in gear competition, and this has been incorporated previously in the assessment models. But the experience with other ITQ fisheries is that, as intended, fisheries can rapidly increase in efficiency and change targeting after ITQs are introduced. The available information is consistent with this having happened in about 1994/5 in this fishery, and analysis to reflect these operational changes in the fishery have been included in the fishery stock assessments since 2004.
2. There was a sharp reduction in all the indicators of spawning stock abundance between 1999/00 and 2000/01 (Figure 9). The commercial catch rate in the mid-depth and deep areas of the northern part of the fishery, the location of the spawning stock (i.e. 10-30m depth from 28-32 °S and greater than 10m depth from 28-30 °S; see Figure 10) decreased by about 50%. At the same time there was a sharp reduction in the abundance of all sizes of

lobsters on the northern coast - in the 120-160mm size range (i.e. immature), in the 160mm+ size range (i.e. mature) and in the 200mm+ size range (i.e. larger than the maximum legal size that should have been protected from the fishery). These low catch rates in the area of the spawning stock persisted for 4-5 years.

3. Following decreased TACs and a decreased maximum legal size in 2004/5 the spawning stock has shown very good evidence of rebuilding – slow at first but more rapid since 2008/09 and by 2010/11 most spawning stock indicators are better than seen previously since monitoring began.
4. Throughout this period catch rates in the more southern areas, which take immature lobsters, have fluctuated but been broadly maintained at depths less than 30m and have significantly increased at depths greater than 30m.

As discussed previously, the cause of this abrupt decline in catch rate and collapse of the spawning stock that started in about 1999/00 is unclear. The decline affected all mature animals - even those above the maximum legal size limit. It also coincided with a period of very low abundance of smaller lobsters in the north, a shift to catching more large animals in deeper water to meet the quota, and a period of warm sea-water temperatures that reduced the availability of lobsters (either by causing migration out of the fishing area or reducing the likelihood of lobsters entering traps). The declines could be explained by: i) significant change in the availability of lobsters (e.g. changed oceanographic conditions that resulted in the lobsters moving to areas where the fishery and surveys did not operate); ii) by a significant change in the catchability of lobsters (e.g. changed behaviour that reduces the chance of lobsters entering or remaining in a trap); iii) by widespread and unusually high natural mortality on the spawning stock, or iv) by excessive fishing on the spawning stock. The first two explanations invoke naturally fluctuating environmental conditions and they become increasingly tenuous as the phenomenon persists across multiple years, especially in the far-north. The last two invoke a period of high either natural or fishing mortality that have similar short term management implications (i.e. the need for spawning stock rebuilding).

The interpretation currently considered most plausible is that in the northern zones a period of low abundance of predominantly juvenile lobsters in depths less than 10m, due to previous weak puerulus settlement, resulted in a transfer of fishing effort during 2000 and 2001 to deeper water where the larger lobsters occur. This in turn greatly altered the selectivity pattern of the northern fishery, and resulted in excessive catches from the spawning stock. Important implications of this are that a relatively small shift in the operation of the fishery in the northern areas gave a large change in fishery selectivity, and that a relatively small increase in catch from the spawning stock caused a significant reduction in the spawning stock - implying that at the time the absolute size of the spawning stock was quite low. These interpretations resulted in a reduction in the maximum legal size from 2004/05 (from 200mm to 180mm) and reduction of the overall TAC so as to protect and rebuild the spawning stock. These interpretations also result in increased credibility for stock assessments that imply a low absolute size of the spawning biomass in about 2000, and the need to ensure that the spawning biomass reference points provide sufficient absolute biomass to be robust to changes in targeting and selectivity in the northern part of the fishery.

The subsequent response of the stock to the reduced TAC and maximum size limit is consistent with the interpretation of excessive fishing on the spawning stock having been responsible for the abrupt reduction of mature lobsters in 2000 and 2001. The mature stock has slowly rebuilt under these management interventions, with rebuilding first occurring in the pre-mature lobsters in the deep-water parts of the

fishery in the south, then feeding into the mature and premature lobsters in the deep water parts of the mid-north coast and latterly into the far-north coast.

5.2.2 Fishery reference points

While target and limit reference points have not been formally agreed for the fishery the TACC has operated with implicit target and limit reference points for several years. These are:

Target reference point. A depletion to 0.5 of the unfished biomass has been used for reporting. Performance against this reference point has been reported for both total biomass and spawning biomass. Because the stock has been well below 0.5 of the unfished biomass since the Share Management arrangements were introduced this reference point has not been highly relevant operationally. But as the stock is recovered an appropriate target reference point should be considered and selected. The target reference point should include socioeconomic as well as biological considerations.

Limit reference point. The 2007 Fishery Management Strategy (SMP) identifies stock depletion to 0.25 of the unfished biomass as a level of depletion that is of concern in relation to biological productivity and that would trigger a review of management. The Committee treats this as a limit reference point, below which urgent corrective action is required. In the past the Committee has used depletion to 0.3 of the unfished level as the limit reference point. These two different limit reference points are consistent and equivalent when applied with different requirements for the probability that the reference point is achieved. In the past the limit reference point used by the TACC was 0.3 depletion combined with a 50% probability that the actual population was above the 0.3 depletion level (i.e. that the median of the estimated depletion is 0.3 or larger). The standard error of estimated depletion in recent assessments is about 0.05, and so a median estimate of 0.3 depletion implies (approximately) and that there is a 95% probability that the true population is above 0.2 depletion and that there is an 84% probability that the true population is above 0.25 depletion. Put slightly differently, the Committee uses a limit reference point that is depletion to 0.25 of the unfished level with a 84% probability that the true population is above this level of depletion. This is approximately equivalent to the median estimate of the depletion being above 0.3, and in some analysis it is simpler to report using the median in relation to a 0.3 depletion rather than a 84% probability level in relation to a 0.25 depletion.

The reasons for use of 0.25 depletion (with 84% probability) or equivalently 0.3 depletion (with 50% probability) as the limit reference point in this fishery are:

- It is probably above the point where recruitment over-fishing and abrupt recruitment failure might be expected, although there remains uncertainty about the exact location of this threshold. There is good evidence from the directly measured puerulus settlement and indices of spawning biomass that the average recruitment was systematically reduced as the spawning biomass has been reduced. From preliminary analysis of these data the observed puerulus settlement when the spawning stock was depleted to 10% was on average about half of the settlement seen when the spawning stock was depleted to 30%. And the observed settlement at 20% depletion of the spawning stock about 2/3 of the settlement seen when the spawning stock was depleted to 30%. It is clear from this that depletion of the spawning stock to 10% and 20% of the unfished level results in significantly reduced recruitment compared to recruitment at a depletion of the spawning stock to 30%. This provides strong justification for avoiding depletion to 20% or more with very high probability, which is achieved for the limit reference point as

defined above. However the available data do not yet allow comparisons with recruitment from spawning stocks that are larger than 30% depletion, and hence whether even at that level there is recruitment impairment. Also there are insufficient observations to allow statistically valid comparisons of recruitment at 25% depletion with recruitment at 30% depletion.

- This species of lobster has some unusual features in its life history, including a very spatially concentrated spawning stock, a complex migration process by immature animals through the fishery back the spawning grounds, and some indications of spatial structure. Uncertainty about the effects of these features on stock and recruitment dynamics at low abundance mitigates for a conservative limit reference point with respect to the spawning stock.
- A specific issue arising from the highly spatially concentrated nature of the spawning stock is its vulnerability to changes in the targeting and operation of the fishery in the vicinity of the spawning stock. An unexpected increase in the proportion of the TACC taken from the spawning stock led to significant reduction of the spawning stock in the early 2000s. There is a need to ensure that the spawning stock has sufficient absolute abundance to absorb catches from such operational changes in the fishery without significant depletion. This gives a need to consider the absolute estimates of the spawning biomass, as well as the relative depletion, in the context of the size of the catches that could be taken. Maintaining the stock at or above a median depletion of 0.3, rather than a lower median value such as 0.2 or 0.25, greatly increases the probability that the absolute spawning biomass has a sufficiently large buffer against such operational changes in the fishery.
- The recent experience of significant reduction in recruitment to lobster populations in other Australian fisheries jurisdictions, despite the spawning stocks of these populations being above levels at which reduction in recruitment was expected, illustrates that there are unknown ecological processes and risks in managing lobster populations. In particular it is speculated that climate change may be causing patterns and levels of productivity that are different from those seen in the lobster fisheries historically and that form the basis of current expectations about the risk of reduced recruitment. These additional risks mitigate for a higher spawning biomass and general population size that historically used so as to increase the 'safety margin' against increased variability or reduced levels of population productivity and recruitment.
- The above points relate to the target species, but Objective 2 of the Lobster Share Management Plan considers the impacts of the fishery on the broader ecosystem. Scientific knowledge of these impacts in NSW is limited. However experience elsewhere has indicated that lobsters are important species in predator-prey relationships and can have significant effects on habitat and ecosystem structure. In some cases the predation of large lobsters on urchins indirectly affects reef habitats (e.g. seaweed cover vs urchin barrens) and associated species. Such considerations and the present state of knowledge mitigate for a larger rather than smaller limit reference point for biomass, especially in relation to large animals in the population.

Performance against the limit reference point has been reported for both total biomass and spawning biomass, with most importance and priority being given to the spawning biomass. In recent years the estimates of spawning biomass have included a substantial probability that the spawning biomass is below the limit reference point, and so this limit has been relevant to the setting of the TACC.

5.2.3 Fishery independent surveys and monitoring

The present stock assessment is strongly reliant on fishery dependent information such as commercial catch rate. This is essential and valuable information. The information covers a wide range of areas and times, and this coverage is chosen by fishers who have a great deal of experience about the behaviour of lobsters and strong incentives to fish where the lobsters are. However the ability of fishers to selectively target high-density aggregations of lobsters, and the economic incentives and constraints that influence where and when fishing is conducted, also results in the fishery dependent information being potentially biased. As a result, reliable fishery assessments also incorporate fishery independent information.

In this fishery independent measures of spawning stock are particularly important because a maximum legal size is enforced that is intended to reduce fishing on a significant part of the spawning stock. This management measure correctly aims to protect the older mature animals from fishing, because they contribute strongly to egg production. But it also has the consequence that commercial catches are unlikely to fully reflect the spawning stock, and hence the need for fishery independent surveys.

Recognising this need two fishery independent monitoring programs have been established, one focused on measuring the spawning stock and the other on measuring settlement of post-larval lobster (puerulus) that grow to and recruit to the fishery about 2-3 years later. Both of these monitoring programs are relatively recent, with spawning stock surveys using standardised pot sets in the northern areas starting in 1998/99 and post-larval surveys starting in 1995/96. However both are already providing critical information for interpreting trends in juvenile and spawning stock abundance in the fishery. Furthermore, the combination of spawning stock and puerulus monitoring is now beginning to have sufficient observations and contrast to allow direct examination of the relationship between spawning stock and recruitment. This allows, for the first time, direct interpretation of the appropriate biological limit and target reference points without the need for biological assumptions and complex models. The value and reliability of these interpretations for future management will increase greatly during the next few years as the recovery of the stock is monitored.

The results from monitoring the settlement of puerulus show that 10 –100 times more lobsters settle in the southern part of NSW (ie about Sydney and south) than in the northern part. In the northern areas a relationship has been recognised for several years between puerulus settlement and the availability of young lobsters to the fishery 2-3 years later, and this has been successfully used to predict the catch rate of the inshore fishery in the north.

The puerulus settlement and spawning stock survey data now have sufficient contrast to allow preliminary analysis of the relationship between spawning stock and subsequent puerulus settlement. This analysis strongly indicates that the puerulus settlement overall, and especially in the southern part of the fishery, was reduced during the periods of reduced spawning stock. The average observed puerulus settlement when the spawning biomass was about 10% of the unfished level, which occurred in the mid-1990s when the Share Management arrangements were introduced and again in the mid-2000s, was about half of the settlement observed when the spawning biomass was about 30% of the unfished level. The average observed puerulus settlement when the spawning biomass was about 20% of the unfished level was about two thirds of the settlement observed when the spawning biomass was about 30% of the unfished level. The average settlement since 2008/09, following increased spawning stock, has been relatively large and constant. While these analyses are preliminary they very strongly indicate that the population

was subject to serious recruitment overfishing in the mid-1990s and again during part of 2000s. The increase in the spawning stock during the late 2000s, and continuing to date, has resulted in an increase in the average number of puerulus settlement.

It is not yet clear whether the strength and consistency of settlement will continue to increase as the spawning stock increases further, or whether the current settlement is a natural 'plateau' or limit to settlement.

In the far northern areas the puerulus settlement has been about average for the last four years, except 2009/10 which was well above average. This is in contrast to the preceding 3 years which had low puerulus settlement. Consequently an increase in lobster abundance in the inshore areas was anticipated in 2010/11, which has been confirmed in the commercial catch rates there, and relatively high inshore catch rates are expected to persist for the next three years.

In the mid-northern areas the puerulus settlement has been above average for the last 5 years. Consequently catch rates in the inshore areas are anticipated to remain high for the next 3 years.

In the southern areas the puerulus settlement has mostly been higher than average for the last 5 years. A correlation between settlement and subsequent catches is not apparent in the data from the southern part of the fishery, probably because more year-classes are integrated in the southern catches. But the high settlement is expected to result in improved overall prospects for stock rebuilding.

The results from the spawning stock surveys in the northern regions using standard pot sets confirm the interpretations made using the commercial and observer data. That is (i) the spawning stock reduced substantially starting in about 2000, (ii) the spawning stock remained low from 2001/2 through to about 2006/7, then began to increase (iii) the spawning stock substantially increased from 2007/8 through to 2010/11, and (iv) that the spawning stock on the far-north coast increased later and initially at a slower rate than that on the mid-north coast, but by 2010/11 this difference was overcome and the catch rate of spawners in both areas was very similar. This monitoring of the spawning stock was changed from annual to biennial starting in 2008/9. In the current stock situation, and considering the range of information sources being used to monitor and predict the population, this has not caused a significant difficulty to assessment of the stock.

5.2.4 Illegal, unreported and recreational catches

There is considerable uncertainty about the level of recreational unreported catch.

In previous years the assessments and population projections assume a 25.8t recreational catch. The 25.8t recreational catch is based on estimates provided by previous studies and surveys. This estimate requires updating.

Up until last year (i.e. the 2010 assessment) an unreported catch of 17% of the total commercial catch was assumed to allow for unreported retained catch from the lobster fishery, unreported lobster catch in the trawl and trap fisheries targeting finfish, mortality due to ghost fishing by lost fishing gear, and predation or other mortality of commercially caught lobsters during fishing operations. In 2010 consistent input from the Compliance Operations Branch and the fishing operators concluded that this figure was too high. Expert judgement was that the unreported retained catch was probably about 10%. An additional allowance of 2% for incidental mortality was considered to be reasonable, giving a total unreported catch of 12% of the reported catch. That is:

$$0.12 = \text{unreported catch} / \text{total catch}$$

TAC Committee

$$= \text{unreported catch} / (\text{reported catch} + \text{unreported catch})$$

and so

$$0.14 = \text{unreported catch} / \text{reported catch}$$

This approach to categorising the various reported and unreported catches can be summarised as in the following table:

Fishing activity	Reported	Unreported
Commercial rock lobster share holders	Reported catch of RL shareholders	x
Commercial other fishers	zero	y
Subtotal: commercial catch	Reported catch of RL shareholders	$x + y = 12\%$ of Reported catch of RL shareholders
Recreational	zero	25.8t
Indigenous	Reported catch of indigenous fishers (e.g. through permit system for cultural fishing).	zero
Total	Reported catch of RL shareholders + Reported catch of indigenous fishers	$25.8t + 12\%$ of Reported catch of RL shareholders

The Total Allowable Commercial Catch (TACC) is calculated from the desired Total Allowable Catch (TAC) from:

$TAC = \text{commercial reported catch} + \text{commercial unreported catch} + \text{recreational catch}$

$TAC = TACC + 0.14 TACC + \text{recreational catch}$

and so

$$TACC = (TAC - \text{recreational catch}) / 1.14$$

$$\text{or } TACC = (TAC - \text{recreational catch}) * 0.88$$

The base case scenario assumes 25.8 t recreational and the unreported commercial catch as 17% of the total commercial catch right through to 2010-11!

But following further consideration of likely unreported catches through the recent history of the fishery an additional scenario was developed that was thought to be at least equally plausible.

This alternative history of unreported catches was:

- The recreational catch is a fixed 10% of the total commercial catch (reported plus unreported), rather than the fixed absolute amount of 25.8t.
- The unreported commercial catch is a linearly decreasing percentage of the total commercial catch, starting at 17% in 1993/4 and decreasing to 9% in 2009/10.
- So for example applying this alternative history to the 122.1t reported catch in 2009/10 gives an estimated unreported commercial catch of 12.1t, a total commercial catch of 134.2t and a recreational catch of 13.4t. In comparison the historical assumptions applied to the same reported catch in 2009/10 would give an estimated unreported catch of 25t, a total commercial catch of 147.1t and a recreational catch of 25.8t.

The alternative assumptions imply that a much lower catch than previously assumed has been taken from the population in recent years, which would aid any recovery but also tend to result in over-estimation of the populations productivity. Different assumptions about the unreported and recreational catch can significantly change

the interpretation and it is highly desirable to estimate them reliably. When dealing with a population that is seriously depleted and in need of recovery, as has been the case with this fishery in recent years, it is appropriate to use high estimates of the unreported catch because that is precautionary. However as the population begins to recover to above the limit reference point it would be appropriate to relax this precautionary approach.

5.3 Analysis

5.3.1 Stock assessment

The status of the lobster population was assessed using a length-based model. This model explicitly represents the length and associated age structure in the population, as well as the sexual difference in some key parameters such as growth and hence availability to the fishery. It allows calculation of the size of the mature stock, it can represent the effects of strong or weak year-classes as they pass through the population, and it can incorporate changes in size selectivity in the fishery.

This model was fitted to the catch data throughout the history of the fishery, to the catch rate data since 1969 when detailed logbooks were introduced, and to the size composition of 160-200mm lobsters in the years 1999/2000, 2000/01 and 2001/02. The limited size range was used because this size range is expected to be less subject to changing fishery practices and the limited period was used because the size composition of the catch in those years were collected by observers. The model also incorporates a great deal of other information that is available. For example it includes detailed biological information (e.g. growth rate, maturity schedule, percentage berried females, natural mortality rate, relationship between mature stock and recruitment) and fishery information (e.g. selectivity of the fishing gear, discarding of lobsters near the legal size limits, and the mortality of discarded lobsters).

Sensitivity tests were conducted in relation to the statistical weight given to the catch rate and length composition data, the level of natural mortality, and the steepness (at low spawning stock) of the relationship between the spawning stock and recruitment. As in last year's analysis two sensitivity tests were used to examine the likely effects of operational changes in the fishery on the commercial catch rate. These sensitivity tests are (i) a historical pattern of vulnerability that reflects the effects that new gear types and expansion into new areas had on the accessibility of different sized lobsters to the fishery, and (ii) a simple standardisation of the commercial catch rate that accounts for gross changes in gear types. The 'base case' in this year's assessment used the raw catch rate data, as in previous years and the standardised catch rate was compared as a sensitivity treatment. A new feature in this year's analysis was a sensitivity test using a revised, and lower, assumed unreported and recreational catches since 1993/4.

As in previous years the effect of different statistical weighting of the size composition data and catch rate data was examined. The base case interpretation this year again uses 0.25% weighting on catch rate and 99.75% weighting on the size distributions. In addition the more conservative weighting – 0.1% on catch rate and 99.9% on size composition – was included because this interpretation includes the implication of small spawning biomass in 2000.

The model fit to the catch rate and length frequency data is reasonable, but there is tension in trying to fit both simultaneously. None of the model fits matched the rapidly increasing catch rate in the last 3-4 years of complete data (i.e. 2005/6 to 2008/9), although the standardised catch rate data are more consistent with the model than the raw catch rate data. The model interpretations are of a relatively stable stock

abundance through those four years, rather than of a stock abundance that is rapidly increasing in proportion to the raw catch rate.

5.3.2 Present stock levels

The key population and depletion estimates, for the two different statistical weighting of the catch rate and size composition data and for the model allowing estimation of natural mortality, are:

	Median	5% limit	95% limit
Unexploited. total biomass (K)			
<u>weighting</u>			
Base case			
99.75 on length: 0.25 on catch rate	6,117	5,840	7,340
99.9 on length:0.1 on catch rate	6,095	5,837	7,270
Standardised catch rate	6,124	5,841	7,381
Alternative unreported catch history	6,106	5,836	7,334
Standardised catch rate and alternative unreported catch history	6,111	5,836	7,380
2010-11 total biomass			
<u>Weighting</u>			
Base case			
99.75 on length: 0.25 on catch rate	2,061	1,551	3,276
99.9 on length: 0.1 on catch rate	1,707	1,354	2,925
Standardised catch rate	2,154	1,575	3,453
Alternative unreported catch history	2,257	1,664	3,536
Standardised catch rate and alternative unreported catch history	2,337	1,687	3,700
2010-11 total biomass/K			
<u>Weighting</u>			
Base case			
99.75 on length: 0.25 on catch rate	0.34	0.26	0.45
99.9 on length: 0.1 on catch rate	0.28	0.23	0.40
Standardised catch rate	0.35	0.27	0.47
Alternative unreported catch history	0.37	0.29	0.48
Standardised catch rate and alternative unreported catch history	0.38	0.29	0.50
Unexploited spawning biomass			
<u>weighting</u>			
Base case			
99.75 on length: 0.25 on catch rate	2,229	2,128	2,675
99.9 on length: 0.1 on catch rate	2,221	2,127	2,650
Standardised catch rate	2,232	2,129	2,690
Alternative unreported catch history	2,225	2,127	2,673
Standardised catch rate and alternative unreported catch history	2,227	2,127	2,689

2010-11 spawning biomass			
<u>weighting</u>			
Base case			
99.75 on length: 0.25 on catch rate	588	416	981
99.9 on length: 0.1 on catch rate	456	356	848
Standardised catch rate	621	427	1,047
Alternative unreported catch history	652	448	1,078
Standardised catch rate and alternative unreported catch history	679	457	1,142
2010-11 spawning biomass/unexp. spawning biomass			
<u>weighting</u>			
Base case			
99.75 on length: 0.25 on catch rate	0.26	0.20	0.37
99.9 on length: 0.1 on catch rate	0.21	0.16	0.32
Standardised catch rate	0.28	0.2	0.39
Alternative unreported catch history	0.29	0.21	0.40
Standardised catch rate and alternative unreported catch history	0.31	0.21	0.42

From the base case and related model interpretations there has been measurable improvement in the spawning stock in recent years, and in the most recent four years (2007/8 to 2010/11) the stock is estimated to have been approximately stable. For the base case and all of the previously conducted sensitivity tests the stock condition in 2010/11 is estimated to be almost exactly the same as the previous year. The estimated stock condition based on the raw and standardised catch rates are very similar, with the standardised catch rate giving slightly more optimistic estimates of all key parameters. The estimated depletion of the spawning stock remains essentially the same as last year at 0.26 of the unfished level under the base case weighting and 0.21 under the alternative weighting. This indicates that the management measures of the past several years have had the desired effect of stopping further decline and beginning to rebuild the stock, although the spawning stock is still significantly depleted and there is only very slow or no rebuilding occurring under the recent catch levels.

The interpretation under the alternative history of the unreported catch is slightly but significantly different from the base case and all of the other sensitivity tests. Compared to the base case the alternative unreported catch history implies that the spawning biomass is larger (i.e. 652t vs 448t), is currently less depleted (i.e. 0.29 vs 0.26 of the unfished level) and has continued to increase in the last few years whereas the other interpretations imply very limited or no further rebuilding in the past four years. An interpretation of continued recovery of the spawning stock is consistent with the fishery independent monitoring of the spawning stock, which has shown considerable improvement in the past four years. This consistency increases the credibility of the alternative unreported catch interpretation. The alternative unreported catch history when combined with the standardised catch rate gives slightly more optimistic interpretation than any of the other scenarios, as would be

expected, and this also interprets the spawning biomass as having been increasing in recent years.

All model interpretations imply a decrease in the abundance of lobsters in the size range that can be legally retained by the fishery. This was predicted previously. The extent of the decrease is less for the model assuming the alternative history of the unreported catch than for any of the other models.

Under any weighting scheme and model the level of depletion of the total stock is below 0.5 of the unfished level, a target reference point.

Under any weighting scheme and model the level of depletion of the spawning stock is well below 0.5 of the unfished level, a target reference point.

Under any weighting scheme and model the estimated median depletion of the spawning stock is at or less than 0.3 of the unfished level, a limit reference point. However the detailed interpretation of stock status in relation to the limit reference point depends on the assumptions made. The standardised catch rate and alternative unreported catch history scenarios, either alone or in combination, provide median estimates of spawning stock depletion that are at or slightly below the limit reference point. Overall, a higher credibility is justified on these scenarios because (i) the standardisation accounts for some obvious changes in the operation of the fishery and results in a better model fit and (ii) because the alternative history of unreported catches considered by enforcement staff to be a reasonable description of history and the resulting model better matches the recent increases in spawning stock measured by the fishery independent surveys. So integrating across models, taking account of the relative credibility of each, it is concluded that the spawning stock depletion is in the vicinity 0.26-0.29, that there is a greater than 50% chance that the spawning stock is less than 0.3 of the unfished level, and that there is an appreciable chance (perhaps 30%) that the spawning biomass is less than 0.25 of the unfished level.

The standardised catch rate interpretation gives a better fit to the available data and this would be an appropriate base case for future assessments.

The alternative history of the unreported catches provides interpretations that are significantly different, and more optimistic, than the other interpretations. This alternative history is credible and also matches better with the increased spawning stock observed in the fishery independent surveys. However it is just one of many arbitrary but credible scenarios that have not been explored. There is a need to more systematically develop possible scenarios of historical unreported catch, assess their credibility, and explore their implications for interpreting stock status.

5.3.3 Predictions of future stock levels

Predictions were made of the change in the biomass that would occur after 5 years of catch at various levels. In the present stock situation there is a need to rebuild the spawning stock to have a low probability of the true spawning biomass being below 0.2 of the unfished abundance.

Predictions were made based on the stock assessments from the two weighting schemes described above, and also for the assessment in which natural mortality was estimated internally. The predicted changes in spawning biomass and exploitable biomass (i.e. biomass in 2013/14 divided by spawning biomass in 2007/08) after 5 years of various constant future catches are:

Predicted proportionate change in spawning biomass after 5 years of various constant future catches		
Total Catch (t)	Weighting on catch rate and length data in assessment model	Increase in spawning biomass ($SB_{2016-17}/SB_{2010-11}$); Median and the 95% confidence interval
150	Base case	
	99.75:0.25 weighting	1.08 [0.97 to 1.15]
	99.9:0.1 weighting	
	Alternative unreported catch history	1.09 [0.90 to 1.20]
175	Standardised catch rate and alternative unreported catch history	1.11 [1.07 to 1.16]
	Base case	
	99.75:0.25 weighting	0.98 [0.77 to 1.13]
	99.9:0.1 weighting	
200	Alternative unreported catch history	1.03 [0.83 to 1.17]
	Standardised catch rate and alternative unreported catch history	1.04 [0.97 to 1.10]
	Base case	
	99.75:0.25 weighting	0.92 [0.76 to 1.09]
200	99.9:0.1 weighting	
	Alternative unreported catch history	0.89 [0.64 to 1.09]
	Standardised catch rate and alternative unreported catch history	0.97 [0.88 to 1.06]
	Alternative unreported catch history	0.97 [0.88 to 1.04]

Predicted proportionate change in exploitable biomass (104-180mm length lobster) after 5 years of various constant future catches		
Total Catch (t)	Weighting on catch rate and length data in assessment model	Increase in exploitable biomass ($B_{2016-17}/B_{2010-11}$); Median and the 95% confidence interval
150	Base case	
	99.75:0.25 weighting	0.99 [0.94 to 1.07]
	99.9:0.1 weighting	1.05 [0.99 to 1.16]
	Alternative unreported catch history	1.03 [0.98 to 1.09]
175	Standardised catch rate and alternative unreported catch history	1.03 [0.97 to 1.08]
	Base case	
	99.75:0.25 weighting	0.85 [0.74 to 0.96]
	99.9:0.1 weighting	0.86 [0.67 to 1.01]
200	Alternative unreported catch history	0.89 [0.84 to 0.97]
	Standardised catch rate and alternative unreported catch history	0.89 [0.84 to 0.96]
	Base case	
	99.75:0.25 weighting	0.71 [0.50 to 0.88]
200	99.9:0.1 weighting	0.64 [0.23 to 0.90]
	Alternative unreported catch history	0.75 [0.63 to 0.88]
	Standardised catch rate and alternative unreported catch history	0.76 [0.64 to 0.88]
	Base case	

For the same model the projections for the spawning biomass and exploitable biomass are slightly less optimistic than those of last year for the same catch levels, which in turn were slightly less optimistic than the year before, reflecting the higher base catches now applied following TAC increases in each of the last three years.

The projections for the alternative unreported catch history interpretation are mostly slightly more optimistic than the previous applied models, but not greatly different. And the interpretations are virtually unchanged when the standardised catch rates are combined with the alternative unreported catch history. Predictions of the relative change in the spawning stock and exploitable stock under different catch levels are remarkably insensitive to the model and weighting scheme used. The spawning biomass is predicted to remain about the same during the next five years under recent total catch levels (175t), but those same catch levels are predicted to result in a further reduction of the exploitable biomass. After five years of a constant 175t total catch per year the median rebuilding of the spawning biomass is to 0.98-1.04 of the current level. So catches of 175t per year for the next five years are on average predicted to maintain the population almost exactly as it is currently – that is at or below the limit reference point. The predicted result of a continued total annual

catch of 175t has a large uncertainty around it, and the change in the spawning biomass could be as low as 0.77 or as high as 1.17. The down-side of this range would be sufficient to reverse most of the spawning stock rebuilding of the past few years, while the up-side of this range would easily rebuild the stock to above the limit reference point. Clearly in this situation it is necessary to closely monitor the stock and be prepared to change management settings as appropriate.

The exploitable biomass is predicted to remain very similar to the present level for the next 5 years under catches of 150t per year, and to decrease under catches of 175t per year, despite the stability in the spawning stock. This is mainly because of the recently restricted size range available for harvesting. For catches of 175t per year the exploitable biomass is predicted to reduce to about 0.85-0.89 of its current level, and this prediction is insensitive to the weighting used. In the absence of innovation and increased capture efficiency this would be expected to reduce the catch rate of commercially retainable lobsters proportionately; a significant reduction. This prediction was also highlighted in last year's report.

So overall with catches of 175t per year in the next 5 years the spawning biomass is predicted to remain at about the current level, the median depletion of the spawning biomass is predicted to be remain at or slightly below the limit reference point, and the stock available for harvest is predicted to decrease to about 87% of the current levels.

5.4 Conclusions

Management decisions in the past several years have been aimed at stock rebuilding. There is now measurable evidence that significant rebuilding the spawning biomass has been achieved since about 2000, but also that the spawning biomass is still somewhat below the limit reference point. Further rebuilding of the spawning stock is expected to be slow under recent catch levels.

The fishery data, scientific survey data and stock assessment provide reasonably consistent evidence and support for these interpretations. Significant discrepancies in the last 4-5 years are, however, that the stock assessment model does not match the increases in commercial catch rate or the increases in the fishery independent measures of spawning stock abundance. Consistency has been improved by a standardisation of catch rate data, and it is likely that additional improvements would be achieved from further development of the standardisation. Consistency has also been improved by inclusion of a new scenario for the unreported catch since 1994 when the current reporting scheme was introduced, and it is likely that additional improvements would be achieved from further development of the likely scenarios.

The current stock assessment clearly estimates the spawning stock to be at or below the limit reference point, irrespective of the assumptions made in the assessment. The uncertainty in assessment is mainly reflected in how close the spawning stock currently is to the limit reference point and whether that stock has continuing to recover or has stabilised under recent catches. Similarly the stock predictions show that the expected result of continued total annual catches at the recent level of 175t is approximately 'status quo' for the spawning biomass. The uncertainty in predictions is mainly reflected in a wide range of possible outcomes around this expected result, from continued strong spawning stock recovery through to its decline to the point of again causing recruitment collapse. Overall the analysis shows significant recovery toward the limit reference point but great uncertainty as to whether that recovery will continue or not. For the recent total catch of 175t there is almost exactly equal probability that the spawning stock will continue to increase or show decrease. A decrease in spawning stock is highly undesirable because the

relationship observed between spawning stock and settlement implies that a significant decrease in average settlement would be expected.

At this time it is considered appropriate to reduce the total catch of 165t. The reasons for this reduction in the total catch are (i) to give a slightly higher probability of 'rebuild' and less of 'status quo' or 'decline', (ii) to provide precaution against possible sensitivity of the analysis to the unreported catch history, particularly given that only one arbitrary history and future has been examined, and (iii) because the fishery independent survey of the spawning stock, which gives a direct measure of the spawning stock and is arguably the most sensitive indicator of it available, will not be conducted for 2 years. This total catch is predicted to give *on average* a modest increase of the spawning biomass. There is also a reasonable probability of faster rebuilding of the spawning stock under this catch. However there is also an appreciable probability that recovery of the spawning stock will stall and reverse under this catch. Also this catch level may result in excessively reduced catch rates from the exploitable stock. Progress will be monitored closely in coming years and a change in management settings would be necessary if the spawning stock changes at a rate much different from the average that is predicted (i.e. if it increases much faster than the average prediction or if it decreases). Resumed annual fishery interdependent monitoring of the spawning biomass would be valuable during the next few years as a part of this monitoring.

For a total allowable catch (TAC) of 165t there remains the question of what levels of unreported and recreational catch to apply in converting the TAC to a total allowable commercial catch (TACC). The TACC is equal to the reported commercial catch. In keeping with the alternative unreported catch history approach used in the stock assessment and projections the recreational catch (RC) is assumed to be 0.1 of the total (reported and unreported) commercial catch and the unreported commercial catch (UCC) is assumed to be 0.085 in 2010/11 of the total commercial catch (RCC+UCC). That is

$$UCC=0.085 (RCC + UCC) =0.085 RCC/(1-0.085)$$

and

$$\begin{aligned} TAC &= RCC + UCC + RC \\ &= RCC + UCC + 0.1 (RCC+UCC) \\ &= RCC + 0.085 RCC/(1-0.085) + 0.1 [RCC + 0.085 RCC/(1-0.085)] \\ &= 1.202 RCC \end{aligned}$$

$$\text{so that } TACC = RCC = TAC/1.202$$

Consequently the TAC of 165t converts to a TACC of 137.3t (rounded to 137t).

This TACC is a 6t (4.6%) increase on last year. There were some requests from industry for a 10% increase in the TACC to test the productivity of the resource and explore just what it can deliver. However it is considered that the productivity of this resource has been thoroughly tested at low spawning biomass levels, to the point that it is now clear that average settlement decreases significantly at spawning biomass levels lower than the current level. It is highly undesirable to again reduce the spawning biomass, or to significantly risk such a reduction, because that would be expected to reduce the productivity of the resource and cause recruitment overfishing.

Suggestions for additional observations, modelling and management

The lobster fishery is in a very critical point in its recovery and there are several improvements in the observations, modelling and management that would be expected to significantly improve confidence in the short and medium term outcome. These are:

1. Update the size frequency information used to drive the population model. Currently the information used is from 1999-2002. The most direct update would be achieved by repeating the observer coverage of the 1999-2002 period, and the Committee was informed that measures are in place that should allow updated data to be used in next year's assessment. But it could also be effective to make greater use of the size information from commercial logbooks and/or the fishery independent trap surveys.
2. Examine the time series of direct measurements of puerulus settlement and spawning stock size, and make comparisons with the model derived estimates of recruitment and spawning stock size, for inferences that can be made about the relative credibility of the two sets of interpretations, about the stock and recruitment relationship for low spawning stock size, and about the appropriate limit reference point.
3. Identify credible scenarios for the unreported commercial and recreational catch since 1994/5, assign relative credibility measures for these scenarios and carry these into the stock assessments. Identify credible scenarios for treatment of unreported commercial and recreational catch in future projections. Identify an appropriate way to calculate the unreported commercial and recreational catch in each TACC setting year for the conversion of TAC to TACC in that year.
4. Use the standardised CPUE as the base case in the stock assessment and further examine options for standardisation of CPUE. The fishery uses a wide range of trap sizes and fishing strategies (e.g. soak times, moon phase, bait type), parts of the fishery are intentionally expanding and changing some practices, and external factors such as weather force other changes for a time. Furthermore, in a healthy quota managed fishery such as this one it is expected and intended that industry innovate and alter fishing strategies to increase fishing effectiveness and profitability, and that the fishing strategies might change quickly to match profitable situations. Assessment of this fishery relies extremely heavily on using CPUE as an index of abundance, and reliability of the assessment would be improved by further standardising the CPUE. The relatively simple standardisation significantly improved the consistency between different data collected from the fishery, and hence the confidence in the assessment. Further development of the catch rate standardisation is likely to give further such improvements.
5. Give consideration to resuming annual fishery independent surveys of the spawning biomass. This information would be a valuable source of information to guide management, especially in the next 2-3 years.
6. A targeted tagging program should be considered. Important issues that could be examined through such a program include:
 - Direct estimation of the size of the spawning stock so as to help resolve which of the assessment weightings is most credible.
 - How far north the lobsters now travel. In particular this relates to where the spawning stock is currently located and whether there is

any indication that the north and far-north zones are now operating as separate stocks or sub-stocks.

- The fishing mortality imposed on the migrating lobsters. If this could be reliably estimated it would significantly resolve the question of which statistical weighting scheme to accept in the stock assessment (i.e. 99.75:0.25 or 99.9:0.1).
 - The calibration of movement in a spatially resolved assessment model. A spatially resolved assessment model could be expected to provide better interpretations of the catch and catch rate information as the cohorts migrate through the fishery and join the spawning stock, provide improved understanding of the dynamics and mortality on the spawning stock, and allow exploration of management options based on spatial management.
 - Specific tagging experiments (e.g. In the Marine Protected Areas or sequentially on the same cohort) could improve estimates of natural mortality.
7. As the stock recovers there should be focused development of the longer-term target for the stock and fishery, and the management and stock assessment arrangements that will be used to maintain the fishery in its desired state. The profitability of the fishery and cost-effectiveness of fishery assessment and management should be factors in these considerations. There appear to be options based on spatial management that could provide high protection for the spawning stock, allow high catches of immature lobsters, and reduce the requirements for management. This consideration should also include the appropriate level desired for the spawning stock.

Figure 8. The landed catch since the start of the fishery.

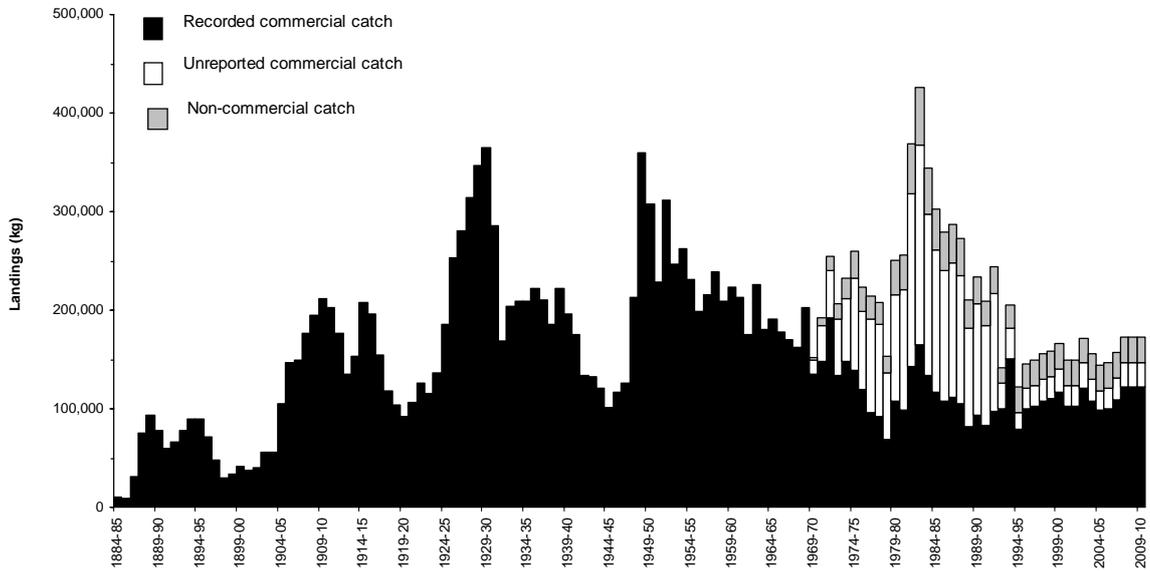


Figure 9. Commercial catch, effort and catch rate since 1969/70 when reliable effort is available.

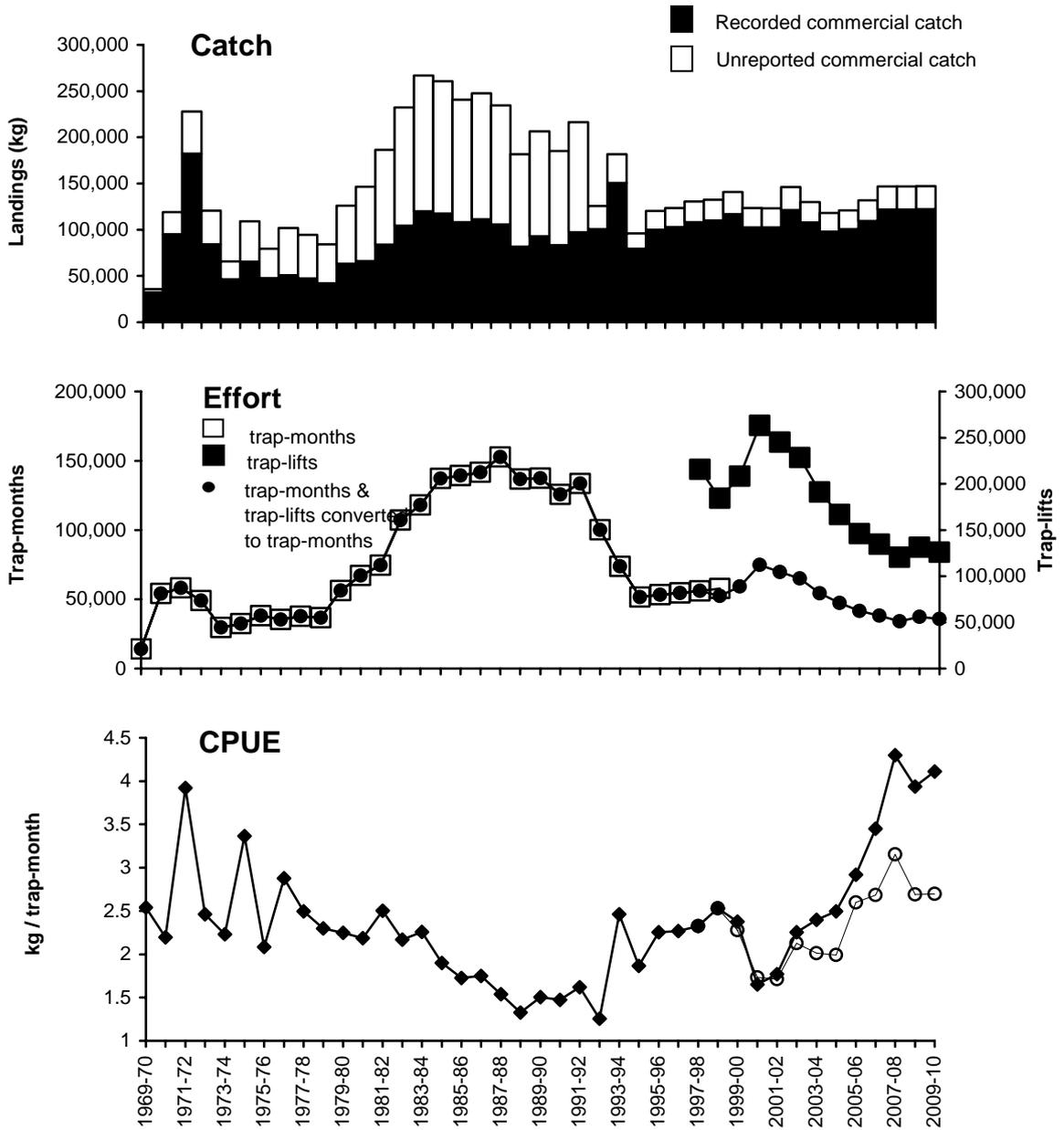


Figure 10. Commercial catch, effort and catch rate by area and depth since 1997/8 when detailed reporting became mandatory. The spawning stock is mostly found in the far north coast (28-30+) and mid-north coast (31-32) at depths greater than 10m and especially depths 10-30m. Open circles are for the incomplete 2010/11 year.

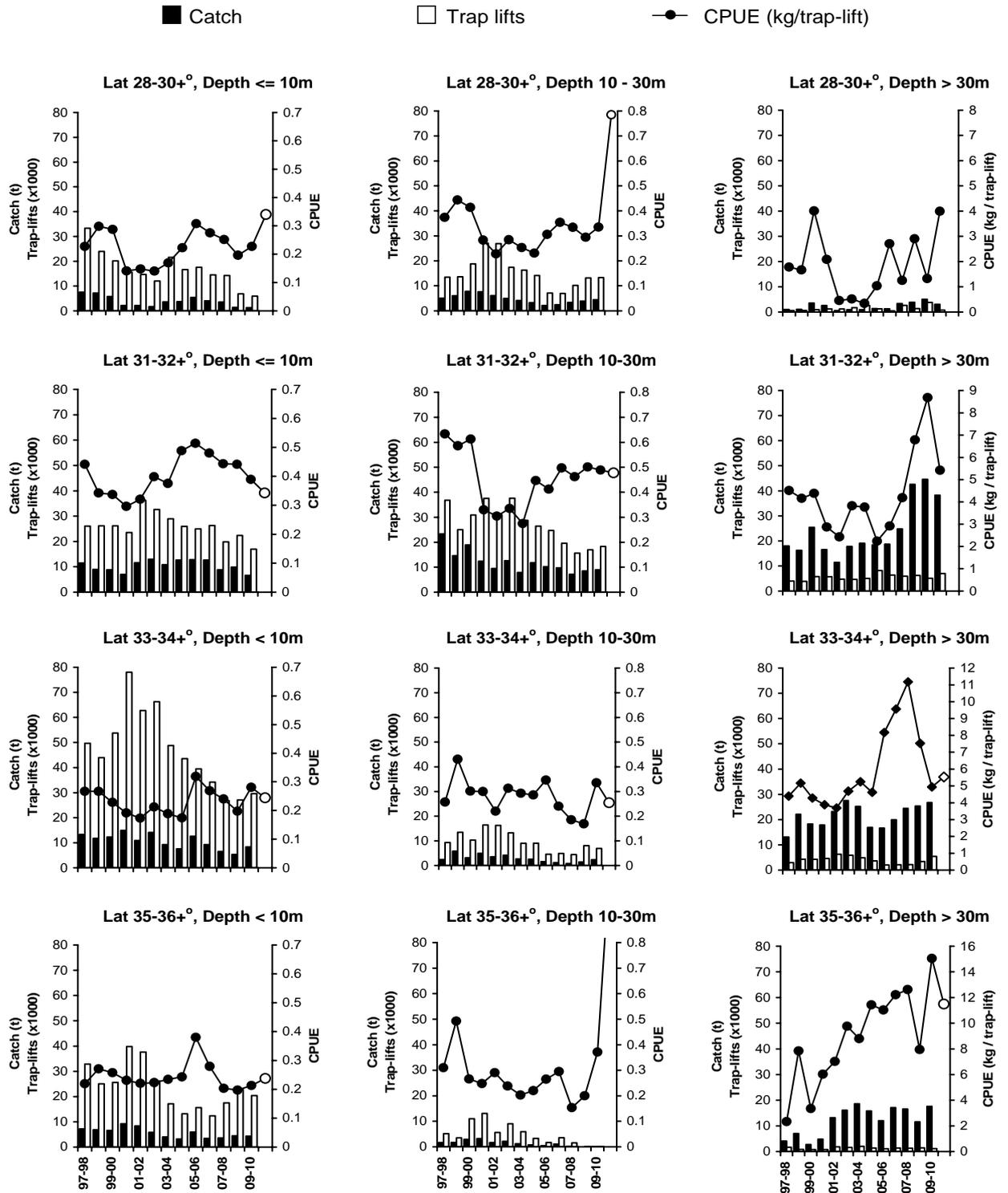
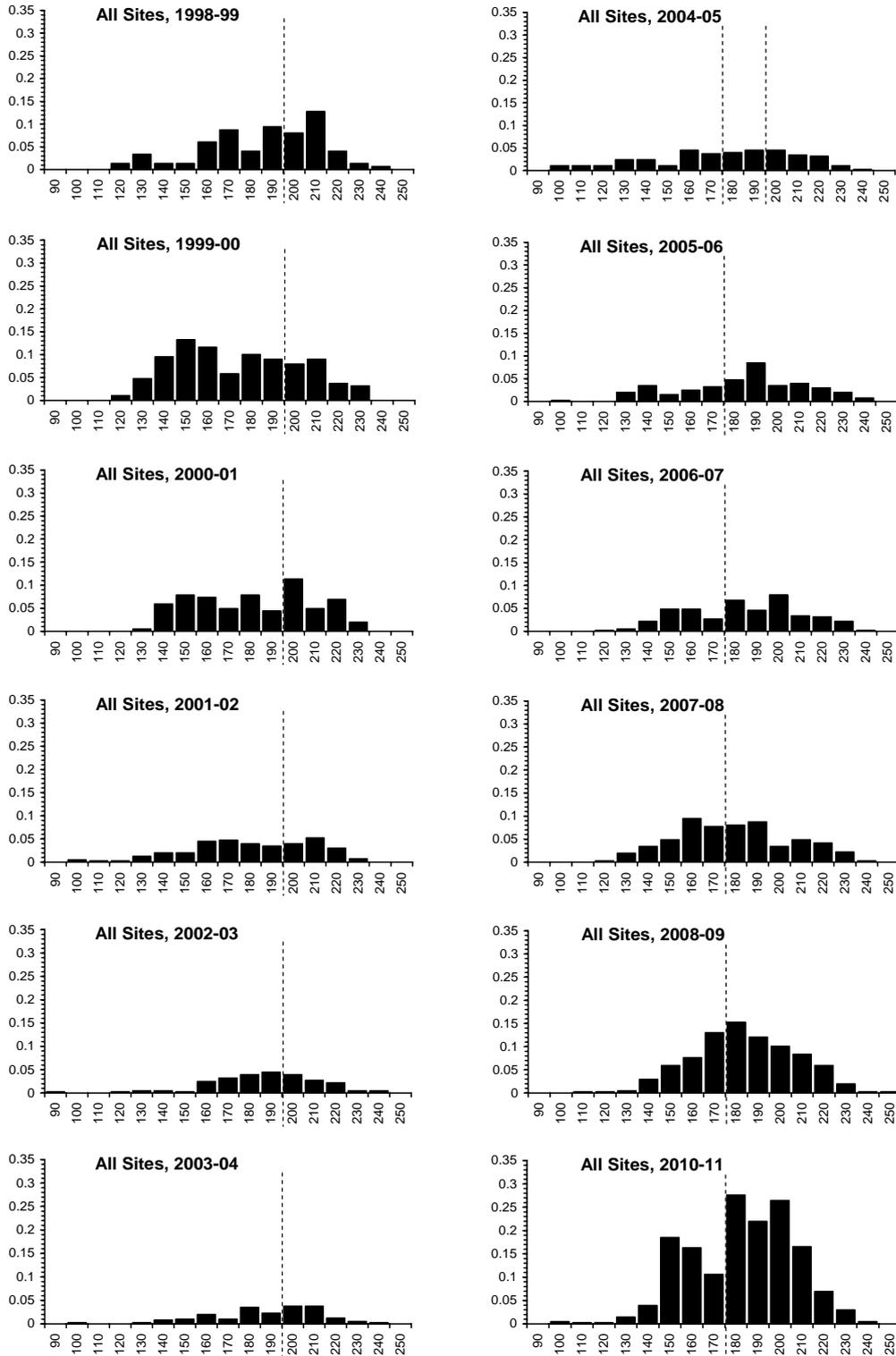


Figure 11. Size composition of lobsters in the commercial catch of the combined mid- and far-northern areas, from data provided by logbooks and augmented by observers. The dashed line is the maximum legal size. These data are updated every second year and have been updated this year.



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THE DETERMINATION

The Total Allowable Catch Setting and Review Committee, pursuant to Division 4 of Part 2 of the Fisheries Management Act 1994, determines that the Total Allowable Commercial Catch of rock lobster that may be taken in the Rock Lobster Fishery during the period 1 July 2011 to 30 June 2012, should be **137 tonnes**.

In making this recommendation, the Committee recognises that while indicators from the fishery continue to be very encouraging, there remains a need to set a catch level that will result in an acceptable level of probability that the spawning stock will rebuild.



Ian Cartwright
Chair



Keith Sainsbury
fisheries scientist



Jessica Hartman
fisheries management



Bill Talbot
natural resource economist

Appendix 1: Details of public consultation

The TAC Committee undertook a comprehensive program of public consultation with stakeholders and the community. The details of this process are summarised in the table below, which chronologically records the stages of consultation undertaken by the TAC Committee and gives effect to the procedural requirements with reference to relevant sections from the *Fisheries Management Act 1994*.

Date	Fisheries Management Act	Consultation Stages
23.2.11	Section 31(1)	TAC Committee called for public submissions on the appropriate level of the annual TACC for Lobster for 2011/12.
23.2.11	Section 284 (1b)	The advertisement was placed in the Sydney Morning Herald, the Daily Telegraph and made available at I&I NSW fisheries offices.
22.2.11	Section 284 (1b)	<p>Individual calls for submissions were also sent to particular interest groups who the Committee considered would be interested in providing a collective standpoint, either due to their direct involvement in the rock lobster industry or due to their interest in conservation issues. These groups included the following:</p> <ul style="list-style-type: none"> • All Lobster Shareholders • All Members of the Lobster Management Advisory Committee • NSW Regional Industry Convenor • NSW Fishermen’s Co-operatives • I&I NSW Fisheries Offices • Nature Conservation Council of NSW
1.4.11	Section 284 (1b)	The TAC Committee allowed a period of 38 days for public consultation.
	Section 31 (2)	<p>The TAC Committee gave regard to the following submissions. The respondents included the following:</p> <ul style="list-style-type: none"> • I&I NSW - Commercial Fishery Management, Science and Research, and Compliance branches • Lobster Fishery Shareholders • Members of the Lobster Management Advisory Committee (LobMAC)
11.4.11		<p>The submissions were collated and analysed, and the TAC Committee heard formal presentations regarding views and opinions at the meeting held on 11.4.11. The following made presentations, or provided information to the Committee:</p> <ul style="list-style-type: none"> • Belinda Lucas: Fisheries Manager I&I NSW • Anthony Chen: Investigator Statewide Operations I&I NSW • Geoff Liggins: Manager, Scientific Services I&I NSW • Ian Cartwright: TAC Chairman • Jessica Hartmann: TAC member • Keith Sainsbury: TAC member • Marcus Miller: Fisheries Technician I&I NSW • Giles Ballinger: Fisheries Technician I&I NSW • Peter Offner: LobMAC • Mark Cranstone: fisherman • Ron Firkin • Tony Fidler: Newcastle Marine Brokerage • Steve Drake: fisherman • Daniel Gogerly: LobMAC • Noel Gogerly: LobMAC • Daryl Sykes: NSW Lobster consultant • Scott Westley: LobMAC • Noel Gogerly: LobMAC • Lee Monin: LobMAC • Daniel Stewart: LobMAC • Alan Dodds: LobMAC Chairman

Appendix 2* Summary of submissions and the issues

Submission provided by	Issue(s)
New Castle Marine Brokerage (Tony Fidler)	Provision of a short statistical analysis of the leasing of lobster quota through the author's brokerage for the nine months of the financial year to date. 25 transactions approved at an average of 451kg per transaction, for an average price of \$17.74 per kilo.
Daniel Stewart ⊕	Notes that the season in the Coffs Harbour area is the best for some time. Good prices were experienced prior to the China marketing ban, which also coincided with peak catches from the deep water. Large quantities of small fish on the inshore grounds with record catches reported. Deeper inshore (mid-depths?) were also very productive with large quantities of undersize lobsters. Numbers of oversized lobsters also evident. Surprised at low numbers of puerelus– possibly due to high level of run-off. FIS catches confirm findings from commercial catches. Results seen in the fishery are reflecting stock assessment predictions. Pleased at the number of lobsters that have migrated onto the fishing grounds, presumably coming from the shelf migration that other parts of the fishery have been experiencing.
Daniel Gogerly	<p>Believes that a 15% increase in the TAC is justifiable based on the following factors:</p> <ul style="list-style-type: none"> • Positive attitude of fishermen in industry and in particular those who are investing or are close to investing. • Restructuring by industry, with fewer fishers taking the TACC. • Strong FIS results, both in quantity and size distribution. • While catch rates seasonal in different areas erratic, the fishery is quite sustainable, as evidenced by large catches of oversize and legal lobsters. <p>Cargo shops and tankers waiting Newcastle port entry continue to cut gear off when floats at the surface.</p> <p>Some issues with lease price expectations; price is high relative to depressed market conditions. Hope that the Fish Online-Fisher Direct program will assist by having all quota for lease or sale in one place, providing an open market.</p>
Industry and Investment New South Wales	Research, compliance, industry analysis and management updates.

* This report is provided to the Minister as background to the Determination. The Committee is aware that after submission, this report is also circulated to industry and other stakeholders. Fishers whose names are marked “⊕”, explicitly requested that their responses either not be placed on public display or remain confidential.

Appendix 3: Financial Performance in the SA Southern Zone Rock Lobster Fishery

Table 3.4 Financial performance in the SA Southern Zone Rock Lobster fishery, 2002/03 to 2006/07 (average per boat)^a

	2002/03		2003/04		2004/05		2005/06		2006/07	
	All Boats	Share of TCC								
Gross Income	\$354,481		\$273,860		\$314,212		\$379,715		\$452,604	
Costs										
Fuel	\$13,016	6%	\$15,730	8%	\$18,161	10%	\$21,559	10%	\$23,925	10%
R&M	\$10,912	5%	\$13,362	7%	\$16,624	9%	\$19,228	9%	\$21,417	9%
Bait	\$5,804	3%	\$7,158	4%	\$8,906	5%	\$9,794	5%	\$10,261	4%
Provisions	\$253	0%	\$310	0%	\$299	0%	\$346	0%	\$385	0%
Labour	\$125,150	59%	\$96,686	50%	\$86,990	47%	\$105,124	50%	\$125,303	52%
Licence fee	\$12,884	6%	\$15,061	8%	\$15,762	8%	\$15,832	7%	\$18,685	8%
Insurance	\$4,352	2%	\$4,483	2%	\$6,176	3%	\$6,412	3%	\$6,522	3%
Interest	\$15,993	8%	\$16,408	8%	\$21,683	12%	\$21,951	10%	\$23,557	10%
Admin and Other	\$23,182	11%	\$23,881	12%	\$11,005	6%	\$11,425	5%	\$11,621	5%
Total Cash Costs	\$211,546	100%	\$193,079	100%	\$185,606	100%	\$211,670	100%	\$241,677	100%
Cash Operating Surplus	\$142,936		\$80,781		\$128,606		\$168,045		\$210,927	
Depreciation	\$44,520		\$44,286		\$47,960		\$45,030		\$45,855	
Earnings Before Tax	\$98,415		\$36,494		\$80,646		\$123,015		\$165,072	
Earnings Before Interest & Tax	\$114,408		\$52,902		\$102,330		\$144,966		\$188,629	
Capital										
Fishing Gear & Equipment	\$321,797		\$320,105		\$351,807		\$330,318		\$336,370	
Licence Value	\$3,640,406		\$2,812,450		\$2,682,397		\$2,873,997		\$3,079,283	
Total Capital	\$3,962,204		\$3,132,555		\$3,034,204		\$3,204,315		\$3,415,653	
Rate of Return to Fishing Gear & Equip	35.6%		16.5%		29.1%		43.9%		56.1%	
Rate of Return to Total Capital	2.9%		1.7%		3.4%		4.5%		5.5%	

^a Financial performance estimates for 2000/01 to 2003/04 are based on the October 2001 survey of licence holders. Financial performance estimates for 2004/05 to 2006/07 are based on the April-May 2006 survey of licence holders. Estimates for 1997/98 to 2001/02 are provided in Appendix 4 of this report.

Source: EconSearch analysis.

