TAC Committee

Total Allowable Catch Committee

Report and Determination for 2012/13

ROCK LOBSTER FISHERY

20 July 2012

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 around 50%. The 20010/11 catch was worth $7.10 million, a record high. The market price for shares almost tripled between 20004/05 and 2007/08 and a recent tender process for previously forfeited shares achieved a price of $3,050 per share. Demand is strong to both purchase and lease quota/shares. CPUE across the fishery in 20011/2012 showed a slight increase and during the last four years represents the greatest rates of catch calculated in the past 38 years. While a decrease in exploitable biomass was expected, catch rate data is more consistent with a general stabilisation than a decrease.

The ITQ system operating in the rock lobster fishery is working effectively, with the total commercial catch in the fishery 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 2010/11 about 50% and 75% of the commercial lobster catch is now being taken by 16 and 37 fishing businesses, respectively. This figure is similar to the previous year.

The number of input controls that are likely to be acting as a barrier to more effective operations continue to be reduced. 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 that 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 have previously been assumed has been taken from the population in recent years. Such a scenario would aid any recovery but also tend to result in over-estimation of the population's 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.

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 on the stock assessment and TACC setting process. The current Commonwealth process for developing marine reserves in the east marine bioregion is at the public comment stage, and early impressions of the extent of the MPAs suggests that it is unlikely that they will 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 the newly-established Lobster Industry Working Group 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 a perception by industry that the future outlook for the fishery is positive. The increase in viability is a result of a number of factors including increases 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 reflecting increasing catch rates and 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 the lobster industry investigate marketing approaches for New South Wales rock lobster to help with product differentiation; 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 the lobster industry does not see the collection of economic data as a priority at this stage, however the Committee is of the opinion that such data collection must start now. Better economic data, such as information on the net return from lobster fishing, will allow for a TACC to be set that maximises economic returns from lobster fishing. It will also facilitate better management decisions by allowing the department to better understand the impacts of alternative management options on the financial well being of industry.

The Committee notes that efforts are being made to collect better recreational and indigenous catch data. However, further efforts need to be made to obtain more robust time-series estimates of recreational and indigenous lobster 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 2012/13 is based on strengthening the prospect of restoration of the spawning stock and maintenance of an appropriately sized available biomass, while providing a buffer for any future downturns in recruitment to the fishery or changes in targeting practices. 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 seven years, peaking in 2007/08, followed by stabilisation and a relatively constant catch rate during the past three years (2007/08 to 2009/10). This reasonably stable catch rate in the last few years is widespread across depths and some very high catch rates have been recorded in the 10-30m depth areas in the far-north coast in the last two years. This is particularly encouraging as it implies an expansion of the breeding stock into this area.

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 two years this appears more consistent with a general stabilisation than a decrease.

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 occurred 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 two 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 20010/11 the catch rates of all sizes are at their highest since monitoring started in 1998/99.

There is a growing difference in the standardised and unstandardized (observed) catch rate, which is interpreted as being due to on-going increase in the efficiency of fishing on top of the substantial increase in the abundance of the exploitable stock between about 2002 and 2006, following the TAC reductions during that time. A consequence of fishers experiencing the increasing unstandardised catch rate in their operations may be leading to an overoptimistic interpretation of the state of the exploitable stock by fishers.

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 at that time 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.

The model interpretations suggest that the spawning biomass has increased measurably and steadily over the past five years, but with a slowing rate of increase (from 3.4 to around 2% per year). The spawning biomass has rebuilt to the limit reference point and the exploitable biomass has been very slowly but steadily

decreasing over the past five years (by about 1% per year) abundance). The model interpretation of a slowly decreasing exploitable biomass during the past 5 years is somewhat at odds with the approximately constant standardised catch rate over the same period. This difference is not great and it does not cast significant doubt on the overall interpretation of stock status and trend

These conclusions indicate that the management measures of the past several years have had the desired effect of rebuilding the stock, although the spawning stock is still significantly depleted and is only very slow rebuilding under the recent catch levels. There is still an about 'even probability' that the true spawning biomass is below 0.3 of the unfished level and further rebuilding of the spawning stock is predicted (by model analysis) to be slow under recent catch levels.

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.

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. This reflects the higher base catches now applied following TAC increases in each of the last three years.

Predictions of the relative change in the spawning stock and exploitable stock under different catch levels are remarkable insensitive to the model used. With catches at about the current level 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 about the limit reference point, and the stock available for harvest is predicted to decrease slightly from current levels. These model predictions are very similar to those made last year, and are expected to be slightly pessimistic for the same reasons described above for the model interpretations of stock status and trends.

The patterns of future recruitment will drive fundamental outcomes and options for future stock rebuilding and for the fishery. If the recent increase in average recruitment is statistical variability around an unchanging long-term average then the current catches are likely to be close to the maximum that is sustainable with current size limits. Further, a period of below average recruitment can be expected at some time. However if the recent increase in average recruitment is significantly driven by the increased spawning stock then the situation is entirely different. The maximum sustainable catch will then depending on just how much the recruitment increases on average as the spawning stock increases, and that can only be determined by observing what happens in nature as the spawning stock is increased.

At this time it is considered appropriate to slightly increase the Total Allowable Commercial Catch (TACC) from 137 to 140t, which corresponds to an increase in the Total Allowable Catch (TAC) from 165 to 168.3t.

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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 2012 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 Eddie Douglas, Fisheries Relations Coordinator, DPI.

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 industry 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. In this respect, the comments on the Committee recommendations contained in the management report this year were particularly helpful. 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, obtained feedback from the TAC Forum and received written reports from:

- NSW Department Primary Industries, Fisheries Research;
- NSW Department Primary Industries, Commercial Fisheries Management;
- NSW Department Primary Industries, Fisheries Compliance; and
- participants in the commercial rock lobster fishery

This year no written reports concerning the fishery were received from Industry.

As occurred in 2011, 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; 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 20012/13 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 Current Performance Against Objectives of the Plan

The Plan specifies performance indicators and trigger points that provide a framework to measure the performance of the Fishery against the objectives of the Plan. The performance indicators provide an indication of whether the objectives are being attained and the trigger points specify a level that suggests a potential problem with the Fishery and a review of the Plan is required. The performance indicators under the objectives in the Management Plan for 2011/12, were such that no triggers for review were activated

As the Fishery continues to biologically improve and move away from its trigger limits, industry and government acknowledge the need to develop targets that

maximise the economic yield from the Fishery (see addition comments in this section).

The FMS also includes a number of objectives and management responses for the Fishery. Performance of the Fishery against goals and performance indicators set out in the FMS is also monitored but advice on this aspect of management is not provided to the TAC Committee.

3.3 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 and gear restrictions.

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.

3.4 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 95% (98.5% in 2010/11) 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 season, on July 2012. The end of of the fishing year coincides with the time when the highly productive deepwater gear is accessible, thereby lifting catch and catch rate and the season dates were advanced by one month for the 2011/12 season 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 continues to yield dividends in terms of adult spawning stock and protection, which is a priority management objective for the fishery.

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 structural adjustment in the Fishery at the shareholding level has occurred, fewer fishers are reporting landing a higher proportion of the total reported catch. Specifically, in 2010/11 50% of the reported catch was landed by 16 fishing businesses while 75% of the catch was landed by 37 fishing businesses. Preliminary data for the 2011/12 current fishing period suggests that 50 and 75% reported catch has been landed by 16 and 37 fishing businesses, respectively. This figure is similar to previous year.

The Department continues to support the reduction in the number of active operators as distinct from the number of shareholders in the fishery. 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 is retention. It is noted that the proportion of shareholders that hold less than the 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 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.

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, further efficiencies should be recognised.

3.5 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 20010/11 period were determined by the Department to be at 88%, which is well above the trigger point of 70%. Preliminary data from the current period indicates that overall compliance rates will remain relatively high.

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 Compliance managers estimate that the illegal take and sale of lobsters is 'low and stable'. Compliance in the commercial sector is considered to present a relatively low risk. Where there have been cases of over quota fishing this is believed to be non-intentional in most cases. There have been some incidences of a failure to reduced tags at the end of the season, which has the potential to affect the integrity of the quota system by giving black-market fissures opportunities to sell their catch in the open market. A number of commercial fishers in the central and northern regions, both inshore and offshore, have expressed concerns regarding persons lifting their traps and is filling the gaps. Compliance efforts are ongoing to identify the persons responsible.

It is felt that the majority of commercial fishers support the direction management is taken in this fishery and are committed to complying with the laws and the rebuilding and strengthening of the lobster stock. It is further believed that these figures have been achieved over time to a strong compliance program and the commitment of many of the fishes. The strong compliance program has been reinforced by now even stronger penalties and the share forfeiture scheme. Withdrawal of compliance

funded by industry will hopefully not adversely impact the ability to deliver a strong compliance deterrent, thereby maintaining these good compliant rates into the future.

As with the commercial sector, most recreational fishers ensure they comply with the rules and regulations, however bag and size limit offences continue to be some of the main offences committed by recreational fishers. There are also instances of persons intentionally targeting lobsters for financial gain. Fisheries officers will continue to target these persons. Further, intelligence has been received indicating that some recreational fishers are selling indictable quantities of lobster to retail outlets and more commonly the public. Compliance efforts will continue to identify these persons and police their activities.

For commercial rock lobster fishers there are considerable incentives to operate within the law. These incentives include large fines goal time, share forfeiture and suspension or cancellation of the commercial fishing licences. higher penalties, the risk of share forfeiture, and increasing shareholdings resulting in fishers having more to lose in the event of non-compliance. Given these penalties and the increasing value of shares industry has stated, and the Committee agrees, that there is little incentive for licensed commercial fishers to contravene regulations.

The Committee notes that Lobster industry members met with NSW DPI in 2010 to discuss the proposed IVR system in detail and the resulting report from this meeting was submitted to NSW DPI, as a formal submission to the consultation paper. At the Lobster Industry Working Group Meeting held on 14 October 2010, the working group was advised that the roll-out of the IVR system has been delayed until 2012 due to timelines associated with the necessary amendments to the *Fisheries Management Act 1994*. An additional discussion paper, which includes IVR reporting requirements, will be released to the broader commercial fishery in late 2012.

Up until 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. These calculations have been carried over to the 2012/13 TACC calculation due to any definitive alternative and the Committee has made a recommendation that better estimates of unreported (and recreational) catch be developed as a priority.

3.6 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.

Currently, the National Recreational and Indigenous Fishing Survey (NRIFS) data are the only available, well replicated state-wide estimates of recreational effort and catch for both freshwater and saltwater fisheries in NSW. However, these NRIFS estimates are approximately 12 years old and updated measures of recreational effort and catch are required for our important fisheries.

The Committee notes that in recognition of the need for updated information, DPI has commenced a project that seeks to develop and test cost-effective methods for monitoring recreational fisheries at a State-wide scale. Preparations for a State-wide survey building on the methodology from the previous National Survey have commenced. A ctual sampling of the recreational sector for a twelve month period by telephone survey will commence in August 2012 with a diary system to be implemented in November 2012.

3.7 Indigenous Fishing for Rock Lobster

In 2010, Aboriginal peoples' connection to the fisheries resource was formally recognised in fisheries legislation through the introduction of a new object to the Fisheries Management Act 1994 (the Act). Aboriginal cultural fishing is also now articulated in the Act as distinct from recreational and commercial fishing.

Other amendments to the Act passed by Parliament at the time include section 21AA (has not yet commenced), which excludes the bag and possession limits from applying in the context of taking or possessing fish for the purpose of Aboriginal cultural fishing. However, section 21AA will not be enacted until new regulation is developed to prescribe the circumstances in which the taking and possession of fish for Aboriginal cultural fishing purposes is authorised and to specify the quantity that may be taken or in possession.

Development of the regulation has commenced with consultation underway with the Aboriginal Fishing Advisory Council (AFAC), as is required under section 21AA. Consultation with other stakeholders including the commercial and recreational fishing sectors along with environmental groups has also commenced, with comments being sought on the current Aboriginal Fishing Interim Compliance Policy. The Interim Compliance Policy is in place to capture the spirit of the yet to be commenced section 21AA of the Act. Comments on the interim compliance policy will provide detail to allow the next level of consultations to take place with stakeholders and continue the development of the Aboriginal cultural fishing regulations.

The current interim compliance policy allows an Aboriginal person to take double that of the prescribed recreational bag / possession limit (other than for abalone, for which the extended limit is 10) to provide for cultural needs where elders, the incapacitated, or other community members are unable to fish for themselves. This limit is on the basis of the individual's limit, not an accumulated limit of people that

the fish are being provided for. To complement this, the shucking of abalone, rock lobster and turban shell is permitted within 100 metres of the high water mark but only if the fish are consumed in this area.

The policy applies to cultural fishing in State waters, including appropriate zones of the NSW marine parks. All other fishing activity and possession of fish and/or fishing gear must comply with the current fisheries legislation.

If Aboriginal people have a need to access the fisheries resource for larger cultural events that go beyond the intentions of the interim compliance policy, an application for an Aboriginal cultural fishing permit under section 37(1)(c1) of the Act can be made. Section 37 permits provide defences against some aspects of the fisheries laws but only if the permit conditions are complied with.

3.8 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 Commonwealth process for establishing marine reserves in the east marine bioregion was at the public comment at the time of preparing this report. While clarification is needed, it appears unlikely that the final result will influence future TAC setting deliberations.

3.9 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)	Value ($m)	Mgt charge (Incl. EIS) / share	Mgt charge (incl. EIS) / GVP (%)
1998/99	125	110	3.8	38.00	10.0
1999/00	140	117	4.6	48.00	10.4
2000/01**	150	102	4.4	58.00	13.2
2001/02	150	102	4.7	58.00	12.3
2002/03	135	121.3	5.4	59.70	11.1
2003/04	135	107.9	4.2	61.70	14.7
2004/05	102	98.1	3.8	58.60	15.4
2005/06	102	100.5	4.1	63.09	15.2
2006/07	112	109.4	5.2	62.06	12.0
2007/08	124	121.6	5.6	57.91	10.4
2008/09	128	121.8	6.7	64.04	9.4
2009/10	128	122.1	6.8	64.70	9.3
20010/11	131	83.8	7.1	52.64	6.2
2011/12	149	121.5	6.8	44.21	6.5

*** Commencement of full cost recovery

The contribution of management charges to total costs has contracted as a share of GVP from the fishery (from around 15% to 6.5%). 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.

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.

As the stock recovery continues, 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.

3.10 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.

The Committee understands that as a result of the recent Review of NSW Fisheries, the LobMAC has been disbanded and a Lobster Industry Working Group established. The Committees is pleased to note that meeting has been set down for 26 June 2012. After consultation with former and current LobMAC industry representatives the Working Group will consist of industry representatives and a representative from both conservation and recreational stakeholder groups. The Committee hopes this body will will continue to engage as effectively as its predecessor.

The Committee recommends that the Rock Lobster Industry Working Group discuss the TAC determination and accompanying report and recommendations, and provide feedback.

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 members of the Lobster Industry Working Group. 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.

3.11 EPBC Act Assessment of the NSW Rock Lobster Fishery

In January 2012, the NSW Department of Primary Industries provided an application to the Department of Sustainability, Environment, Water, Population and Communities for assessment, seeking continued export approval for the NSW Lobster fishery

The application was assessed for the purposes of the protected species provisions of Part 13 and the wildlife trade provisions of Part 13A of the EPBC Act and approved until 30 March 2017. Important factors taken into consideration were management arrangements and precautionary measures currently in place for the fishery including annually reviewed total allowable catch limits, limited entry, mandatory tagging of commercially harvested lobsters, recreational bag limits, minimum and maximum size limits, prohibition on the take of berried females, area closures and gear restrictions.

3.12 Fishery Management Strategy (FMS)

A statutory review of the FMS (Lobster Share Management Plan) Regulation has commenced. A working group has been established to assist in the conduct of the review and consists of representatives from commercial (including representatives of the now defunct Lobster Management Advisory Committee), recreational,

conservation and indigenous fishing sectors. The working group met in November 2011.

The meeting doscussed he following aspects: Operational – gear marking, offences and demerit point system, broader commercial reforms, IVR and Fish on Line, incorporating aspects of FMS in regulation and future.

Currently the lobster fishery is monitored and managed under regulation with major objectives, performance indicators and trigger points outlined to ensure species sustainability – these performance monitoring types can be classed as 'existing reference points'.

At the meeting other performance monitoring types were apparently discussed incuding economic (MEY-type) reference points and biological limit reference points. Industry recommended moving certain performance indicators and trigger points from the (FMS) into regulation. The Department has agreed to identify which biological performance indicators and trigger points would be best moved into the LSMP and consult with industry.

The Committee notes (but does not agree with) the strategy by the department to not provide specific economic targets and to allow industry to drive management towards economic optima. Industry, for its part apparently wishes to remain focused on building biomass and ensuring ongoing security of the resource.

To properly guide TAC setting it is important that the Committee is provided with the necessary bioeconomic analysis and, preferably agreed targets.

The Committee again <u>recommends</u> 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 past discussions on this with LobMAC. The issue of 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.

3.13 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.

3.14 Conclusion

Catch rates increased over the last the seven years between 2000/01 to 2007/08, more than doubling since 2000/02 and now exceed the 1998-99 benchmark by around 50%. While a decrease in exploitable biomass was expected, the catch rate data more consistent with a general stabilisation than a decrease. The market price for shares has almost tripled in the past four years, with the price now appearing stabilise, while 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. There has been particularly high levels of compliance by the commercial sector, due in part to the high penalties that may be imposed for major offences. Improved knowledge of illegal (and recreational) catch would provide better quality assessments and, possibly, result in increased TACCs. The ongoing effect of the reduction in compliance services will need to be monitored carefully, 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 while some rebuilding has occurred, a conservative management approach is considered to be the best option.

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 industry representatives formerly via LobMAC and now through the Rock Lobster Industry Working Group, also merits mention.

The communication and interaction between the Department, industry and the TACC is excellent in this 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.

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.

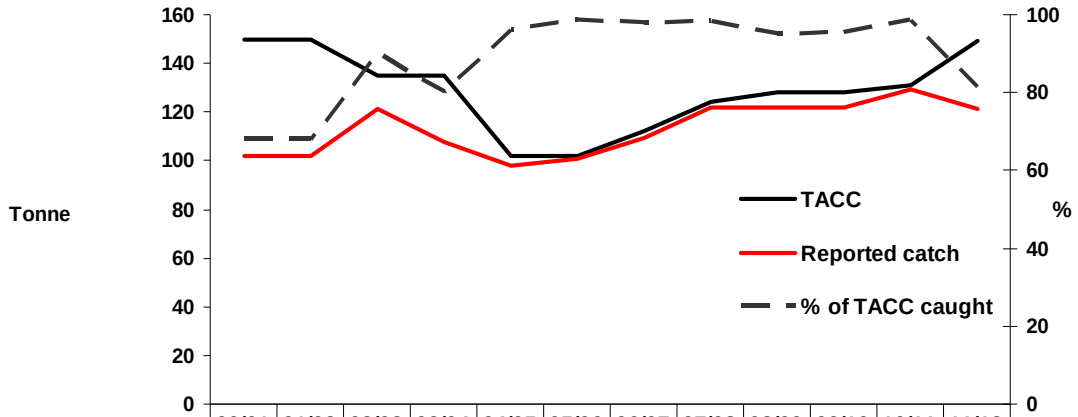
The absence of timely and relevant data on fishing costs means that it is not possible to make a complete analysis of the economic performance of the NSW Rock Lobster industry. Focussing on gross returns alone means that changes in costs, and the

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.

4.2 Volume and value of production

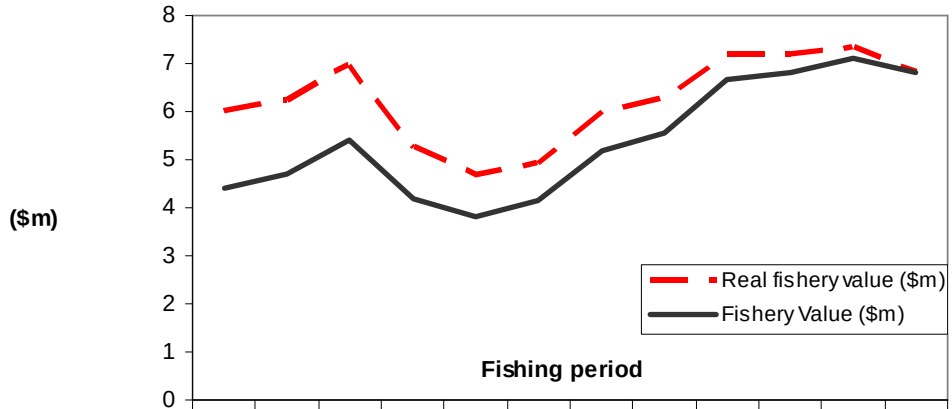
The volume of reported catch of rock lobster in 2010/11 was 129 tonnes, an increase of 6 per cent from 2010/11 where 122.1 tonnes was caught (Figure 1). This catch accounted for around 98.5 per cent of the TACC. The reported ability of industry to catch virtually the full TACC over a number of consecutive 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 only slightly between 2009/10 and 2010/11, from $7.2 million to $7.3 million in real terms. Based on data to end March 2011/12, it is expected to fall in 2011/12 (Figure 2).



	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12
TACC	150	150	135	135	102	102	112	124	128	128	131	149
Reported catch	102	102	121.3	107.9	98.1	100.5	109.4	121.6	121.8	122.1	129	121.5
% of TACC caught	68	68	89.9	79.9	96.2	98.5	97.7	98.1	95.2	95.4	98.5	81.5

Figure 1: Catch, TACC and percent of TACC caught, 2000/01 to 2011/12



	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12
Real fishery value ($m)	6.0	6.2	6.9	5.3	4.7	4.9	6.0	6.2	7.2	7.2	7.3	6.8
Fishery Value ($m)	4.40	4.70	5.40	4.20	3.80	4.15	5.19	5.57	6.65	6.80	7.10	6.80

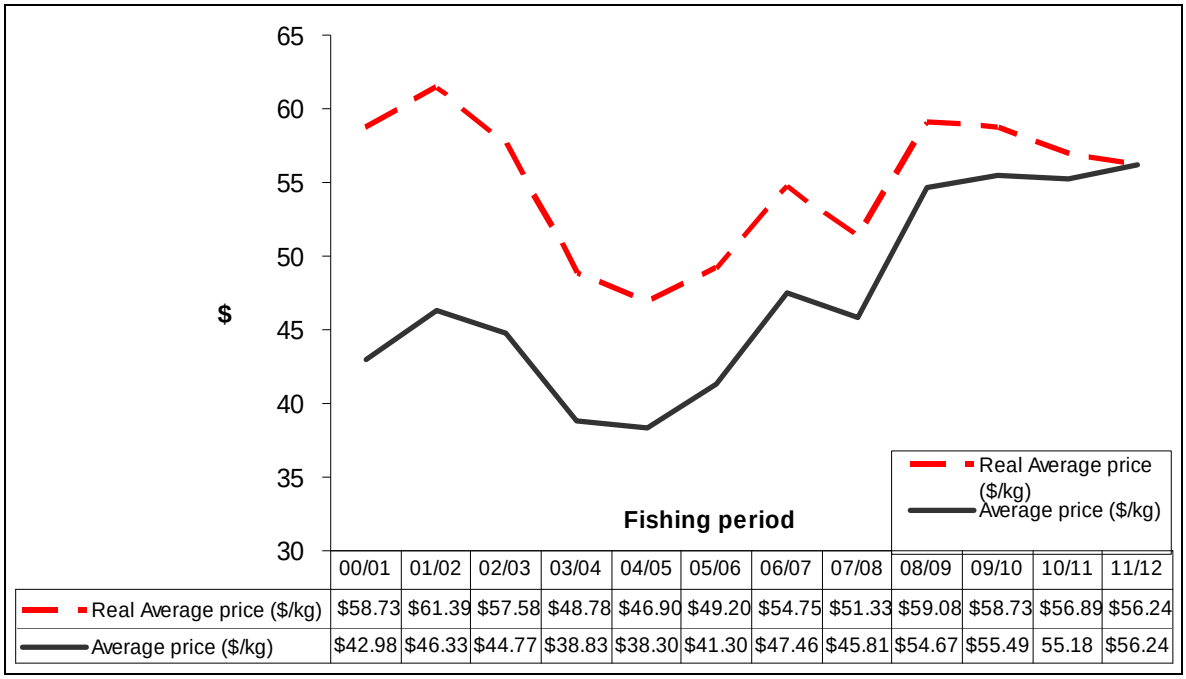
Figure 2: Value of production, 2000/01 to 2011/12

4.3 Prices

Beach prices have been relatively stable for the last four years, falling slightly by 3 per cent between 2009/10 and 2010/11 from $58.73/kg (in real terms) to $56.89/kg (Figure 3). For the first nine months of 2011/12 the average beach price has been $56.24/kg, suggesting that the final price for the year will be lower than the previous year, as prices generally 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).

ABARES (2012) forecasts that prices for rock lobster on domestic markets will increase over the medium term as a result of production limitations in the major rock lobster producing states and an assumed depreciation of the Australian dollar.



	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12
Real Average price ($/kg)	$58.73	$61.39	$57.58	$48.78	$46.90	$49.20	$54.75	$51.33	$59.08	$58.73	$56.89	$56.24
Average price ($/kg)	$42.98	$46.33	$44.77	$38.83	$38.30	$41.30	$47.46	$45.81	$54.67	$55.49	55.18	$56.24

Figure 3: Beach prices in real and nominal terms, 2000/01 to 2011/12

4.4 Catch per unit effort

Catch per unit of effort has increased markedly over the period since 2001/02. Catch rates in achieved during the past four years are the hightest levels for the last 38 years. Catch per unit effort in 2010/11 was marginally lower (0.4 per cent) compared to 2009/10. It is likely that catch per unit effort for the current fishing year (2011/12) will be higher than for 2010/11.

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.

4.5 Rock lobster markets

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 2009/10 total Australian production of rock lobster was 9,628 tonnes, a fall of 20 per cent from the previous year when it was 12,045 tonnes. 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)[1]. 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 to some extent with Western Australian and South Australian product at the Sydney Fish Markets, however there is very limited promotion of NSW product to differentiate it 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. The Committee urges industry to investigate marketing approaches for NSW product. As part of this investigation, the potential benefits to NSW lobster product from gaining Marine Stewardship Council export approval could also be looked at.

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 southern rock lobsters over NSW lobsters at the Sydney Fish Markets. The Committee believes that it is worth investigating the factors behind this premium.

The Committee <u>recommends</u> that Industry investigate marketing approaches for New South Wales Lobster to help with product differentiation.

At last year's TACC meeting, industry reported 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. In 2010/11 it represented only 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. Rock lobster accounted for about one third of the total value of fisheries product exported in 2009/10 (ABARES 2011).

Prices for rock lobster on overseas markets have been high because of strong demand and reduced supply. 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 was not as great as expected due to record high export prices in the first quarter of 2010/11. Overall, prices for rock lobster increased on overseas markets in 2010/11 when compared to 2009/10. (ABARES, 2011; ABARES 2012). Prices on overseas

[1] 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).

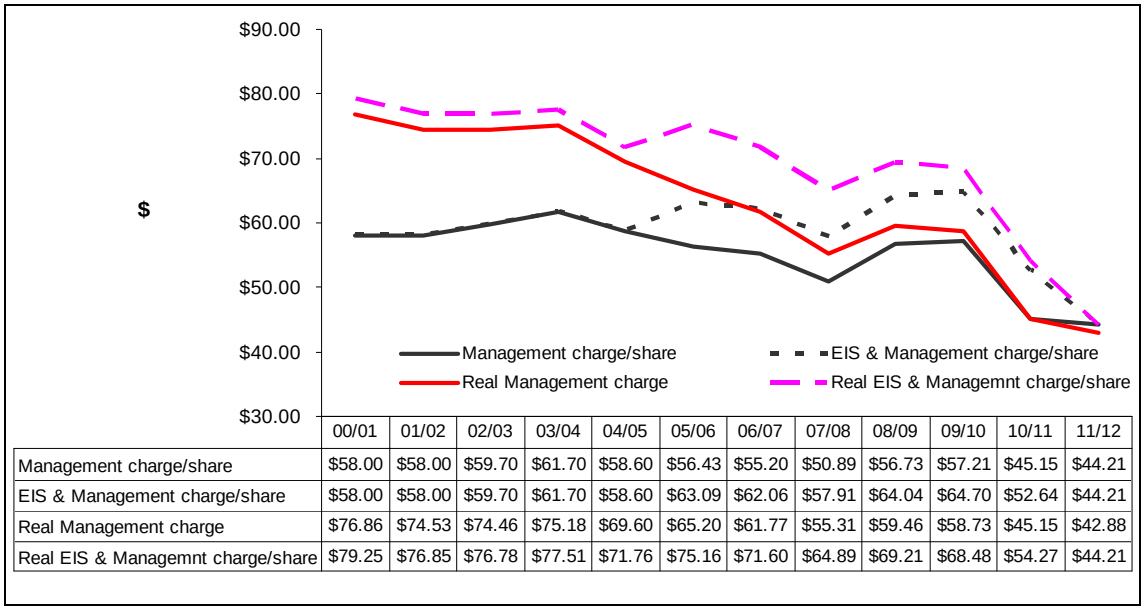
markets are expected to continue to increase over the medium term due to an assumed depreciation of Australian dollar against the US dollar and Japanese Yen.

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.

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 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 fell by around 20 per cent from $57.21 per share in 2009/10 to $45.15 per share in 2010/11 (Figure 4). Management charges fell again by a further 2 per cent, to $44.21 per share in 2011/12. The significant decrease in management charges between 2009/10 and 2010/11 was due, in part, to no dedicated lobster compliance salaries being recovered in 2010/11; which was again the case in 2011/12.



	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12
Management charge/share	$58.00	$58.00	$59.70	$61.70	$58.60	$56.43	$55.20	$50.89	$56.73	$57.21	$45.15	$44.21
EIS & Management charge/share	$58.00	$58.00	$59.70	$61.70	$58.60	$63.09	$62.06	$57.91	$64.04	$64.70	$52.64	$44.21
Real Management charge	$76.86	$74.53	$74.46	$75.18	$69.60	$65.20	$61.77	$55.31	$59.46	$58.73	$45.15	$42.88
Real EIS & Managemnt charge/share	$79.25	$76.85	$76.78	$77.51	$71.76	$75.16	$71.60	$64.89	$69.21	$68.48	$54.27	$44.21

Figure 4: Management charge/share, nominal and CPI adjusted value (real price) for each fishing period from 2000/01 to 2011/12.

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, which are borne out by landings data, 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 Ocean Trap and Line, which is used 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.

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 reasonable to assume that there have been no major changes to costs and, consequently, 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.

In its 2010/11 and 2011/12 determinations, 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. Table 2 below provides a example summary of the indicators presented by EconSearch to the SA rock lobster Fishery and Appendix 3 is the latest economic report for that fishery. The Committee believes that sound economic data is an essential part of the decision making process and a vital complement to biological data, given the economic objects of the Fisheries Management Act[2].

The Committee also recommended, in its 2010/11 and 2011/12 determinations, that the issue of funding for the cost survey, (government, industry or some combination), should be resolved as a matter of urgency. Other States and the Commonwealth generally use government funding for economic surveys of the fishing sector[3].

The Committee notes the Department's responses to the two recommendations above: that the Lobster Industry Working Group does not consider this a priority at this stage given that the lobster stock is still recovering. However, the Committee believes that the Department and industry should work together now to design a process for collecting information on the costs of fishing. An early start would allow the lobster industry time to put in place necessary data collection processes and create a meaningful times series, so that it is well placed to use information from the surveys in the future.

In order to better appreciate the benefits of conducting a survey the Committee also recommends that the Department and industry invite EconSearch to present information on the process involved in collecting economic data and the benefits of collecting this data.

The Committee repeats its <u>recommendation</u> that a survey of the costs of lobster fishing be undertaken.

In order to better appreciate the benefits of conducting a survey the Committee also <u>recommends</u> that the Department and industry invite EconSearch to present information on the process involved in, and benefits of, collecting economic data.

[2] Which include the promotion of viable commercial fishing and aquaculture industries, and to provide social and economic benefits for the wider community of New South Wales.

[3] 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.

Table 3.5 Financial performance in the SA Southern Zone Rock Lobster fishery by return to capital quartile, 2006/07 (average per boat)

	Average per boat [a]				
	Lowest 25%	Second Quartile	Third Quartile	Highest 25%	All Boats
Gross Income	**$418,788**	**$406,838**	**$466,242**	**$520,010**	**$452,604**
Costs					
Fuel	$29,216	$22,147	$24,749	$19,631	$23,925
R&M	$27,779	$20,417	$19,555	$18,045	$21,417
Bait	$11,471	$9,986	$10,035	$9,576	$10,261
Provisions	$750	$50	$575	$172	$385
Labour	$151,133	$126,810	$120,858	$102,547	$125,303
Licence fee	$18,574	$19,189	$18,034	$18,951	$18,685
Insurance	$7,667	$5,862	$6,869	$5,704	$6,522
Interest	$22,515	$14,549	$20,316	$37,405	$23,557
Admin and Other	$12,198	$9,548	$12,194	$12,612	$11,621
Total Cash Costs	**$281,301**	**$228,558**	**$233,185**	**$224,645**	**$241,677**
Cash Operating Surplus	**$137,487**	**$178,280**	**$233,057**	**$295,365**	**$210,927**
Depreciation	**$62,176**	**$42,702**	**$40,668**	**$38,255**	**$45,855**
Earnings Before Tax	**$75,311**	**$135,578**	**$192,389**	**$257,110**	**$165,072**
Earnings Before Interest & Tax	**$97,826**	**$150,127**	**$212,705**	**$294,515**	**$188,629**
Capital					
Fishing Gear & Equipment	$408,714	$345,423	$336,532	$254,393	$336,370
Licence Value	$2,860,593	$2,891,277	$3,167,636	$3,402,154	$3,079,283
Total Capital	**$3,269,307**	**$3,236,700**	**$3,504,168**	**$3,656,547**	**$3,415,653**
Rate of Return to Fishing Gear & Equip	**23.9%**	**43.5%**	**63.2%**	**115.8%**	**56.1%**
Rate of Return to Total Capital	**3.0%**	**4.6%**	**6.1%**	**8.1%**	**5.5%**
Average Number of Pots Owned [b]	65	63	70	76	68
Average Number of Pots Leased [b]	0	0	1	1	0
Average Total Pots	**66**	**63**	**71**	**76**	**69**

[a] Totals may not sum due to rounding.

[b] The average number of pots owned and leased by licence holders is based on information from the 2004/05 survey results.

Source: EconSearch analysis.

Table 2 Financial performance indicators in the SA Southern Zone Rock Lobster Fisheries

4.9 Shares

There are currently 102 shareholders in the lobster fishery who are eligible for a lobster fishing endorsement. Of these, 82 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 has increased from 89 in 2010/11 to 95 in 2011/12. This has increased from 54 in 1996/97. There has been an increase in the number of shareholders who hold large shareholdings and a reduction in the number of shareholders who hold small shareholdings (Figure 5). There has also been a redistribution of shares from small to large shareholders.

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 2010/11 reported catch was landed by 16 fishing businesses, while 75 per cent of catch was landed by 37 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 proposed implementation of an on-line quota transfer system will assist in lowering the transaction costs associated with quota transfers.

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 and notes that the Department has initiated consultation with industry representatives on an interim maximum shareholding to improve operational flexibility. Industry representatives have proposed that the interim maximum shareholding be 700.

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.

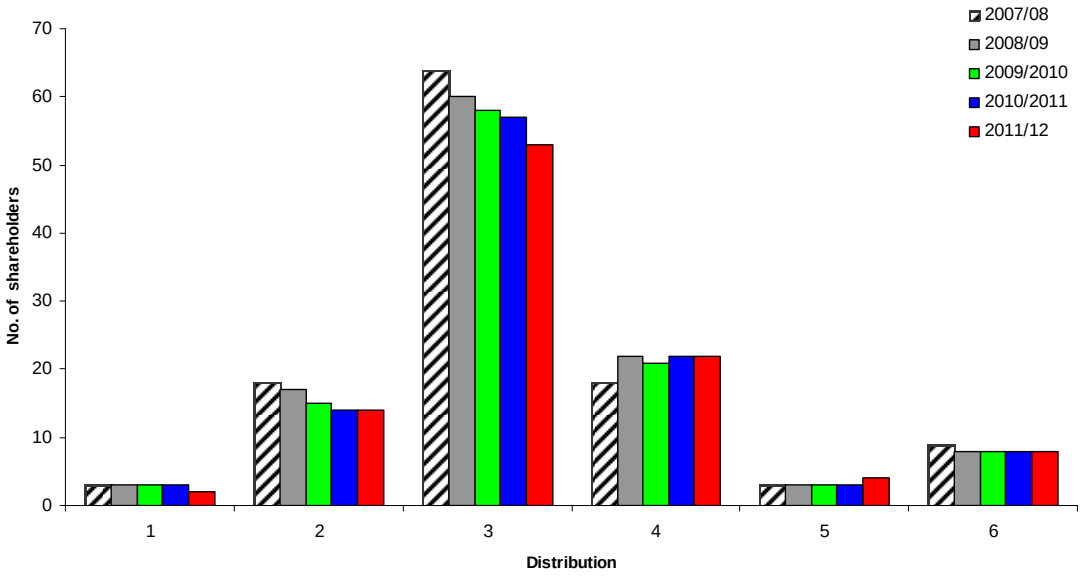


Figure 5. Distribution of shareholders that hold between 0 – 19, 20 – 54, 55 – 99, 100 – 149, 150 – 199 and > 200 shares in the 1999/00, 2007/08, 2008/09, 2009/2010 and 2010/2011 fishing periods. ***# 2011/12 data as at April 2012.***

The Department has indicated, and the Committee agrees, that structural change in the industry is desirable in order to achieve 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 result of restructuring is to improve the long-term economic 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 2011/12 to date, 11 lobster share transactions have been processed at an average price of $2022. This is lower than in 2010/11, when eight share transactions took place at an average price of $2036. 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. Indeed, a recent public tender run by the department for the sale of 14 lobster shares, available due to forfeiture offences, drew a winning bid of $3050 per share.

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 (Figure 6). However, reasonably flat share prices since this time indicate that the future outlook for the fishery is 'status quo'. This is in contrast to the high price paid for shares through a recent public tender run by the department, which would tend to indicate, even as a one-off, that optimism in the fishery continues to improve.

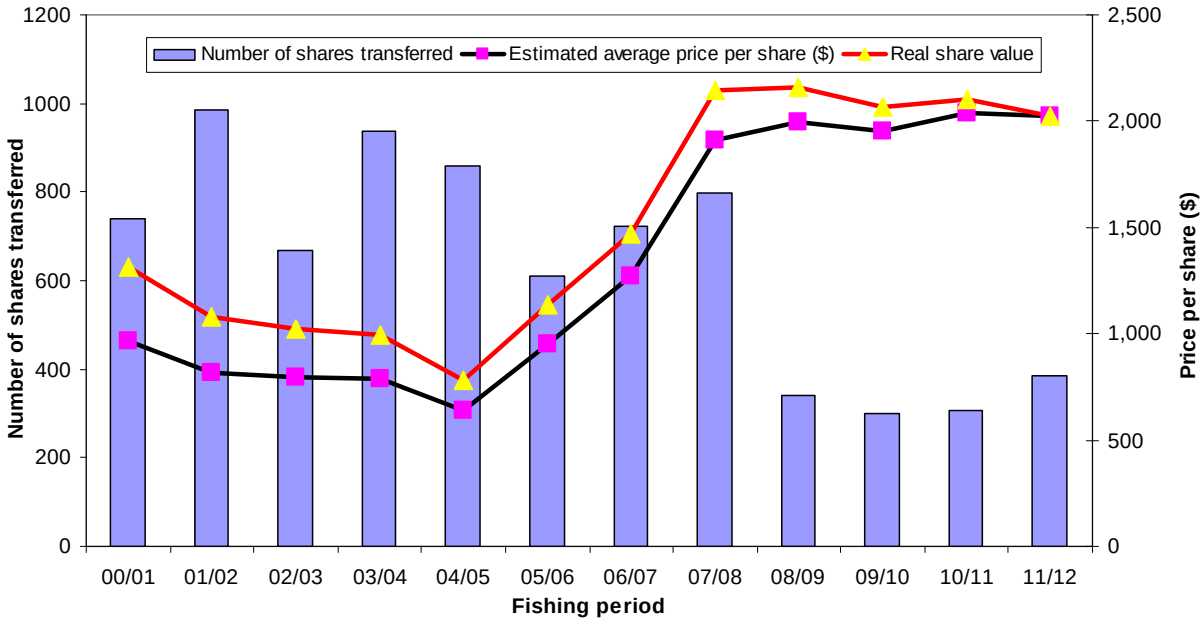


Figure 6. Number of shares transferred, estimated share price and CPI adjusted (real share price) by fishing period from 1999/00 to present. *#2011/12 data as at April 2012.*

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

The amount of quota transferred has fallen gradually over the past four years. In 2010/11 there were a total of 77 quota transactions representing 39.3 tonne of quota (30 per cent of the TACC). 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 was scheduled to start in June

2012 but has now been delayed, will assist in reducing transactions costs associated with quota transfer and should, therefore, increase the efficiency of these transfers.

Table 3: **Total quota transferred (t), number of quota transferors and transferees, amount of TACC transferred (%) and the average price paid for quota ($/kg) in each fishing period from 1996/97 to 2011/12.** ***# 2011/12 data as at April 2012.***

Fishing period	Total quota transferred (t)	Quota transferors (out)	Quota transferees (in)	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	39.3	48	41	30%	$17.5
2011/12	43.2	44	41	29%	$17.6

In past reports, the Committee suggested that the trend (between 2000/01 and 2007/08) in the number of quota transferors significantly exceeding the number of transferees indicated progressive reallocation of quota from smaller to larger operators. However, since this time, the margin with which quota transferors has exceeded transferees has been declining, suggesting a slowing in reallocation of quota from smaller to larger operators.

The very largest businesses, in term of numbers of shares held, were most likely to transfer quota into the business and the smallest shareholders were more likely to transfer quota out than businesses with more shares, possibly reflecting the benefits of scale/specialty operations. However, there was a reasonable level of quota transfers, both in and out of businesses of all sizes.

There is a relationship between the percentage of TACC caught and the percentage of quota transferred, albeit an imperfect one. License holders are likely to be 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.

In the current fishing period to date, only 22 per cent of quota transferees provided data on the price of quota transfers. The available information, while possibly not representative, indicates that quota prices in 2010/11 and 2011/12 to April were

higher than in 2009/10. This reverses a downward trend in quota prices that had been observed since 2007/08. Higher quota prices are possibly an indication of an improvement in the short run profitability of the industry, despite this being at odds with trends in share prices.

In past determinations, the committee has observed that the price per kilogram of transferred quota is 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.

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.

In last year's determination, the Committee recommended that the Department and LobMAC encourage fishers to make further efforts to report price information for quota transfers.

The Committee notes the Departments response to its recommendation: that once legislative amendments have been completed, an on-line system for transferring quota will be operational which will facilitate better reporting of quota transfer prices. However, even with the on-line system, reporting of prices for quota transfers is optional. As such, the Committee is still of the opinion that fishers should continue to be encouraged to provide information on the price of quota transfers.

The Committee repeats its recommendation that the Department and the Lobster Industry Working Group encourage fishers to make further efforts to report price information for quota transfers.

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. 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 2010/11 represents around 22 tonnes. At prices prevailing in 2010/11 illegal take in the fishery is estimated to be worth $1.2 million.

In its previous determination the Committee recommended that Industry consider investing more heavily in compliance activities to assist in reducing illegal catch in the fishery. The Committee notes the Department's response to this recommendation, i.e. that at a LobMAC meeting held in 2010, industry representatives advised that they would only pay operating costs for compliance in the budget and would no longer pay for a salary to bring them in line with other NSW quota managed fisheries.

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 take 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.

In its 2011/12 determination the Committee 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 the Departments response to this recommendation, but considers the response to be inadequate. As such, the Committee reiterates its response in this year's determination.

The Committee repeats it recommendation 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. It is especially difficult to get a handle on how many lobster are being taken through indigenous permits. Departmental compliance officers report that while the number of requests for indigenous permits and potential catch is large, the actual catch is only a fraction of the total permitted.

In its 2011/12 determination the Committee recommended that the Department continue to invest resources in obtaining more robust time-series estimates of recreational and indigenous catch.

The Committee notes the Department's response to this recommendation:

1a) A project has commenced that seeks to develop and test cost-effective methods for monitoring recreational fisheries at a state-wide scale.

1b) Preparations for a state-wide survey building on the methodology from the previous National Survey have commenced.

1c) Telephone sampling of the recreational sector for a 12 month period will commence in August 2012 with a diary system to be implemented in November 2012.

2) A new lobster tag has recently been developed, as a tool for compliance, for use with Section 37 permits issued for Aboriginal cultural and ceremonial fishing.

The Committee is pleased that the Department is making efforts to gather better recreational fishing data, however, it is still concerned that it will be very difficult to get data on recreational lobster fishing through the survey/s, due to the recreational lobster fishery having low participation rates and an inabilty to identify which recreational license holders were taking rock lobster. As suggested at the 2011 TAC Committee meeting, the Department could, as a starting point in collecting better data on the level of recreational lobster take, amend conditions on the recreational fishing licence to require that people identify whether they are taking, or intend to take lobster. The Committee would like to be updated on how this is progressing.

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

Until such time as better data on recreational lobster take is available, the Committee will continue to use a figure of 25.8 tonnes of recreational catch in arriving at its TAC estimate. At current prices, 25.8 tonnes of catch is worth $1.5 million. At the most

recent TAC Committee open meeting, Industry and the Department acknowledged that the estimate of 25.8 tonnes of recreational catch was likely to be too high.

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. In its 2011/12 determination, the Committee recommended that the Department direct funding towards developing a resource-sharing model for the lobster fishery, as is currently occurring in the WA lobster fishery. The Committee notes the Departments response to this recommendation: that Departmental policy on resource sharing will be developed across major harvest sectors, but that this work has been delayed by other higher priorities.

The Committee repeats its <u>recommendation</u> that the Department direct funding towards developing a resource-sharing model for the lobster fishery.

4.15 Economic data

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. Economic data would also place the Lobster Industry Working Group in a much more informed position regarding the review of the share management plan for the lobster fishery. It would also be helpful in assisting the Department to develop a more meaningful set of economic performance indicators for the fishery.

In its 2011/12 determination the Committee recommended that the Department place more importance on the gathering of economic data in order to better understand the optons for, and impacts of, fisheries management decisions on the financial well being of industry. The Committee notes the Department's response to this recommendation, i.e. Industry wants to remain focussed on building biomass and ensuring ongoing security of the resource and that gathering of economic data is not considered a priority at this stage. The Committee also notes that in past informal communication, the Department has indicated that it is not in a position to expand its support of the Committee in its endeavours to meet its statutory obligation regarding the economic circumstances of the industry.

The Committee repeats its <u>recommendation</u> 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.

Better economic data would place industry in a much more informed position regarding setting of the TACC in order to maximise profits. 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 discussed earlier in this report, in order to collect information on the net return from lobster fishing, 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.

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 repeats its recommendation 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 repeats its recommendation that the Department and Industry undertake a study to investigate the relationship between length and economic yield in the lobster fishery.

4.16 Community Contribution

The community contribution charge in the NSW commercial lobster fishery was based on a decision by the NSW Government to return economic rent being earned by lobster fishers to society. It was designed on the basis that in a well-managed fishery with TAC set with reference to Maximum Economic Yield, there is potential for economic rent to be earned by fishers.

Economic rent is profit (after accounting for all costs, including the full costs of management) 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. 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. 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 fishery[4].

It is a political decision as to whether or not rent is collected from a fishery, or is left with fishers, and how much of the rent to collect. Rent should only be collected if it is cost-effective to do so. The fact that many state and Commonwealth fisheries agencies, who have attempted to collect resource rents, have later abandoned those proposals and programmes, may be evidence that it is not cost effective to collect resource rents in commercial fisheries.

The current community contribution charge in the lobster fishery of $115 per shareholder was set to change in February 2012, though no decision has been taken as yet. The community contribution charge was then to 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. 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. However, even before this is done, the NSW Government should demonstrate the appropriateness of collecting a resource rent charge and should

4 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)

undertake a cost/benefit analysis of determining and collecting payments in order to demonstrate whether it is cost effective to collect a resource rent charge from the fishery.

The Committee recommends that the application of the Community Charge in the lobster fishery be postponed until such time as the NSW Government can demonstrate the appropriateness and cost effectiveness of collecting a resource rent charge.

4.17 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 a perception by industry that the future outlook for the fishery is positive. The increase in viability is a result of a number of factors including increases 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 reflecting increasing catch rates and 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 the lobster industry investigate marketing approaches for New South Wales rock lobster to help with product differentiation; 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 the lobster industry does not see the collection of economic data as a priority at this stage, however the Committee is of the opinion that such data collection must start now. Better economic data, such as information on the net return from lobster fishing, will allow for a TACC to be set that maximises economic returns from lobster fishing. It will also facilitate better management decisions by allowing the department to better understand the impacts of alternative management options on the financial well being of industry.

The Committee notes that efforts are being made to collect better recreational and indigenous catch data. However, further efforts need to be made to obtain more robust time-series estimates of recreational and indigenous lobster 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 2012/13 is based on strengthening the prospect of restoration of the spawning stock and maintenance of an appropriately sized available biomass, while providing a buffer for any future downturns in recruitment to the fishery or changes in targeting practices. 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.

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 2012/13 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 were not formally standardised for changes in details such as the gear, area, depth or time of fishing operations; unstandardised catch rates are calculated as the total catch divided by the total effort in the area/time of interest. In the last few years catch rates are reported both in the unstandardised 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, and this year the standardised catch rates are regarded as the 'base case' interpretation.

The total catches are shown in Figure 5.1. The total catch, effort and catch rates since 1969/70 are shown in Figure 5.2. The detailed catch, effort and catch rate by area and depth since 1997/8 are shown in Figure 5.3. These figures provide data from the most recent complete catching year (2010/11) and a preliminary estimate of the catch rate in the current incomplete catching year (2011/12). Although data from 2011/12 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 5.3) and so the annual catch and aggregate catch rate for 2011/12 are expected to be higher than the incomplete figures indicate.

Both unstandardised and standardised catch rates (Fig 5.2) show similar trends, though as expected the absolute changes and recent rate of increase are smaller for the standardised catch rate.

Both unstandardised and standardised catch rates show an increase during the seven years 2000/01 to 2007/08, followed by stabilisation and a relatively constant catch rate since 2007/08. The exploitable biomass has been expected from model predictions to decrease following the increases in TAC since 2007/08. However the standardised catch rate is more consistent with a general stabilisation than a decrease. The reasonably stable catch rate in the last few years is widespread across depths where significant fishing effort has been expended (Fig 5.3). The incomplete data from 2011/12 indicate similar catch rates to recent years in most areas. Some very high catch rates have been recorded in the 10-30m depth areas in the far-north coast in the last two years. This is particularly encouraging as it implies an expansion of the breeding stock into this area. The catch rates in deep water (>30m) on the central and north coasts remain high. These are maturing lobsters from southern regions recruiting to the spawning stock.

Overall the catch and catch rate data support interpretations that the stock is broadly stable and slowly increasing in recent years, having increased significantly from the low levels in 2000-2002. Inshore catch rates of small lobsters are fluctuating, at least partly in response to patterns of recent puerulus settlement, and deeper catch rates of maturing lobsters showing continued recruitment into the spawning stock.

The difference between the unstandardised catch rate (i.e. the catch rate experienced by fishers) and the standardised catch rate (i.e. the index of exploitable stock abundance) has been very wide in the past 5 years and appears to be growing. Since the low catch rates in 2000-2002 the unstandardised catch rate has increased to more than double the standardised catch rate. This is interpreted as being due to on-going increase in the efficiency of fishing on top of the substantial increase in the abundance of the exploitable stock between about 2002 and 2006 following the TAC reductions during that time. A consequence of this growing difference in the standardised and unstandardised catch rate, with fishers experiencing the increasing unstandardised catch rate in their operations, could be an overoptimistic interpretation of the state of the exploitable stock by fishers.

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 5.4. This is the area the area occupied by the mature lobsters. T his size composition was last updated in 2010/11 as part of monitoring every second year, so this Figure has not changed since last year's assessment. 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 5.2 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 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. 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 ^{o}S and greater than 10m depth from 28-30 ^{o}S; see Figure 5.3) 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; see Figure 5.4.
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 2011/12 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 have 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 was unclear at the time. 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 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), 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), by widespread and unusually high natural mortality on the spawning stock, or by excessive fishing on the spawning stock. The first two explanations invoke naturally fluctuating environmental conditions and became 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 that was considered most plausible was 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 decreased 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. This is now by far the most credible interpretation of the collapse of the spawning stock. The spawning stock has slowly rebuilt under the 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 now 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. So a median depletion estimate of 0.3 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, as used by the Committee.

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:

- This is probably above the depletion 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 puerulus recruitment was systematically reduced as the spawning biomass has been reduced. From preliminary analysis of the observed puerulus settlement was on average about half when the spawning stock was depleted to 10% compared to the settlement 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 puerulus settlement compared to settlement 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 applied by the Committee. 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. Further it not yet possible to clearly relate changes in puerulus settlement to changes in recruitment to the exploitable biomass, though there is reasonable evidence from past fluctuations that there is a positive correlation between the two. 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. 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 risk. These

uncertainties 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 (eg 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 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 puerulus surveys starting in 1995/96. However both are already providing critical information for interpreting trends in juvenile and spawning stock abundance in the fishery. The combination of spawning stock, puerulus monitoring and fishery monitoring is beginning to have sufficient observations and contrast to allow direct examination of the relationship between spawning stock, settlement of puerulus and recruitment of lobsters to the exploitable stock. 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, and this will greatly help to optimise future management and the fishery.

In the far northern areas the puerulus settlement has been about average for the last 4years, 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 3y.

In the southern areas the puerulus settlement has been higher than average for the last 6y, and was extremely high in the most recent year. 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 were not updated in 2012. This survey 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 change in monitoring 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 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.

This approach to categorising the various reported and unreported catches in 2010 can be summarised as:

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

These estimates and judgements were discussed at length again this year. It was accepted that there was no objective basis for change in the interpretations from last year and that there was considerable confusion about how different elements of the unreported catch were being interpreted and reported by different people. It was thought that the recreational catch was most likely much less than 25.8t. It was also thought that that the unreported commercial catch could be in the range 10-20% but that it had substantially decreased in recent years. It was agreed that a special working group of relevant people would be formed to examine the issues and estimates of recreational and unreported catch in more detail, and to provide some best estimates and ranges, for use in the stock assessment process next year.

The Committee recommends that researchers, industry and managers work together to develop agreed definitions and scenarios/estimates for removals from the fishery other than reported commercial catch (including recreational, non reported and illegal).

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 it 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 of the model was examined for two interpretations of the catch rate (i.e. the unstandardised and the standardised catch rate) and for two interpretations of recent unreported catch (i.e. a high unreported catch scenario of 17% of reported commercial catch plus a non-commercial catch of 28.5t and a low unreported catch scenario in which recent unreported catch is 8.5% of reported commercial catch plus a non-commercial catch of 10%). These are the same unreported catch scenarios as were used in last year's assessment. The base case interpretation is the standardised catch rate combined with the low unreported catch scenario. The high unreported catch scenario is high in the range considered likely, and so the projections based on these assumptions are expected to be somewhat over-pessimistic. Conversely the interpretations based on the low unreported catch scenario expected to be somewhat over-optimistic.

The model fit to the catch rate and length frequency data is reasonable, but there is tension in trying to fit data both simultaneously. None of the model fits matched the rapidly increasing catch rate in the last 4y-5y, although the standardised catch rate data provides a more consistent fit than the raw catch rate data. The model interpretations are of a relatively stable or slightly decreasing exploitable stock abundance through those years, rather than of an exploitable stock abundance that is rapidly increasing.

5.3.2 Present stock levels

The key population and depletion estimates, for the combinations of catch rate (i.e. unstandardised or 'raw' catch rate and standardised catch rate) and unreported catch interpretations (i.e. high and low scenarios) are:

	Median	**5% limit**	**95% limit**
Unexploited total biomass (K)			
Raw CPUE & High unreported catch	6,113	5,841	7,333
Raw CPUE & Low unreported catch	6,103	5,836	7,326
Std CPUE & High unreported catch	6,121	5,842	7,374
Std CPUE & Low unreported catch(base case)	6,108	5,836	7,375
2011-12 total biomass			
Raw CPUE & High unreported catch	2,042	1,540	3,301
Raw CPUE & Low unreported catch	2,246	1,663	3,561
Std CPUE & High unreported catch	2,127	1,574	3,434
Std CPUE & Low unreported catch (base case)	2,319	1,686	3,738
2011-12 total biomass/K			
Raw CPUE & High unreported catch	0.33	0.28	0.49
Raw CPUE & Low unreported catch	0.37	0.28	0.49
Std CPUE & High unreported catch	0.35	0.27	0.47
Std CPUE & Low unreported catch (base case)	0.38	0.29	0.50
Unexploited spawning biomass			
Raw CPUE & High unreported	2,228	2,129	2,672

catch			
Raw CPUE & Low unreported catch	2,224	2,127	2,670
Std CPUE & High unreported catch	2,231	2,129	2,687
Std CPUE & Low unreported catch (base case)	2,226	2,127	2,688
2011-12 spawning biomass			
Raw CPUE & High unreported catch	586	425	1,000
Raw CPUE & Low unreported catch	655	459	1,099
Std CPUE & High unreported catch	620	434	1,063
Std CPUE & Low unreported catch (base case)	684	461	1,172
2011-12 spawning biomass/unexp. spawning biomass			
Raw CPUE & High unreported catch	0.26	0.20	0.39
Raw CPUE & Low unreported catch	0.29	0.21	0.41
Std CPUE & High unreported catch	0.28	0.20	0.40
Std CPUE & Low unreported catch (base case)	0.31	0.22	0.43

All of the model interpretations are very similar:

- the spawning biomass has increased measurably and steadily over the past 5y (in the base case by about 3.4% per year from the starting abundance);

- the rate of increase in the spawning biomass has slowed in the past 2y (in the base case to about 2% per year from the starting abundance);

- the spawning biomass has rebuilt to the limit reference point (median estimate in the base case 0.31 with a 95% confidence interval from 0.22 to 0.43);

- the exploitable biomass has been very slowly but steadily decreasing over the past 5y (in the base case by about 1% per year from the starting abundance).

This indicates that the management measures of the past several years have had the desired effect of rebuilding the stock, although the spawning stock is still significantly depleted and is only very slow rebuilding occurring under the recent catch levels.

All model interpretations imply a decrease during the past 5y in the abundance of lobsters in the size range that can be legally retained by the fishery.

The standardised catch rate gives a better fit to the available data than the raw catch rates, supporting the use of this as the base case interpretation. However the model interpretation of a slowly decreasing exploitable biomass during the past 5y is somewhat at odds with the approximately constant standardised catch rate over the same period. This difference is not great and it does not cast significant doubt on the overall interpretation of stock status and trend, but it is persistent. Possible causes of this difference are not mutually exclusive and include increasing fishing efficiency beyond that accounted for in the catch rate standardisation, higher than average recent recruitment (consistent with the observed increasing trend in average puerulus over the period) and lower than assumed unreported catch (consistent with some views expressed about recent trends and the absolute levels of unreported catch). The evidence available is more consistent with the inconsistency being due to recently increased recruitment and/or overestimated unreported catch rather than to changed fishing efficiency. And if that is the case the interpretations will be overly cautious rather than overly risky with respect to stock status and trends. To the extent that fluctuations to above average recent recruitment is responsible then it is expected that in future the stock and fishery will be subject to period of below average recruitment. However if the observed high puerulus settlements in recent years are a systematic result of the increased spawning stock or 'simply' part of natural fluctuation then this increased settlement could be expected to continue, on average, while the spawning stock remains high.

5.3.3 Predictions of future stock levels

Predictions were made of the change in the biomass that would occur after 5y of catch at various levels.

Predictions were made based on the stock assessments from the two weighting schemed described above, and also for the assessment in which natural mortality was estimated internally. The predicted changes in spawning biomass and exploitable biomass various constant future catches during the 5y of management from the current year (i.e. biomass in 2017/18 divided by current biomass in 2011/12) are:

Predicted proportionate change in spawning biomass after 5y of various constant future catches		
Total Catch (t)	**Catch rate and unreported catch rate assumptions**	**Increase in spawning biomass ($SB_{2017-18}/SB_{2011-12}$); Median and the 95% confidence interval**
150	Raw CPUE & High unreported catch	1.04 [0.9-1.12]
	Raw CPUE & Low unreported catch	1.08 [1.01-1.13]
	Std CPUE & High unreported catch	1.03 [0.91-1.11]
	Std CPUE & Low unreported catch (base case)	1.07 [1.01-1.12]

175	Raw CPUE & High unreported catch	0.96 [0.78-1.07]
	Raw CPUE & Low unreported catch	1.01 [0.91-1.07]
	Std CPUE & High unreported catch	0.96 [0.80-1.05]
	Std CPUE & Low unreported catch (base case)	1.00 [0.92-1.06]
200	Raw CPUE & High unreported catch	0.88 [0.69-1.03]
	Raw CPUE & Low unreported catch	0.94 [.82-1.03]
	Std CPUE & High unreported catch	0.88 [0.7-1.01]
	Std CPUE & Low unreported catch (base case)	0.93 [0.83-1.02]

Predicted proportionate change in exploitable biomass (104-180mm length lobster) after 5y of various constant future catches		
Total Catch (t)	**Catch rate and unreported catch rate assumptions**	**Increase in exploitable biomass ($B_{2017-18}/B_{2011-12}$); Median and the 95% confidence interval**
150	Raw CPUE & High unreported catch	1.06 [1.00-1.14]
	Raw CPUE & Low unreported catch	1.05 [0.99-1.11]
	Std CPUE & High unreported catch	1.05 [0.99-1.14]
	Std CPUE & Low unreported catch (base case)	1.04 [0.98-1.10]
175	Raw CPUE & High unreported catch	0.89 [0.75- 1.01]
	Raw CPUE & Low unreported catch	0.9 [0.84-0.98]
	Std CPUE & High unreported catch	0.89 [0.77-1.00]
	Std CPUE & Low	0.90 [0.84- 0.98]

	unreported catch (base case)	
200	Raw CPUE & High unreported catch	0.71 [0.44-0.91]
	Raw CPUE & Low unreported catch	0.75 [0.61-0.89]
	Std CPUE & High unreported catch	0.73 [0.47-0.9]
	Std CPUE & Low unreported catch (base case)	0.76 [0.61-0.89]

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 This reflects the higher base catches now applied following TAC increases in each of the last 3y.

Predictions of the relative change in the spawning stock and exploitable stock under different catch levels are remarkable insensitive to the model used. With catches at about the current level 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 about the limit reference point, and the stock available for harvest is predicted to decrease slightly from current levels. These model predictions are very similar to those made last year, and are expected to be slightly pessimistic for the same reasons described above for the model interpretations of stock status and trends.

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 there is still an about ‘even probability’ that the true spawning biomass is below 0.3 of the unfished level. Further rebuilding of the spawning stock is predicted by model analysis to be slow under recent catch levels.

The fishery data, scientific survey data and stock assessment provide reasonably consistent evidence in support of these interpretations. Discrepancies in the last 4-5y 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. The model predictions are somewhat, although not greatly, pessimistic compared to the field observations for both. 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. But the inconsistency is likely to be mainly due to overestimation of the unreported catch and the greater than average recent recruitment.

The patterns of future recruitment will drive fundamental outcomes and options for future stock rebuilding and for the fishery. If the recent increase in average recruitment is statistical variability around an unchanging long-term average then the current catches are likely to be close to the maximum that is sustainable with current size limits. Further, a period of below average recruitment can be expected at some time. However if the recent increase in average recruitment is significantly driven by

the increased spawning stock then the situation is entirely different. The maximum sustainable catch will then depending on just how much the recruitment increases on average as the spawning stock increases, and that can only be determined by observing what happens in nature as the spawning stock is increased.

At this time it is considered appropriate to slightly increase the Total Allowable Commercial Catch (TACC) from 137 to 140t, which corresponds to an increase in the Total Allowable Catch (TAC) from 165 to 168.3t.

This conversion between TAC and TACC uses the same method and unreported catch assumptions as applied last year. The TACC is equal to the reported commercial catch (RCC) and the TAC is equal to the reported commercial catch plus the unreported commercial catch plus the recreational catch. In keeping with the low unreported catch scenario used in the base case 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) from 2010/11 is assumed to be 0.085 of the total commercial catch (RCC+UCC). That is

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

and

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

so that $TACC = RCC = TAC/1.202$.

The reasons that this slight increase in the total catch is considered appropriate include (i) there is a persistent recent increasing trend in puerulus settlement and catch rate of small lobsters inshore, consistent with good recruitment to the fishery for at least the next few years, (ii) this increase in recruitment may be a structural change related to the increased spawning biomass and so it may persist, but if it is not and it reverses then the monitoring and assessment available in this fishery will allow detection of the decrease and an adequate management responses with minimal risk to the spawning stock, (iii) there are many and varied reports of high abundances of large lobsters, and although the fishery independent surveys were not repeated in the most recent year there is little doubt that the spawning stock continues to be protected by the maximum size limit and it continues to build, and (iv) the recreational catch is probably over-estimated.

This total catch is predicted to give *on average* a modest increase of the spawning biomass, but the confidence interval around this average estimate is wide. There is also a reasonable probability of faster rebuilding of the spawning stock under this catch and there is also an appreciable probability that recovery of the spawning stock will stall and reverse under this catch. Also this catch level has an appreciable probability of resulting in a reduced exploitable biomass and therefore reduced catch rates. Much depends on the recruitment to the population that occurs. Progress will be monitored closely in coming years and a change in management settings would be necessary if the spawning stock recovery slows appreciably or if the exploitable biomass is significantly reduced.

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, recruitment to the exploitable stock and spawning stock size, so as to 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. 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 increase the confidence and accuracy of stock status estimates.
    - 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.
5. 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 5. The landed catch since the start of the fishery.

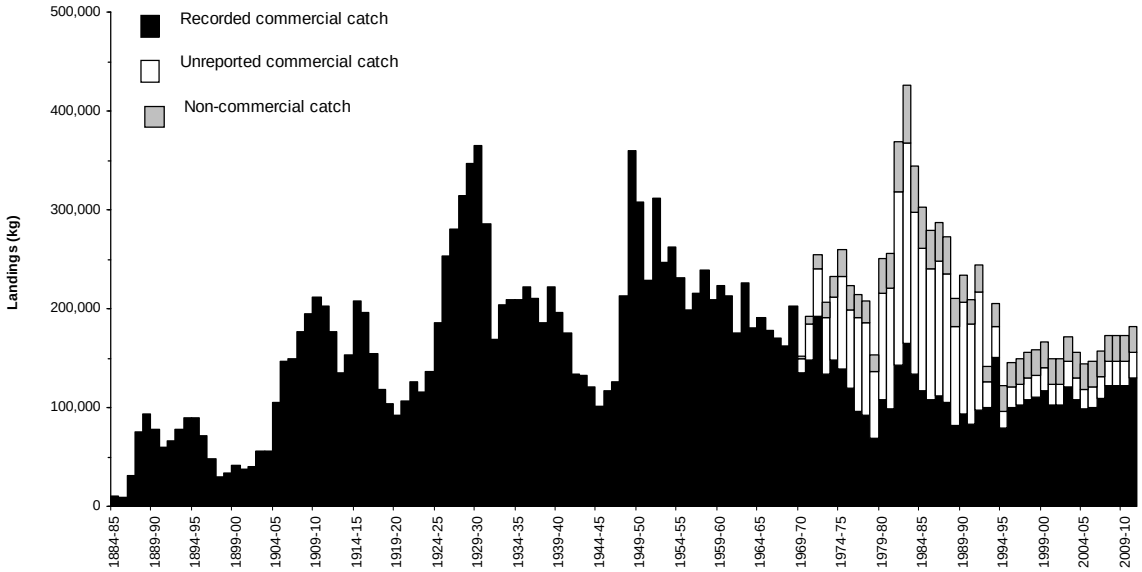


Figure 6. Commercial catch, effort and catch rate since 1969/70 when reliable effort is available.

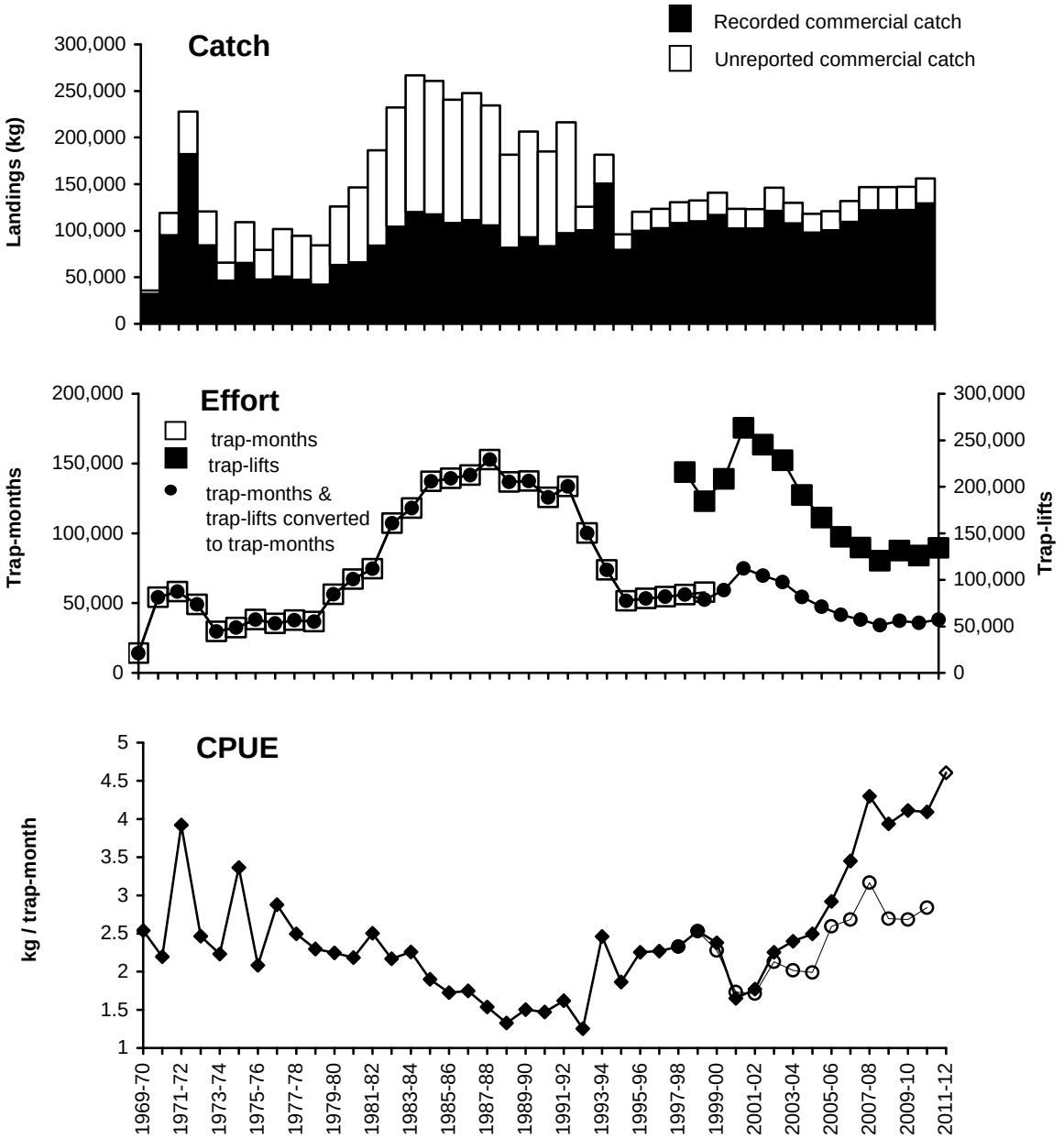


Figure 7. Commercial catch, effort and catch rate by area and depth since 1997/8 when detailed reporting became mandatory. The spawning stock is mostly found in the far north coast (28-30+) and mid-north coast (31-32) at depths greater than 10m and especially depths 10-30m. Open circles are for the incomplete 2011/12 year.

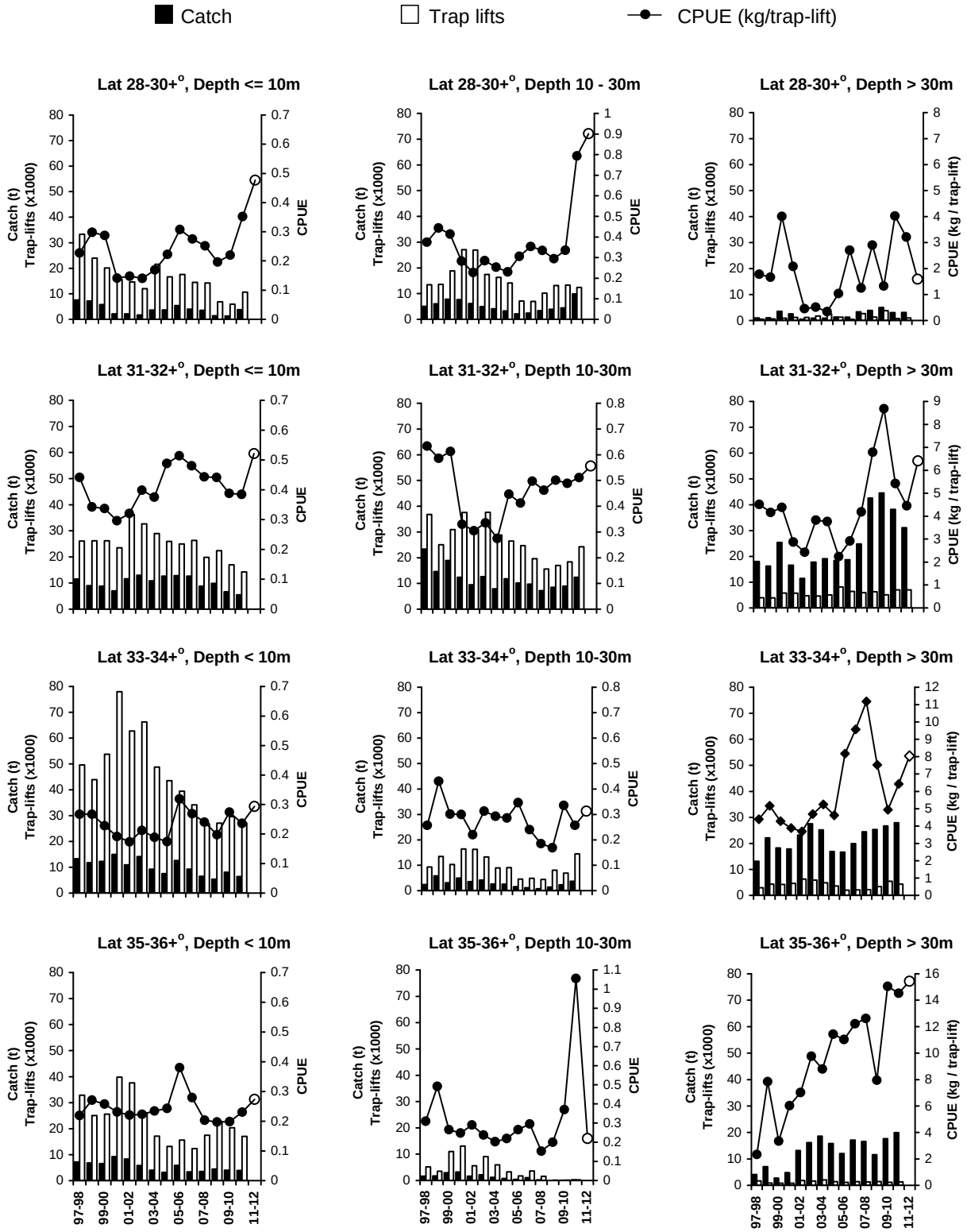
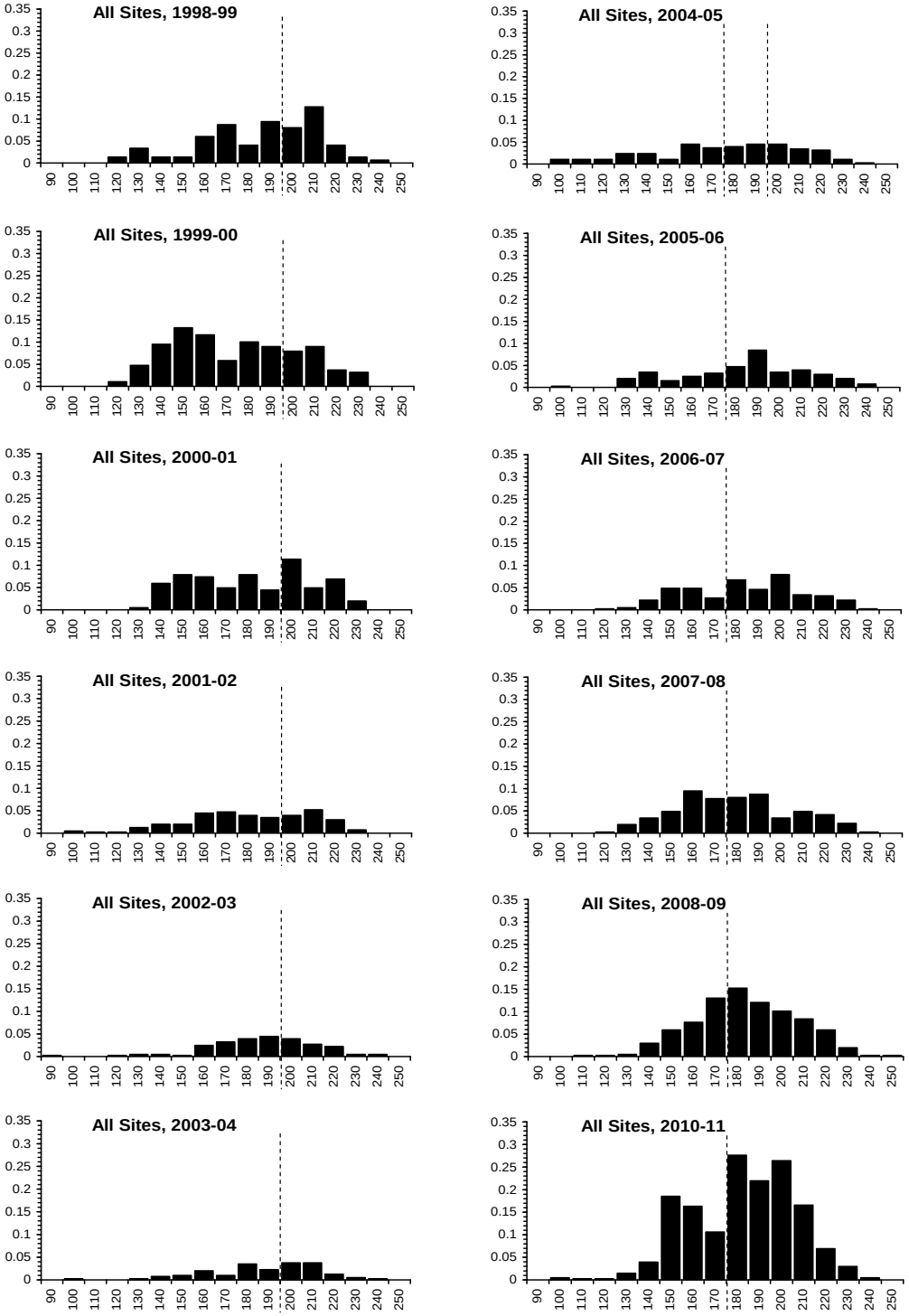


Figure 8. Size composition of lobsters in the commercial catch of the combined mid- and far-northern areas, from data provided by logbooks and augmented by observers. The dashed line is the maximum legal size. These data are updated every second year and have not been updated this year.



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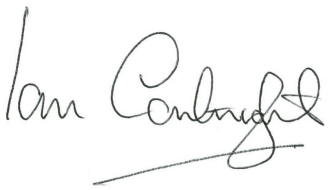
THE DETERMINATION

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 August 2012 to 31 July 2013, should be **140 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
15.2.12	Section 31(1)	TAC Committee called for public submissions on the appropriate level of the annual TACC for Lobster for 2012/13.
15.2.12	Section 284 (1b)	The advertisement was placed in the Sydney Morning Herald, the Daily Telegraph and made available at NSW DPI Head Office and Fisheries Offices.
6.2.12	Section 284 (1b)	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 abalone industry or due to their interest in conservation issues. These groups included the following: ■ All NSW Lobster Shareholders ■ All Members of the Lobster Management Advisory Committee ■ NSW Fishermen's Co-operatives ■ Nature Council NSW Conservation ■ NSW DPI Fisheries Offices
1.4.12	Section 284 (1b)	The TAC Committee allowed a period of at least 30 days for public consultation.
	Section 31 (2)	The TAC Committee gave regard to the following submissions. The respondent included the following: ■ NSW DPI – Commercial Fisheries Management, Research and Compliance. ■ Wallis Lake based Lobster fishermen
27.6.12		The submissions were collated and analysed, and the TAC Committee heard formal presentations regarding views and opinions at the meeting held on 27.6.12. The following made presentations, or provided information to the Committee: ■ Ian Cartwright: TAC Chairman ■ Jessica Hartmann: TAC member ■ Keith Sainsbury: TAC member ■ Bill Talbot: TAC member ■ Belinda Lucas: Fisheries Manager, DPI ■ Anthony Chen: Senior Fisheries Investigator, DPI ■ Geoff Liggins: Manager, Scientific Services, DPI ■ Peter Offner: LobMAC ■ Noel Gogerly: LobMAC ■ Scott Westley: LobMAC ■ Lee Monin: LobMAC ■ Daniel Stewart: LobMAC ■ Mark Cranstone: Lobster fisher ■ Ron Firkin: Lobster fisher ■ Steve Drake: Lobster fisher ■ Dane Van Der Neut: Lobster fisher ■ Tom Van Der Neut: Lobster fisher

Appendix 2* Summary of submissions and the issues

Submission provided by	Issue(s)
Industry and Investment New South Wales	Research, compliance and management reports.