

CHAPTER E ASSESSMENT OF THE IMPLICATIONS OF THE DRAFT FMS

The aim of this section of the EIS is to assess the draft FMS (Chapter D) to determine whether it will effectively reduce the intermediate to high risks to the ecosystem components of the Lobster Fishery identified in Chapter B and ensure that the fishery continues to operate in an ecologically sustainable way for at least the next five years. This section also assesses the economic and social implications of implementing the draft FMS. As was described in the risk analysis framework in Chapter B2, this chapter is a theoretical appraisal of the measures proposed in the draft FMS. Only by monitoring the implementation of these measures will it be possible to fully determine whether they are sufficient to reduce risks in the fishery.

The role of the FMS is to outline the long-term approach to management of the fishery. Accordingly, the strategy does not include full details for the implementation of specific management changes. Ultimately, the FMS will be implemented through various supporting documents and operational plans, such as the share management plan and research and compliance strategic plans, which will establish the specific mechanisms for implementing and monitoring the changes foreshadowed by the FMS. The detailed actions will require consultation with affected stakeholders so as to obtain the support necessary to achieve effective implementation and compliance with the new rules.

E1 Ecological Issues

E1.1 Target species

E1.1.1 Changes to fishery impacts due to the draft FMS

The risk to the target species from the fishery was assessed as intermediate level in the Chapter B of the EIS, with the risk to the spawning stock being of most concern.

Existing management measures which relate to a possible reduction in risk to the rock lobster stock are:

- 2.1(a). The TAC Committee will determine the maximum weight of rock lobster to be taken by the commercial Lobster Fishery.
- 2.1(b). Conduct an annual assessment of the eastern rock lobster resource including a review of the exploitation status of the stock and a risk assessment of alternative harvest strategies.
- 2.1(c). Develop models of the eastern rock lobster population and fishery
- 2.1 (d). Monitor catch and effort for eastern rock lobster in the commercial lobster fishery.
- 2.1(e). Monitor length and sex composition of commercial landings of eastern rock lobster.
- 2.1(f). Monitor recruitment to the population of eastern rock lobster.
- 2.2(b). Prohibit taking rock lobsters below the minimum size limit or above the maximum size limit.

Management response 2.1(a) leads to a reduction in the risk to the immature stock when the TAC Committee recommends changes to the TACC and these recommendations are implemented, as is the case in the 2004/05 year. Management responses 2.1(b) to 2.1(f) provide the modelling and monitoring information which are used by the TAC Committee to arrive at a recommended TACC.

Management Response 2.2(b) provides the opportunity for reducing the impact of the fishery on lobsters by way of maximum and minimum legal sizes.

The major new management response is related to protection of the spawning stock:

- MR 2.2(a): Provide enhanced protection to the eastern rock lobster spawning stock and in particular reduce the maximum size limit from 200 mm to 180 mm carapace length.

This response is a direct commitment to implement urgent remedial management measures, and identifies a particular control mechanism (reduction in maximum size limit) to be implemented.

The timeframe for implementing the management response 2.2a is given in the Appendix to the FMS (this volume) as “within one year”. This timeframe addresses the urgent necessity of implementing management measures to rebuild and protect the spawning stock. The risk to the target stock would be significantly reduced by the implementation of appropriate management measures, including the specified reduction in maximum size from 200 mm to 180 mm, in combination with judicious setting of the TACC.

E1.1.2 Changes to external impacts as a result of the draft FMS

External impacts on the fishery were identified in Chapter B as oceanographic and climatological factors. Implementation of the draft FMS would not result in any change to the external impacts on the fishery.

E1.1.3 Changes to sustainability as a result of the draft FMS

The risk to the sustainability of the target stock is significantly reduced by the management responses in the draft EIS. The proposal to take action to protect the spawning stock and in particular to reduce the maximum legal size limit from 200 mm to 180 mm (MR 2.2(a)) within a timeframe of one year (FMS Appendix 1, this volume) amounts to urgent implementation of remedial management measures, provided that the chosen management measures can provide effective protection of the spawning stock. Reductions in the TACC as recommended by the TAC Committee for the 2004/05 season constitute one of the components in reducing the risk to the spawning stock, but there is a low probability of rebuilding the spawning stock without the urgent implementation of adequate complementary management measures. While a TACC reduction of 25% may roughly translate to a reduction of 25% in the harvest of spawning size lobsters (depending on other factors such as availability/catchability differences with size or stage, the differing proportions of quota used by the fishers targeting sub-adult and mature lobsters), the TAC Committee in its 2004 report recommended that the effect of new management measures should result in an effect equivalent to a zero take of spawning size lobsters. The draft FMS proposes to protect the spawning stock of lobsters and indicates that a reduction in the maximum legal size from 200 mm to 180 mm will be implemented within one year, while other measures such as introduction of spatial and temporal fishing closures may also be considered (MR 2.2(a)). This will reduce risk, while ongoing monitoring of the spawning stock will enable evaluation of the effectiveness of the measures.

While the stock assessment and monitoring processes represent best scientific practice, and the TAC Committee provides further expert review of the assessment of the stock status, the fishery would benefit if the options to protect the spawning stock were canvassed with Lobster Fishery managers from other Australasian jurisdictions where a wide variety of management measures have been tested and monitored over a number of decades.

E1.2 Byproduct and bycatch species

E1.2.1 Changes to fishery impacts due to the draft FMS

E1.2.1.1 Elasmobranchs

The risk assessment described in Chapter B identified a high level of risk to wobbegong populations, and a low risk to blind sharks, catsharks and swellsharks taken as byproduct species. Two management responses in the draft FMS are aimed at reducing the impact of the fishery on elasmobranchs, while a management response from the Ocean Trap and Line draft FMS regarding risks to elasmobranchs will also affect activities in the Lobster Fishery. These management responses and their assessed changes in impacts are:

From the Lobster Fishery draft FMS:

- MR 2.3(d): Modify reporting system to record and monitor landings of species other than rock lobster species taken in lobster traps.
- MR 2.3(e): Use observers to collect additional information on elasmobranchs.

While these responses will not directly reduce the risk, they are necessary for the long-term management of elasmobranch harvesting or bycatch.

From the Ocean Trap and Line draft FMS:

- MR 2.1(g): Implement a (provisional) minimum size of 100cm total length on retained wobbegong sharks.

This management measure will apply across all NSW fisheries and will provide a reduction in risk to wobbegong sharks, but the efficacy of this measure depends on the results of current research, which indicates that there may be a third species of wobbegong in NSW waters (N. Otway, NSW Department of Primary Industries, pers. comm.). Information on the biology of the species and on the species composition of catches is crucial to the choice of management measures to be introduced to lower the risk on wobbegong sharks from the two NSW commercial trap fisheries.

E1.2.1.2 Finfish species

The rubberlip morwong was classed as being at intermediate risk from the fishery. There are no finfish species landed in significant quantities in the Lobster Fishery that are currently classified as overfished. The following management responses will lead to a reduction in risk if finfish species landed in the Lobster Fishery become overfished in the future:

- MR 2.3(a). Limit lobster fishers to a defined set of species that can be retained as byproduct from waters greater than 10m depth.
- MR 2.4(a). Contribute to the development of recovery programs for species harvested by the Lobster Fishery, and adopt any measures required for a recovery program.

- MR 4.3(b). Require use of fish escape panels in lobster traps if it becomes evident that lobster traps are being used to target finfish.

These management measures are adequate to address any future increase in risk to finfish species. They are also adequate to reduce the intermediate risk on morwong species.

E1.2.2 Likelihood of market development

The only byproduct or bycatch taxon which was identified in the EIS as at risk of increased harvest because of development of markets was hermit crabs. The EIS assigned a low risk to hermit crab populations from the Lobster Fishery, but noted that close monitoring of the fishery would be an appropriate cautionary measure. The likelihood of the market for hermit crabs expanding is low at the present time.

E1.2.3 Changes to sustainability as a result of the draft FMS

There is a substantial reduction in the risk to hermit crabs by closer monitoring of bycatch and the establishment of a trigger point of 30 tonnes for the annual total retained commercial catches of hermit crabs.

Reduction in risk is provided to elasmobranchs through the collection of information from improved catch reporting in the Lobster and Ocean Trap and Line fisheries and the Lobster Fishery observer program, and through the introduction of a minimum size limit of 100 cm which is being proposed for wobbegong species through the Ocean Trap and Line FMS.

There would be a reduction in risk to finfish species by the implementation of any recovery programs, which would be initiated as a result of overfishing by the total commercial and recreational fishery sectors.

E1.3 Bait species

No significant risks from bait species were identified in the EIS. Management response 1.4(a) (i.e. to implement, in consultation with the lobster MAC, measures required in accordance with any marine pest or disease management plans) adequately covers the possibility of disease transmission.

E1.4 Protected and threatened species and communities

E1.4.1 Changes to fishery impacts due to the draft FMS

Risks to threatened species from the Lobster Fishery under the present management arrangements are low and there is no change to these risk ratings under the draft FMS, however the risk assessment identified a lack of information about fishery interactions with threatened species, which the FMS has addressed.

E1.4.2 The eight-part test

A summary of the eight-part test for threatened and protected species is provided in Table E1.1. Information supporting the answers to each part can be found in Section B2.6. The factors to be considered in the eight-part test are:

- 1 *In the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction*

Evaluation of the likelihood of a local extinction occurring as a result of the activity is based on the risk assessments for threatened species if the draft FMS were implemented (Table E1.1). Viable local populations of a threatened species are likely to be placed at risk of extinction if the risk level is intermediate or greater (see Table B2.17). The southern right whale and loggerhead turtle are the only threatened species identified, and both were assigned a low level of risk.

- 2 *In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised*

Disruption of the viability of an endangered population as a result of the activity is based on the risk assessments for threatened species under the draft FMS (Table E1.1). Any assigned risk level of intermediate or greater is considered likely to significantly compromise the viability of the population. The only endangered populations that may be disturbed by the Lobster Fishery are the Southern right whale and loggerhead turtle, however it is considered that any interactions between the Lobster Fishery and southern right whales would have a negligible impact on the population as a whole, resulting in a low level of interaction with the fishery.

- 3 *In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed*

The activity of the fishery set out in the draft FMS is unlikely to modify or remove habitat.

- 4 *Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community*

The activity of the fishery as proposed in the draft FMS is unlikely to isolate areas of habitat.

- 5 *Whether critical habitat will be affected*

No critical habitats have been declared for the species subject to impact from the fishery.

- 6 *Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or similar protected areas) in the region*

The species considered here (marine mammals and turtles) travel long distances in search of food or as part of their natural migration. While they may occur in conservation reserves at times, it is likely that, for the majority of the time, these species would be poorly represented in nature reserves. In fact, for such highly mobile and wide-ranging species, it has been argued that marine reserves are necessary but not sufficient to protect the species from the processes that threaten them (Allison *et al.*, 1998). Therefore these species are not considered to be adequately represented in conservation reserves.

Blue groper and a variety of the other rocky reef fish are likely to occur in many of the marine protected areas that contain rocky shores, and juveniles of the species are likely to occur in marine protected areas containing seagrass beds.

7 Whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process

No aspect of the fishery constitutes a recognised threatening process.

8 Whether any threatened species, population or ecological community is at the limit of its known distribution

Loggerhead, green and hawksbill turtles are at the limit of their distributions.

Table E1.1 Summary of the results of eight-part tests for the impacts of the Lobster Fishery on threatened and protected species listed under the FM Act, and threatened species listed under the TSC Act and/or EPBC Act.

Species common name	Factors considered in the 8-part test							
	1	2	3	4	5	6	7	8
<i>Endangered species</i>								
Southern right whale	no	n/a	no	no	n/a	no	no	no
Loggerhead turtle	no	n/a	no	no	n/a	no	no	yes
<i>Vulnerable</i>								
<i>Cetaceans</i>								
Southern right whale	no	n/a	no	no	n/a	no	no	no
Minke whale	no	n/a	no	no	n/a	no	no	no
Humpback whale	no	n/a	no	no	n/a	no	no	no
<i>Reptiles</i>								
Green turtle	no	n/a	no	no	n/a	no	no	yes
Leatherback turtle	no	n/a	no	no	n/a	no	no	no
Hawksbill turtle	no	n/a	no	no	n/a	no	no	yes
<i>Protected from commercial fishing</i>								
Groper, blue,brown, red	n/a	n/a	n/a	n/a	n/a	n/a	no	no

n/a indicates that the particular factor is not applicable to this species.

E1.4.3 Effectiveness of the draft FMS to protect listed species

To address a lack of information on interaction of the fishery with threatened and protected species, the draft FMS proposes several mechanisms for obtaining better information. The measures contained within the harvest strategy and the research plan satisfy the requirements for ongoing monitoring of interactions and gathering of new information. The specific measures are listed below.

E1.4.3.1 Harvest strategy

- Data on interactions between the Lobster Fishery and turtles will be obtained through changes in reporting forms and through onboard observer studies.
- Modification to the monthly catch return forms which will incorporate mandatory reporting of fishers' interactions with threatened species during fishing operations (see MR 3.1(a)); it should be noted that mandatory reporting carries with it an element of potential bias against mentioning them at all; therefore it will require careful verification by the observer program
- The implementation of an observer-based survey that will *inter alia* collect data on occurrences of threatened species in catches and feeding on discards (see MR 1.2(b)) of the draft management strategy). The very low frequency of interactions with threatened and

protected species means that an observer program that can only cover a small proportion of trips, while collecting data on overlaps, is unlikely to provide useful data on the overall frequency of interactions.

- Cross-jurisdictional collaboration to consider consistent management regimes would promote consistency in policies for reducing harm to threatened species. This could reduce risks to threatened species, but to what extent risk would be reduced cannot be determined.

E1.4.3.2 Research plan

- The strategy seeks to improve the accuracy of information available on interactions between the Lobster Fishery and threatened species using research projects undertaken through threatened species recovery plans.

The proposals listed above would contribute to the protection of threatened species through the improvement of knowledge on how the fishery interacts with threatened species. Provided this information is fed back into the management of the fishery and action to reduce any risks identified are implemented, the measures would reduce the already low risk to threatened species.

E1.4.3.3 Management responses

Goal 3 of the draft FMS is specifically aimed at conserving threatened species, and has an objective to: "Identify and minimise or eliminate any impacts of fishing activities on threatened species, populations, ecological communities and protected species of fish, and where possible promote their recovery".

Specific management responses proposed to achieve this objective are:

- 3.1(a) - Modify reporting arrangements to enable collection of information on interactions with or sightings of threatened or protected marine species, and gear interactions with other threatened or protected species;
- 3.1(b) - Implement the provisions of any threatened species recovery or threat abatement plan.
- 3.1(c) - using code of practice, promote use of fishing techniques that avoid the capture of, or interaction with, threatened species, protected fish and fish protected from commercial fishing.

Responses 3.1(a) and 3.1(c) address the need for more information and therefore could contribute to risk reduction, provided that any issues identified are acted upon. Management response 3.1(c) is a practical measure that could lead directly to reduced catches of (or other negative interactions with) threatened species, and increased survival of certain threatened species.

In addition to the management responses dealing directly with Goal 3, certain management responses under Goals 1, 2, and 4 are listed in the draft FMS as also contributing to Goal 3. These are discussed below.

Management responses under Goal 1

- 1.1(c) Develop a "Code of Practice" for the Lobster Fishery.
- 1.1(d) Use fishing closures to control fishing activities in the Lobster Fishery.

- 1.2(b) Implement a periodic observer program to collect information on the quantity and composition of bycatch.
- 1.4(a) Implement, in consultation with the MAC, measures required in accordance with any marine pest or disease management plans.

The “Code of Practice” (MR 1.1(c)) would contribute to reducing the risks to threatened species assuming there was substantial voluntary compliance.

The use of fishing closures (MR 1.1(d)) would be available if the circumstances arose in which there was an increased frequency of adverse interactions because of changes in populations of threatened or protected species, or time/space changes in fishing activity.

Response 1.2(b) addresses information gaps with regard to capture rates of threatened species and has the potential to document other interactions such as the species feeding on discards, etc. Provided that it is fed back into other management responses (e.g. 1.1(d)) - closure of areas to fishing) and used to reduce impacts, gathering such information would contribute to reduction of risk.

E1.5 Other aspects of ecosystem structure and function

E1.5.1 Changes to fishery impacts due to the draft FMS

Management responses 1.1(d) and 1.2(c) are likely to alter the impacts of the fishery on ecosystem structure. These responses are:

- 1.1(d) Use fishing closures to control fishing activities.
- 1.2(c) Using best available knowledge and appropriate technology, modify fishing practices to reduce the impacts of the fishery on non-retained fish, invertebrates, reptiles, mammals and birds.

As discussed in Chapter B, there is very little scientific information on ecosystem structure related to the NSW Lobster Fishery, and we have to rely on inferences from other Australian fisheries. Even with relatively large research effort, definite conclusions about ecosystem structure and function may be difficult to establish. The long-term studies of ecosystem elements of large MPA (marine protected areas) compared to non-protected areas have shown possible cascading ecosystem effects in Tasmania involving the relationships between rock lobster, abalone and sea urchins.

E1.5.2 Implications of the draft FMS

Given the lack of scientific information on these assemblages, it is not possible to assess the impact of proposed management measures on ecosystem structure and function. There may be some progress in this area as a result of the projects on ecosystem management research currently being funded by the NSW Department of Primary Industries. This project will explore the potential of whole-ecosystem simulations based on ECOSPACE, a spatially-explicit modeling technique, to forecast the results of alternative policy options for the marine and estuarine fisheries in New South Wales. The project will also explore some of the uncertainties in implementing ecosystem-based management in NSW.

Although the project aims to characterise all fisheries and habitats within the New South Wales coastal region, the work will focus on protected and gear-restricted zones which have been established or mooted along the NSW coast. Estuarine, sub-littoral, inshore, coastal, shelf and deep-water offshore habitats will be represented by approximate habitat maps at a range of spatial scales.

E1.6 Aquatic habitats

E1.6.1 Changes to fishery impacts due to the draft FMS

There are two management responses in the FMS which address the low risk of the fishery on aquatic habitats, namely:

- MR 1.1(b) Collect information on the number of traps in the fishery that are lost during fishing operations, and implement appropriate management actions if necessary.
- MR 1.3(a) Modify the use of lobster fishing methods in areas where their use is identified as having a detrimental impact on marine habitat and associated biota.

MR 1.1b will provide basic information for assessing the extent of the possible impact, while MR 1.3a provides for the contingency that detrimental effects are established. Proposed research to investigate the impacts of trap loss (Table D4.8) will support these responses.

E1.6.2 Implications of the draft FMS for aquatic habitats

There was a low risk to aquatic habitats found in Chapter B, but implementation of measures in the FMS would reduce this low level of risk.

E1.7 Performance reporting, monitoring and research regime

E1.7.1 Evaluation of the likely effectiveness

The performance reporting and review regime described in Section D5 of the FMS provides adequate levels of information for all aspects of estimating the commercial catch of rock lobster, byproduct and bycatch species. They are also appropriate for impacts on the ecosystem. The performance indicators and trigger points are generally sufficient and realistic for reporting, monitoring and research. These measures are all appropriate to the scale of the fishery. The only performance indicator and trigger point that is not adequately treated in the draft FMS is that for PI 1, Goal 4. While the goal of appropriately sharing the resource is justified and reasonable, there is no mechanism specified which will provide the data required to test the trigger point. However, work is currently being undertaken at the national level to develop an appropriate model.

It is not possible for the presently used estimates of recreational fishing to be refined to provide current, regular and reliable estimates of the recreational catch. In the background notes of MR 4.1a, it is stated that information on the recreational catch of lobsters will be obtained from results of the National Recreational and Indigenous Fishing Survey, “related studies to be conducted in NSW”, charter boat logbooks, etc. None of these sources can provide reliable estimates of the annual recreational fishery for rock lobsters. The national survey results for NSW are based on the results of a year-long longitudinal study of approximately 3500 fishers, but the very small proportion of fishers who dive for or trap rock lobsters represents 1% (or less) of all fishers. As fishers are only about 20% of the NSW population, population-based surveys will not obtain samples large enough to estimate the recreational lobster harvest. The FMS for Recreational Fishing will consider the recreational fishery for rock lobster, and it will be important to include some firm commitment in that FMS to redress this information gap and provide the necessary information for the application to this performance measure and trigger point.

E2 Physical Issues

E2.1 Water quality

Two new management responses in the FMS will help to reduce the impact of the fishery on water quality. These responses are:

- MR 1.1(b) Collect information on the number of traps that are lost during fishing operations, and implement appropriate management actions if necessary.
- MR 1.1(c). Develop a code of practice for the Lobster Fishery in consultation with the Lobster MAC.

The collection of information of number of lost traps will allow a better assessment of the possible impact of lost traps on water quality, while the code of practice will cover the issue of disposal of traps and waste, with a view to reducing these impacts.

E2.2 Noise and light regimes

It is expected that implementation of the draft FMS will not result in any significant increase in impacts on noise and light regimes, and so the risk remains negligible.

E2.3 Air quality, energy and greenhouse gas emissions

E2.3.1 Changes to fishery impacts due to the draft FMS

It is expected that the draft FMS will not result in any significant increase in impacts on air quality, energy and greenhouse gas emissions.

E2.3.2 Measures in the draft FMS to increase energy use efficiency and minimise greenhouse gas emissions

There are no specific measures in the draft FMS that address these matters, however the draft FMS will not result in any significant increase in impacts on air quality, energy and greenhouse gas emissions. Management response 1.1(c) – Code of practice – lists some examples of issues that may be covered in a code of practice, and reference to energy-use efficiency and minimising pollutants could be added to these issues to be covered by the code.

E3 Economic and Social Issues

Changes in the management of a fishery will have both economic and social implications for those who are part of the fishery. Changes in management structures can influence costs, revenues and the incentives of operators, which flow on to have effects to the families and communities in which fishers live. The aim in this section of the EIS is to: 1. Identify whether economic and social components of the fishery are changed as a result of management responses contained within the draft FMS (Chapter D); 2. Assess whether the risk to the economic viability of the fishery is changed (and the potential magnitude of this change) by the management measures in the FMS. Essentially, the latter part of this assessment relates to determining whether the FMS effectively reduces the intermediate to high risks to economic viability identified in Chapter B. However, it is only through monitoring the implementation of measures in the FMS that it will be possible to determine whether they are sufficient to reduce risks in the fishery.

Identification of changes to the social and economic components of the fishery requires identification of the impact of the FMS at the fishing business level and the broader socio-economic system. In many cases, the true effect of a draft management response will be unknown as competing effects may be present. As such, a cost benefit type approach will be taken in order to compare the different effects. Despite the lack of formal values, an indication of the effects can be obtained from such an approach.

E3.1 Economic Issues

Introduction

The guidelines for this Environmental Impact Assessment require an assessment of the effect of the draft FMS on the economic performance of the fishery particularly with regard to the potential change in economic viability of operators as a result of implementing the draft FMS. This includes the ability of fishers to pay increased management costs in the Lobster Fishery (taking into consideration increased costs accrued in other fisheries), the potential market trends and developments likely to affect the fishery, and the potential impact on the value of shares in the fishery.

The magnitude and direction (i.e. positive or negative) of the effects of the goals, objectives and management responses set out in the draft FMS will differ in response to each element. As the management responses are designed to reach different goals and achieve different objectives, the tools used, and hence the impacts, will vary significantly across the different responses. For example, management responses related to monitoring and subsequent management of the lobster stock may lead to changes in the Total Allowable Catch (TAC), hence having a positive or negative impact depending on the direction of change in the TAC. However, as these responses are aimed at protecting the 'resource asset', they will have long-term benefits for sustainability, which will positively impact on operators' viability. Additionally, if research programs result in management changes, and increased demand for management resources, there may also be increases in management charges, which will negatively impact on operators' viability.

Given the differing impacts of management responses in the draft FMS on the economic situation of fishers in the Lobster Fishery, each response has been analysed separately for the purpose of this assessment. Economic issues relating to the different goals and subsequent objectives and management responses are discussed in relation to their perceived effect. First, management

responses, which are believed to have only a minimal impact on operators' viability, either because they are a continuation of existing programs, or because they are expected have no appreciable effect on costs and returns in the fishery in the short-term, have been identified. Second, strategies impacting on fishers' costs and revenues through, for example, changes in costs (including management charges) and on catch, are considered. Finally, strategies, which are believed to have a significant effect on the viability of lobster fishers', are discussed in more detail.

E3.1.1 Responses with minimal impact on fishers' costs and revenues

Proposed management responses that do not influence fishers' costs and revenues are unlikely to have an impact on fishers' viability. However, the impact of many of the responses classified as having a minimal effect depend on the results of research, and, hence, may impact on fishers' viability in the future. Research programs contain essential actions to ensure long-term sustainability of the 'resource asset' and the businesses that depend on it. If as a result of these programs new information emerges that results in lowering of the TACC, or the introduction of new management programs requiring additional resources, returns from fishing may be lowered and costs may rise. However, as these programs are essential to protect the resource asset, they protect the long-term viability of operators in the fishery and hence should be viewed in a positive light. Having said this, implementing management changes in response to the outcomes of research should take account of the urgency of these changes and the potential for the changes to be phased in. If changes are phased in, businesses have an opportunity to adjust their operations in a planned and efficient manner.

Many management responses are a continuation, or extension, of current processes and research and as such will not lead to a change in fishers' costs or returns, unless a major expansion in the magnitude of these programs occurs. Hence, in the short-term, the cost and harvesting structure and economic viability of fishers should remain unchanged as a result of these responses. Furthermore, these responses provide ongoing certainty about the intended direction and scope of fishing harvest strategies. This provides fishers' with greater confidence and facilitates business planning. These responses also have positive marketing impacts through potential promotion of a clean, green product. Export and environmental approvals depend on maintaining the sustainability of the fishery and related aquatic resources.

Management responses that are a continuation of current practices, or that are new but are expected to have no appreciable effect on costs and returns in the fishery in the short term, are presented in Table E3.1. The status of the management responses is also given, i.e. whether they are existing management practices or are new. In the Appendix to Chapter D of this EIS (this volume), a timeframe for implementation of management actions is provided.

Table E3.1 Management responses with a minimal impact on fishers' costs and revenues

Response	Details	Status
1.1 (a)	Prohibit commercial lobster fishers from taking species other than species of rock lobster in waters less than 10 m in depth	Existing
1.1 (b)	Collect information on the number of traps in the fishery that are lost during fishing operations, and implement appropriate management actions if necessary	New
1.1 (c)	Develop a code of practice for the Lobster Fishery in consultation with the Lobster MAC	New
1.2 (b)	Implement a periodic observer program to collect information on the quantity and composition of bycatch	Existing

Table E3.1 cont.

Response	Details	Status
1.2 (c)	Using best available knowledge and appropriate technology, modify fishing practices to reduce the impacts of the fishery on non-retained fish, invertebrates, reptiles, mammals and birds (including threatened species populations)	Existing
1.2 (d)	Use best practice handling techniques, including a restriction on the use of "spikes" to those times when other handling methods would present an unacceptable health and safety risk	Existing (new for spikes)
1.3 (a)	Modify the use of lobster fishing methods in areas where their use is identified as having a detrimental impact on marine and terrestrial habitat or associated biota	Existing
1.4 (a)	Implement, in consultation with the Lobster MAC, measures required in accordance with any marine pest or disease management plans	Existing
2.1 (b)	Conduct an annual assessment of the eastern rock lobster resource including a review of the exploitation status of the stock and a risk assessment of alternative harvest strategies	Existing (new for assessment)
2.1 (c)	Develop models of the eastern rock lobster population and fishery	Existing
2.1 (d)	Monitor catch and effort for eastern rock lobster in the commercial Lobster Fishery	Existing
2.1 (e)	Monitor the length and sex composition of commercial landings of eastern rock lobsters	Existing
2.1 (f)	Monitor recruitment to the population of eastern rock lobsters	Existing
2.1 (g)	Monitor abundance and size-composition of the spawning stock of eastern rock lobsters	Existing
2.2 (b)	Prohibit taking eastern rock lobster below the minimum size limit or above the maximum size limit;	Existing
2.2 (c)	Prohibit taking all female lobsters carrying ova;	Existing
2.3 (b)	Develop a system, in consultation with the Lobster MAC, to provide for appropriate new additions to the list of byproduct species for the Lobster Fishery	New
2.3 (c)	Monitor, record and differentiate catches of species of rock lobster on log sheets in addition to eastern rock lobster	Existing
2.3 (d)	Modify the reporting system to record and monitor landings of all other species taken in lobster traps	New
2.3 (e)	Utilise onboard observers to collect additional biological information, to facilitate estimation of size at maturity and fecundity/brood size data, for the elasmobranch species (i.e. wobbegong, blind sharks, cat sharks and swell sharks) taken by the fishery	New
2.4 (a)	Where the Lobster Fishery is a harvester of an overfished species, contribute to the development of any recovery program for the species, and adopt any measures required by a recovery program	New
3.1 (a)	Modify the mandatory reporting arrangements, in consultation with the Lobster MAC, to enable the collection of information on interactions with or sightings of threatened or protected marine species and interactions with other threatened or protected species	New
3.1 (b)	Implement, in consultation with the Lobster MAC, the provisions of any relevant threatened species recovery plans or threat abatement plans, or other similar management arrangements designed to protect critical habitat areas	Existing
3.1 (c)	Using the code of practice, promote the use of fishing techniques that avoid the capture of, or interaction with, protected fish and fish protected from commercial fishing	New
4.2 (b)	Provide for the transmission of a shareholding to more than one person	New
4.3 (a)	Use cross-fishery consultation to discuss and manage issues relating to, but not limited to, the multiple use of specific fishing grounds, collaborative research, fair and equitable access to stocks, complementary management arrangements and other interactions between fishing sectors	Existing

Table E3.1 cont.

Response	Details	Status
4.3 (c)	NSW Department of Primary Industries will work cooperatively with staff from other jurisdictions (e.g. Commonwealth, Victoria, Tasmania, Queensland) regarding management, research and compliance arrangements for rock lobster species	Existing
4.4 (a)	Manage the Lobster Fishery in a manner consistent with the Indigenous Fisheries Strategy and Implementation Plan	Existing
4.4 (b)	Modify the activity, where relevant, in response to new information about areas or objects of cultural significance in order to minimise the risk from lobster fishing activities	Existing
4.5 (a)	In consultation with the Lobster MAC, identify areas of high interaction between the Lobster Fishery and other resource users and respond appropriately to resolve any conflicts	Existing
5.1 (c)	Allow for the storage of live eastern rock lobster	Existing
5.1 (d)	Identify and promote harvest and post-harvest practices which will ensure the best return in dollars per kilogram for product of the fishery, within the context of the fishing regulatory controls that apply to harvesting	Existing
6.1 (a)	Utilise and review, in consultation with the Lobster MAC and key stakeholders, the compliance strategic plan and update where appropriate	Existing
6.1 (b)	Utilise and review, in consultation with the Lobster MAC and key stakeholders, the research strategic plan and update where appropriate	Existing
6.2 (b)	Require all eastern rock lobsters taken in the Lobster fishery to have an approved tag attached	Existing
6.2 (d)	Introduce a requirement that the marking required on each lobster trap to indicate the position of the trap must include (in clearly visible figures which are no less than 50 mm in height): (1) the fishing business (FB) number of the fishing business with which traps are associated, and (2) the letter "L" (for lobster trap).	New
6.2 (e)	Develop strategies to support appropriate practices and behaviour in commercial fisheries, including development of training and accreditation courses in core competencies and the introduction of fit and proper person requirements	New
6.3 (a)	Utilise a key consultative body, such as the Lobster Management Advisory Committee (MAC), when undertaking industry consultation on all aspects of the Lobster Fishery	Existing
6.4 (a)	Manage the Lobster Fishery consistently with other jurisdictional or natural resource management requirements, such as the marine parks program, aquatic biodiversity strategy, threatened species program, Indigenous Fisheries Strategy and other relevant strategies	Existing
6.4 (b)	Provide for the issue of permits under section 37 of the <i>Fisheries Management Act 1994</i> authorising modified fishing practices to assist research programs or for purposes consistent with the vision and goals of this management strategy	Existing
7.1 (a)	Contribute to the ongoing education of shareholders through advisory programs and port meetings	Existing
7.1 (b)	Promote awareness of the Lobster Fishery as part of the overall communication strategy across all commercial designated fishing activities by implementing issue-focussed education programs	Existing
7.2 (a)	Undertake research programs in accordance with the research strategic plan for the Lobster Fishery	Existing
7.3 (a)	Require every commercial fisher endorsed in the Lobster Fishery to make a record of all rock lobsters taken each day (i.e. daily log books) and each month (i.e. monthly reconciliation form) and send a copy to NSW Department of Primary Industries within seven days following the end of the day fished and within seven days after the end of the month (respectively)	Existing

Table E3.1 cont.

Response	Details	Status
7.3 (b)	Periodically review, in consultation with the Lobster MAC, the mandatory catch and effort return forms submitted by lobster fishers and implement changes if the data collected is perceived to be insufficient for monitoring and assessment purposes	Existing
7.3 (c)	Assess the accuracy of species identification recorded in catch records and provide advice to industry to make needed changes	New

E3.1.1.1 Responses that affect resource sustainability

The majority of management responses listed in Table E3.1 provide for the continuation of current management processes and research, compliance with recovery programs and the collection of information via, for example, the observer and logbook program. As such, these responses are likely to have a continuing positive effect on viability through sustainable management of the lobster resource. Programs such as stock assessment and accurate catch reporting are unlikely to change the costs and revenues of fishers unless new unexpected information was to be found, and this required additional management measures to be taken.

The outcomes of research and collection of data may impact on fishers' viability through, for example, changes in the TACC. If, for example, it was found that the biological stock was in a much-depleted state to that of its current state, or that byproduct species were growth overfished, reductions in the allowable catch and changes in other management structures would need to be made in order to preserve the stock. Conversely, if it was found that the stock had improved from its current state, the TACC may be adjusted upwards. Adjustments to the TACC or changes in other management structures in the fishery may have an effect on revenues received by fishers through decreasing or increasing available catch. However, the fact that the TACC has not been caught in any year (see Chapter B, Section 4.1) may offset, to some extent, the effect on revenues from lower catches. In addition, prices for eastern rock lobster may rise due to lower available supply. Though, in the case of a price rise, competition from other rock lobster supplying regions, such as Western Australia, would prevent prices increasing significantly. In addition, and as will be discussed in more detail below, a lower TACC which acts to limit catch may actually be better from an industry restructuring and economic viability point of view.

A number of responses relate specifically to monitoring and protecting the status of the rock lobster stock. From a sustainability and economic viability point of view, responses that aim to protect the resource are to be viewed positively. For example, monitoring catch and effort in the Lobster Fishery (management response 2.1 (d)), and developing models of the eastern rock lobster population and fishery (management response 2.1 (e)) are essential for stock assessment and for setting the TAC at its biological optimum. Though, in the short run, if resource protection results in a lower TACC, fishers may incur reduced revenue from lower catches.

The collection of extra biological information through the observer program, e.g. management responses 1.2 (b) and 2.3 (e) is believed to have a minimal impact on the economic viability of fishers operating in the Lobster Fishery as it is part of the pre-existing management structure and hence utilises existing management resources. The periodic observer program is already in operation in the fishery and it is believed that the collection of extra information through an established program will not have a significant impact on management charges in the fishery.

Responses 1.2 (c), 1.2 (d), 1.3 (a), 2.3 (b), 2.3 (d), 3.1 (a), 3.1 (c) and 3.1 (b) are thought to have a minimal impact on the viability of fishers due to the minimal impact of lobster fishing on the

environment and other non-commercial species. Bycatch in the Lobster Fishery is low, and as such responses aimed at reducing the level of bycatch are believed to have a minimal impact on fishers, as little, or no, change in operations is required for them to be compliant with the new strategies. Also, techniques used in lobster fishing are believed to have only a small impact on the environment and threatened species, thus responses aimed at modifying the use of fishing in areas where fishing is identified as having a detrimental effect of the environment or threatened species (e.g. responses 1.3 (a), 3.1 (a) and 3.1 (b)) are likely to have little impact on lobster fishers.

E3.1.1.2 Responses that influence quality of product

The quality of lobster product that goes to market determines, to a large extent, the price that lobster fishers receive. Generally, poor quality products will receive low prices, with high quality products commanding strong market prices. Management response 5.1 (d) is aimed at improving the quality of product that goes to market.

There may be costs involved in achieving a higher quality product. If the costs of achieving improvements in quality are high, benefits from improved quality may be eroded.

E3.1.1.3 Other responses

Several other responses, covering issues ranging from reducing the effect of the black market, to improving cooperation between NSW Department of Primary Industries and other jurisdictions have been found to have minimal impact on fishers' economic viability (Table E3.1). For example, response 4.3 (c) states that NSW Department of Primary Industries staff will work cooperatively with staff from other jurisdictions in regards to management, research and compliance arrangements for rock lobster species. This response will not have a significant effect on fishers' viability unless different management techniques are identified that have an effect on costs and revenues from lobster fishing.

Management response 1.1 (c) relates to the development of a code of practice in the Lobster Fishery. Depending on what is in the code, the economic viability of lobster fishers may be changed as a result of this management response.

Management response 1.4 (a) deals with the management of diseases and pests, which may threaten the biological stock of the fishery. To date, no disease or pest has been identified as posing a significant threat to the stock, however, if one was identified, it has the potential to have a significant effect of the economic viability of fishers in the fishery. The impact of an outbreak of disease, or the incursion of a pest, would be to reduce yields and possibly prices (as consumers would not wish to purchase diseased produce), thus impacting on the viability of the operation. Also, if areas were to be quarantined, or an outbreak geographically isolated, then fishers who fish in those areas would be significantly affected. However, if such action is not taken the outcome may be far worse as the incursion of a pest, or outbreak of disease in the fishery may cause stocks to collapse, thereby affecting fishers' economic viability to a far greater extent, and for a much longer period of time.

The management of Indigenous and cultural interactions with lobster fishing activities (management responses 4.4 (a) and 4.4 (b)) are unlikely to impact costs and revenues of fishers unless new areas of cultural or Indigenous significance are identified or if there were to be a change in resource allocation across sectors. If there were to be a change in resource allocation across sectors the TACC may be lowered and economic return from the commercial Lobster Fishery may be reduced.

Management response 6.2 (b) works to prevent the sale of product outside the quota system by requiring lobsters to be tagged. The introduction of this requirement in the fishery has been responsible for a significant reduction in the volume of unreported (black market) catch. For example, in 1980, unreported catch was estimated to be around 120% of reported legal catch. After the introduction of the lobster tagging program in 1992, the volume of unreported catch fell and is currently at around 17%.

Response 4.5 (a) will increase the transparency of fishing operations in the Lobster Fishery. This response sets out a method to resolve conflicts in resource use where they exist between fishers and other resource users. This will have a minimal impact on lobster fishers unless a large number of conflicts are identified as requiring changes to current fishing practices. Lobster fishers may be the beneficiaries of the resolution of conflicts, for example, through reductions in gear loss by resolving interactions with trawlers or Commonwealth tuna longline operations.

Response 6.4 (a) states that fishing activities be conducted as part of the Lobster Fishery must be consistent with other natural resource management requirements. This is not a direct management issue in the fishery, and as activities are in most cases already required to be consistent (for example, limitations on lobster fishing in marine parks) it is believed this response will have a minimal impact on fishers.

Response 6.4 (b) has the potential to provide an incentive for innovation in the fishery. By allowing fishers to be actively involved in research programs or trial new fishing techniques, which otherwise may be outside of the current prescribed techniques, it provides an incentive for fishers to develop, or invest in developing, new techniques that reduce their costs (or increase their catch). These new measures, if successful, might allow for efficiency gains through reduced costs, thus improving the economic viability of operators in the fishery. Further, as the Lobster Fishery is managed through a TACC, techniques that improve catch will not lead to overfishing of the target species and will only reduce effort and associated operating costs (which could have implications for other non-quota managed fisheries).

E3.1.2 Responses affecting fishers' costs and revenues

Any changes to revenues received, and costs incurred, in the fishing activities of lobster fishers will have a direct effect on the viability of those fishers. Management responses that influence costs and revenues are therefore likely to have an effect on lobster fishers. The extent of the impact will depend on the management response.

Management responses that are likely to have an impact on costs and revenues of lobster fishers may do so through their effect on: management costs incurred by lobster fishers, the quality of information available on which to base decisions affecting fishers' viability; bycatch and byproduct; black market activity; and the TACC.

E3.1.2.1 Responses affecting management costs

Many of the responses listed in Table E3.1 may affect management charges in the Lobster Fishery if they result in additional research programs that are paid for by the Lobster Fishery. The Lobster Fishery is operated as a cost recovery fishery in accordance with modern approaches to economic management as set out in the National Competition Policy guidelines and consistent with ecologically sustainable development principles. As such, any changes to the management structure that increase or decrease costs will be passed on to fishers' in the form of higher or lower management

charges. Management charges in the Lobster Fishery were \$59.70 per share in 2002/03. This represented around 11% of the total value of catch in 2002/03. However, in 2001/02, when management charges per share were lower, at \$58.00 per share, catches were also lower, hence management charges represented a proportionately higher percentage of the total value of catch, at 13%. However, changes in management charges would have to be significant in order to affect economic viability (see analysis in Section B4).

E3.1.2.2 Responses affecting the quality of information

There are several management responses that affect the quality of information that is available to NSW Department of Primary Industries and commercial lobster fishers with which to make informed management and business decisions. The process of making more informed decisions may improve economic viability in the Lobster Fishery.

It is worth noting that other management responses that improve the quality of information may also impact on economic viability in the Lobster Fishery. For example, monitoring abundance and size-composition of the spawning stock of eastern rock lobsters may improve the information base available for determination of the TACC. This, in turn, may improve the long-term productivity of the stock and hence economic return in the Lobster Fishery.

Management responses that affect the quality of information on which to base decisions that affect the costs and returns from lobster fishing are listed below:

- **5.1 (e):** Refine the performance indicator for monitoring trends in the commercial viability of typical fishing businesses within each designated commercial fishing activity, so as to be based on net returns;
- **5.1 (f):** Investigate the data available to assess the economic multiplier (flow-on) effects of the Lobster Fishery to the broader community, and develop strategies to improve the quality / usefulness of such data;
- **5.1 (g):** Collect information to detect patterns in the quantity and price of share transfers and the quantity of quota traded, and investigate the feasibility of collecting data on the price of quota traded; and
- **7.2 (b):** Develop a strategy, in consultation with the Lobster MAC, for improving the understanding of economic and social information relating to the Lobster Fishery, taking into account the information gaps outlined in the economic and social assessment in the Environmental Impact Statement for the fishery.

Improving the understanding of economic and social information relating to the Lobster Fishery, particularly key information gaps, will help in identifying the implications of certain management decisions, such as restructuring proposals, on economic and social aspects of the fishery.

As discussed in Chapter B of this EIS there is a paucity of data on the economic and social aspects of the Lobster Fishery. For example, there is currently insufficient data on the costs and returns of fishing businesses with lobster shares. This poses a threat to the economic viability of lobster fishers in so far as it does not allow for the full impact of changes in management of the fishery, on net returns from fishing, to be assessed. The collection of more accurate data, collected more regularly, as suggested by management response 5.1 (e), would improve the information base available to the lobster industry and NSW Department of Primary Industries to make informed

business and management decisions, and would support efforts to refine the level of community contribution.

As mentioned in Section 4.4 of Chapter B of this EIS, the price at which quota is traded may provide some indication of the short-run health of the fishery. If quota is trading at a high price relative to previous seasons, this may indicate increased stock abundance and increased optimism about the prospects of improved returns from lobster fishing. Furthermore, the price at which shares are traded can provide an indication of the long-term economic health of the fishery. Monitoring both of these prices, as is suggested in management response 5.1 (g), would allow for determination of both short and long run trends in the economic viability of lobster fishers.

Currently little data exists on the economic multiplier, or flow-on effects, of commercial fishing activities. Economic multipliers are the flow-on effects generated from a productive activity. Flow-on effects can be seen directly through the employment of labour and expenditure on other inputs in the production process, or indirectly through the subsequent effects on the economy through the employment of people in sectors related to the industry. Although no formal multiplier study has been conducted on the Lobster Fishery, inferences can be made from past studies conducted on the commercial fishing industry, see for example Tamblyn and Powell (1988), McVerry (1996) and Powell *et al.* (1989). Data on the expenditure patterns of lobster fishers in regional communities can also provide guidance as to the likely flow-on effects generated by lobster fishing activities (Roy Morgan, 2001a).

The data available with which to assess multiplier effects in the Lobster Fishery is dated. In order to improve the quality and usefulness of this data, it should be updated and expanded to include activities specific to lobster fishing. This can be achieved through conducting similar studies to those conducted by Tamblyn and Powell (1988), McVerry (1996) and Powell *et al.* (1989).

E3.1.2.3 Responses affecting bycatch and byproduct

The economic value of byproduct to lobster fishers is not well understood. Most fishers with endorsements in the Lobster Fishery also hold endorsements in a variety of other fisheries. Most commonly, lobster fishers will hold an endorsement in the Ocean Trap and Line Fishery with the result that fish caught in lobster traps are often reported as being caught in fish traps, or through the activities of other fisheries. As such, when reporting, this catch is not recorded as being caught in a lobster trap.

In the draft FMS, there are several management responses that pertain to recording, and retaining for sale, byproduct that is caught in the Lobster Fishery. They are:

- **2.3 (a):** Limit lobster fishers to a defined list of species that can be retained as byproduct in the Lobster Fishery when working in waters deeper than 10 m; and
- **4.3 (b):** Require the use of fish escape panels in lobster traps if it becomes evident that lobster traps are being used to target finfish.

It is thought that the quantity of byproduct caught in lobster traps is minimal as a proportion of the total value of catch taken in the Lobster Fishery. Hence, it is thought that the affect on the economic viability of fishers as a result of management responses 2.3 (a) and 4.3 (b) would be minimal. However, it is uncertain how they will affect the viability of fishers for whom byproduct taken in lobster traps represents a significant proportion of returns. It may also result in higher costs if lobster fishers are required to make changes to gear as a result of the installation of fish escape panels

(50 x 75 mm). Several fishers have stated that the costs of trap production would increase as a result of the installation of fish escape panels (pers. comm. LobMAC, September 2003). However the effect on revenues as a result of loss of marketable fish is expected to be minimal (Stewart and Ferrell, 2001). On the other hand, if fish escape panels are not implemented, and the majority byproduct that fishers take in lobster traps are part of the defined list of species that are allowed, there would be little or no impact.

E3.1.2.4 Responses aimed at reducing the effect of the black market

Management responses concerned with reducing the black market catch are:

- **6.2 (a):** Utilise, review and amend (where appropriate) the share forfeiture scheme based on demerit points, following the implementation of an endorsement suspension/share forfeiture scheme in other NSW share management fisheries;
- **6.2 (c):** Investigate the feasibility, and implement the outcome, of introducing a requirement that lobster fishers include tag numbers of marketed lobsters on prescribed records to enable effective auditing.

The draft management responses set out in 6.2 (a) and 6.2 (c) have the effect of reducing lobster fishers incentive to sell product outside the quota system. If penalties and threat of being caught are severe enough, it provides the incentive for individuals to abide by the law. If the management responses are successful, the reduction in black market sales would benefit operators and thus improve their viability through increased market share. If the strategies fail to achieve their objectives, they may only increase management costs and thus impact on economic viability.

Black market sales of lobster form a significant proportion of the total catch from the fishery. This illegal catch has several effects on fishers operating in the Lobster Fishery. First, black market sales reduce the return to operators landing legally caught lobsters by placing downward pressure on the amount of the TAC that is available to them. Further, black market catch may reduce the value of quotas and shares. The values of quotas and shares are linked to the stock and the right to catch that stock. If that right is not protected (as occurs with black market sales), its value may fall. Finally, a reduction in illegal catch has the potential to increase the returns to fishers by reducing pressure on the stock and subsequently increasing the catchability of animals. Prices may also rise if illegally caught lobster was previously being sold at a lower price to legally caught lobster.

In Figure E3.1 the levels of recorded catch and estimates of unreported commercial catch for the Lobster Fishery are presented. The estimated unreported commercial catch represents the black market in lobster, that is, the amount of lobster sold outside the management arrangements. It can be seen that the level of unreported commercial catch is significant. Hence, the impact on the returns to fishers landing legitimate lobster is believed to be significant.

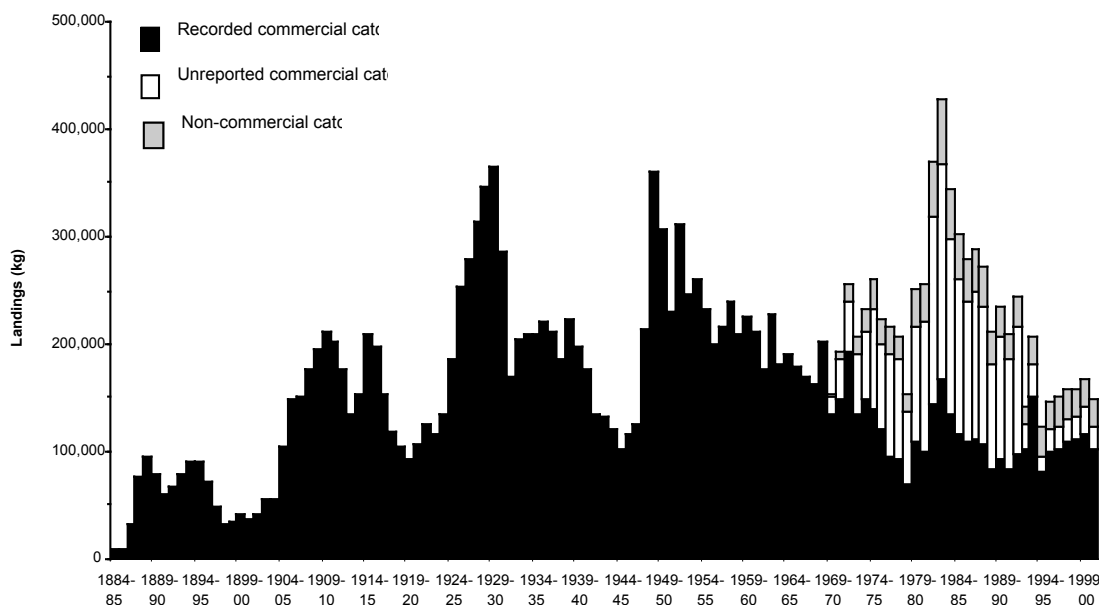


Figure E3.1 Annual catch of eastern rock lobsters from the waters of NSW

Reported commercial catch, estimates of unreported commercial catch and estimates of recreational catch. Catch data were unavailable for the periods 1895-96 to 1897-98, 1942-43 and 1943-44 and estimates for these years are based on interpolation.

(Source: Liggins *et. al.*, 2003)

E3.1.2.5 Responses affecting Total Allowable Commercial Catch

Changes in the TACC may directly affect fishers revenues by limiting the amount of catch they are allowed to take from the fishery. Management responses that may influence revenues directly through the TACC are listed below:

- **2.1 (a):** The TAC Committee will determine the maximum weight of eastern rock lobster to be taken by the commercial Lobster Fishery; and
- **4.1 (a):** Refine, as far as practicable, estimates of total catches of eastern rock lobster, taking into account commercial catch and estimates of recreational, Indigenous and illegal catches, for use in stock assessment models and reports to the TAC Committee.

Management response 2.1 (a) is a continuation of current management arrangements. As the TACC determines the amount of lobster that is allocated to be caught in any one year, changes in the level of the TACC may directly affect fishers' revenues, especially if their allocation of catch is binding (that is fishers' take their total allocation). To date, the level at which the TACC has been set has not been restrictive on catches (Table E3.2).

As mentioned earlier in this assessment, changes to the TACC are essential to respond to new information about the lobster stock and in order to protect the resource asset from overfishing. Hence, whilst potentially leading to an fall in revenue to operators, reductions in the TACC will protect incomes from lobster fishing in the future by helping to ensure that there is still an asset to be fished.

Table E3.2 Reported commercial catch and TACC

Year	TACC (tonnes)	Reported commercial catch (tonnes)	% TACC caught
1995-96	106	99.8	94.1
1996-97	106	102.6	96.8
1997-98	117	108.2	92.5
1998-99	125	109.9	87.9
1999-00	140	117	83.6
2000-2001	150	102.4	68.3
2001-2002	150	102.3	68.2
2002-2003	135	121/122	89.9

Reductions in the TACC may also help to improve the speed at which restructuring in the fishery takes place and may improve returns to fishers. Reducing the TACC forces up the value of quota due to the scarcity value placed on that quota. This may be reflected in an increase in the value of shares, and may provide an incentive for fishers wishing to leave the industry to exit. As units of quota will move to those fishers who can harvest it at the lowest cost, and for the greatest return (for it is those fishers who place the highest value on the quota), overall returns in the Lobster Fishery may rise as a result. However, if the cost of purchasing quota outweighs the benefits that can be derived from harvesting it, overall returns in the Lobster Fishery may fall. In addition, reducing the TACC may result in increasing effort in other fisheries which are not managed through output controls, as fishers may diversify away from lobster fishing or may cease fishing altogether if the reduction is severe enough.

An increase in the TACC may have a positive effect on fishers. If the expansion in the TACC allowed for fishers to increase their catch whilst being able to expand operations and experience economies of scale (lowering the share of total cost as a proportion of total revenue) the economic viability of fishers would improve. However, if the TACC is not currently being met, an increase will not change the current situation. On the other hand, if the TACC was currently being met, but an increase in the TACC meant that in order to catch extra units of lobster, the marginal cost of doing so would exceed the marginal gain from catching the extra unit, then there would be no improvement in fishers viability as fishers would not expand effort to increase catch.

E3.1.2.6 Other responses with impacts on costs and revenues

There are a variety of other draft management responses that are expected to have an impact on fishers' costs and revenues, including:

- **1.1 (d):** Use fishing closures to control fishing activities within the Lobster Fishery;
- **1.1 (e):** Map major lobster fishing grounds (including information on associated geological features), assess the level of lobster fishing on each ground and define the areas in NSW waters open to lobster fishing (taking account of marine protected areas);
- **1.2 (a):** Investigate the use of escape gaps in lobster traps set in waters less than 10 m depth
- **2.2 (a):** Provide enhanced protection to the eastern rock lobster spawning stock and in particular reduce the maximum size limit from 200 mm to 180 mm carapace length;
- **4.2 (a):** Limit the maximum allowed shareholding in the fishery to 350 shares;

- **5.1 (a):** Investigate the application of minimum shareholding requirements for all shareholders to be eligible for an endorsement, in order to promote positive returns at the fishery level, and implement the outcome of the investigation;
- **5.1 (b):** Limit the quantity of quota that shareholders can acquire through quota transfer during each fishing period;
- **5.2 (a):** Investigate the feasibility of implementing an exchange accessible by all lobster shareholders transferring quota and implement the outcomes of the investigation;
- **5.3 (a):** Co-operate with the NSW Food Authority in the development and implementation of food safety programs relevant to the fishery.

Management response 1.1 (d) may significantly impact on revenues and costs of lobster fishers, depending on the location of any closure. If a closure occurs in a high use area, then fishers' revenues may fall. Areas of high exploitation occur where the catchability of the stock is greatest, thus closures in these areas may displace effort to areas in which the stock is more difficult to catch. This has the effect of increasing costs per unit of effort, and may also lead to new costs through the requirement of operators to travel longer distances to fishing grounds. However, if a closure is made in an area with little effort concentration or catch, then the likely effects may only be small.

Despite the potential dampening effect closures may have on fishers' revenues, if the closure is for the purpose of protecting the lobster stock, e.g. closing an area due to excess fishing pressure on spawning stock, the long-term sustainability of the resource asset will be protected, and hence fishers should benefit through sustained incomes from lobster fishing. If the area was not closed and the stock experienced a decline, or in the worst case scenario, a collapse, fishers would be even worse off in terms of lost income from lobster fishing.

Closures in the Mid North and Sydney South regions could have a significant impact on the Lobster Fishery, as effort is highest in these regions as evidenced by a high concentration of trap lifts (Figure E3.2). Incomes are also low in the Mid North region relative to the number of trap lifts.

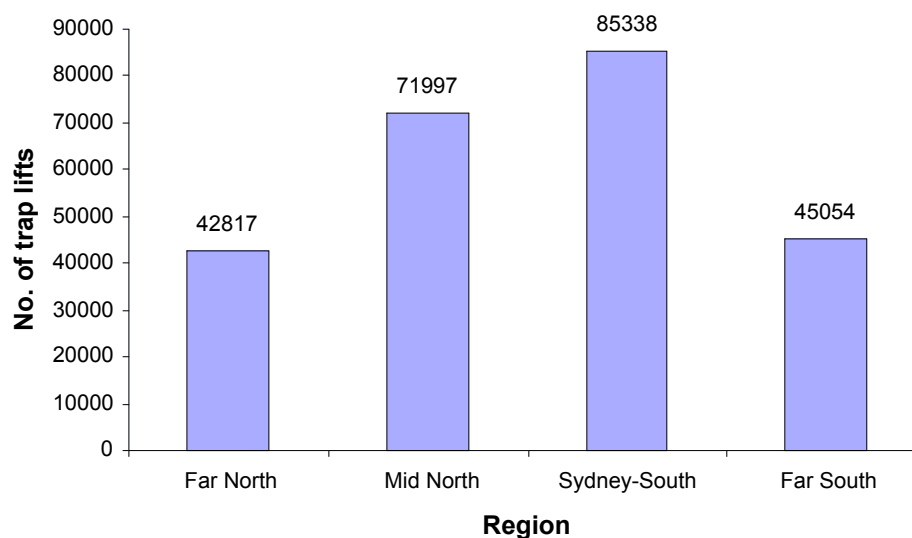


Figure E3.2 Location of trap lifts along the NSW coast, 2001/02.

(Source: NSW Department of Primary Industries Fish Catch Records, 2003.)

The timing of closures may also impact on lobster fishers. The distribution of effort in terms of trap lifts show that in the two regions with the greatest number of trap lifts (Sydney South and Far North) effort is concentrated in the summer months (Figure E3.3). As such if a closure were to occur in the summer months, there would be a significant impact on fishers.

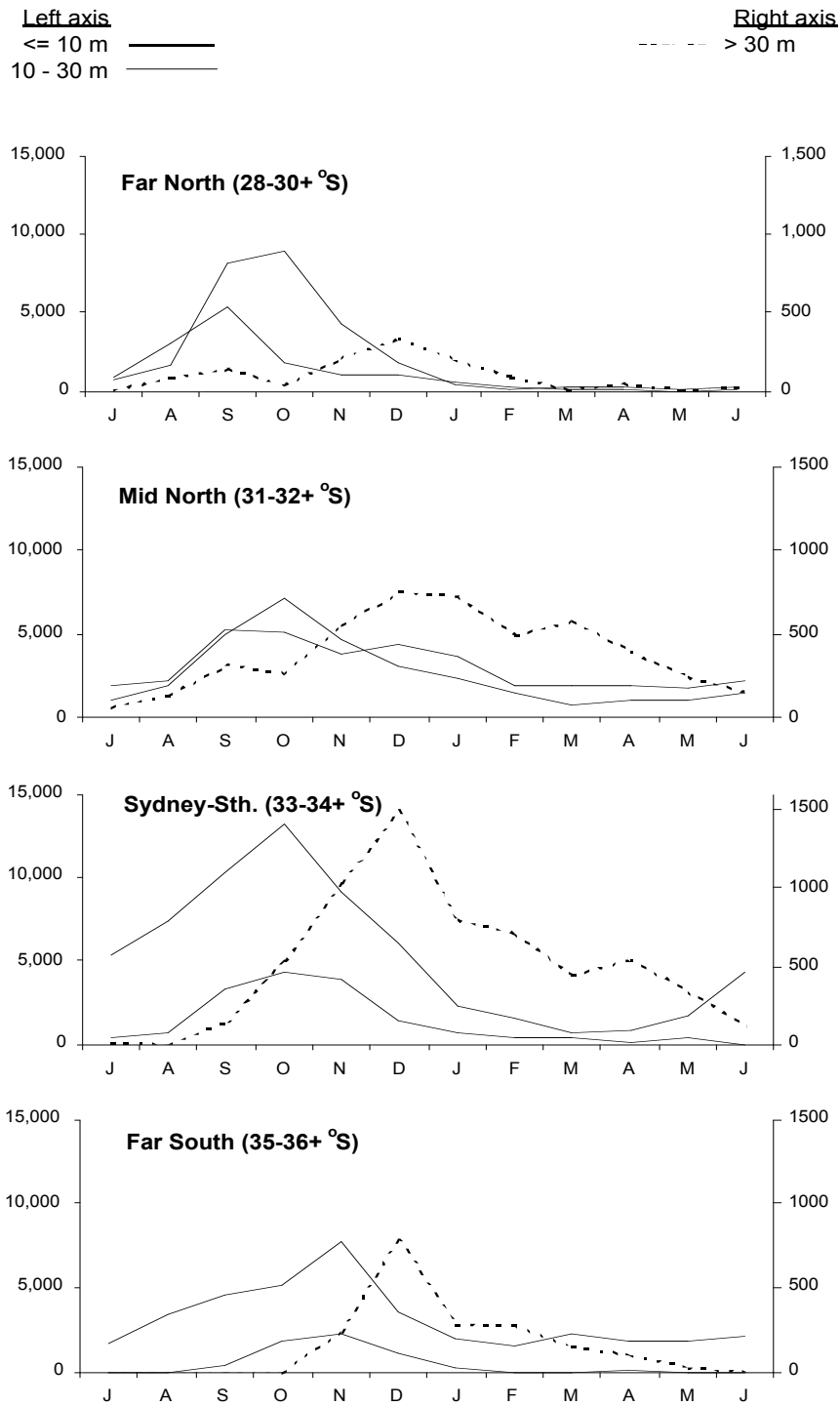


Figure E3.3 Location of fishing effort (trap lifts)

(Source Liggins *et. al.*, 2003)

The above analysis applies equally to any seasonal or spatial closures that are introduced under management response 2.2 (a). This management response seeks to provide enhanced protection to the spawning stock of lobsters, in particular by reducing the maximum legal size limit from 200 mm to 180 mm carapace length in the short term. This size reduction, combined with the reduction in the TACC for 2004/05, may have significant economic impacts in the short run by reducing the volume of catchable lobsters. This impact will be greatest for fishers on the north coast who typically rely on

catching larger lobsters than fishers located further south. However, in the long run, economic returns to fishers may improve as a result of the protection measure. By providing enhanced protection to the spawning stock, the risk of spawning stock depletion is reduced, as is the risk that there may further substantial reductions in the TACC in future years.

Management response 2.2 (a) also provides for the introduction, through consultation with lobster fishers, of further measures to protect the spawning stock, such as additional reductions in the maximum size limit and/or the introduction of seasonal and/or spatial fishing closures. In the event that further measures are considered, consultation with fishers should, in broad terms, also draw out their potential economic implications.

Management response 1.1 (e) has the potential to reduce costs, and, hence, improve returns from lobster fishing. The purpose of the management response is to map major lobster fishing grounds in order to define areas where lobster fishing occurs. The effect of such a response should be to minimise the interaction of lobster gear with other fishing gear, and in particular interaction with trawl fishing gear. The most significant result will be a reduction in the number of traps lost due to damage by trawlers, and a reduction in repair and replacement costs, resulting in: lower overall costs; higher catches; and an improvement in economic viability. However, it is important to note that this outcome might involve higher costs for trawl operators.

Draft management responses 4.2 (a), 5.1 (a) and 5.1 (e) will affect the structure of the lobster fishing industry and therefore could have a significant impact on the viability of individual operators. Response 4.2 (a) is concerned with placing an upper limit on the number of shares. This could have the potential of limiting economies of scale, that is, where cost savings can be realised through increases in the scale of operations, although fishers can still buy in quota to increase the scale of operation. In addition, the stock may not be productive enough for an individual operator to hold 350 shares. If this is the case, this management response will have no impact. This response will be discussed in greater detail in the following section.

Management response 5.1 (a) involves setting a lower limit on the level of shares required to operate in the fishery. The economic viability of fishing businesses holding a small number of shares in the Lobster Fishery may be lower than for fishing businesses with larger shareholdings (see Chapter B, Section 4.4). The effects of this response will also depend on the productivity of the stock. If the stock is productive enough, then to hold a certain minimum number of shares may not be a problem for operators. As with response 4.2 (a), 5.1 (a) will be discussed further.

Response 5.1 (b) may decrease efficiency in the Lobster Fishery if it does not allow for the redistribution of quota to fishers who can fill the quota at the lowest cost. Allowing quota trade without restrictions on quantity provides for the reallocation of quota from high cost fishers to low cost fishers. This is the most efficient outcome from an economic efficiency point of view, as it allows lobster to be harvested by fishers who can take it at the lowest cost. Whether a fisher is high or low cost will depend on, amongst other things, the productivity of the stock for any given year. If one region has a poor year, then fishers' cost per unit of effort in the Lobster Fishery may be higher, as more effort is spent on catching fewer animals. If other regions are having a relatively good year, then an opportunity exists to transfer quota from the poor season region to the good season region, as the increased benefit of extra quota to a fisher in a region with a good season is greater than the price the fisher is willing to sell (at his opportunity cost, that is, what the fisher would be able to make from the quota if the fisher were to hold on to it), hence both parties can benefit from the trade in quota. If the amount traded, in order to reach an efficient allocation of resources is more than twice the amount of a fishers' initial allocation of quota, then there would be significant efficiency losses from restricting the trade in quota to only twice a fishers' initial allocation. Whether this is the case in the Lobster Fishery will be discussed in more detail in the next section.

Management response 5.2 (a) has the potential to improve efficiency in the fishery. As mentioned, quota trade allows for a transfer of effort from high cost fishers (be it due to fishing business or the current season) to low cost fishers, thus reducing the cost in the fishery. At present, a significant proportion of quota trade is carried out in the fishery, e.g. 20% of total quota was traded in 2001/2002. Any improvements that aim to increase accessibility will only improve these efficiency gains in the long run. Increased accessibility through a faster system, one that is easier to use and has lower costs (a major impediment to use) will reduce the transaction costs (where transactions costs are defined as all the costs incurred in making an economic exchange, including the opportunity cost of time) of trading in lobster quota. The impacts of quota trading will be discussed in more detail in the following section.

Management response 5.3 (a) recognises that the fishery participants must abide by new food safety regulations and plans being developed and implemented by the NSW Food Authority. These requirements will need to be observed by fishers irrespective of the FMS requirements, however the draft FMS recognises that food safety is a critical element for long term viability of the fishery and reiterates the fishery's support for managing food safety risks. The food safety program comes at an annual cost to fishers for NSW Food Authority licences and ensuring compliance with the requirements, and this will continue to be the case after the FMS commences. In addition, a co-op that takes part in the food safety program may pass on increased costs as a result of the program to all members, including lobster fishers.

Co-op charges and services provided by co-ops vary significantly across regions, and hence increases in co-op charges as a result of the food safety program will have different impacts across the fishery. Anecdotal evidence suggests that co-op charges range between 5 and 12% of the total gross value of lobster production in a region. These differences result in fishers in some regions facing higher costs when selling their product than fishers in other regions. It also indicates that in some regions, increases in co-op charges may only have a minimal impact on the economic viability of fishers, whilst in other regions there may be a significant impact.

As food safety programs are aimed at improving the quality and safety of seafood products for human consumption, by participating in food safety programs fishers may be able to command a premium for product that is compliant with food safety standards. In addition, the implications for viability if product is not compliant with the program, and causes illness, are far worse. The offending fishing business may be subject to hefty fines if they are found liable and the good reputation of the eastern rock lobster product among consumers may be damaged.

E3.1.3 Further investigation of significant impacts

Certain responses have been identified as being likely to have significant impacts on the economic viability of fishers in the Lobster Fishery. The issues surrounding each of these issues are dealt with separately in order to provide an indication of the likely effect of implementing the draft management responses.

- **4.2 (a):** Limit the maximum allowed shareholding in the fishery to 350 shares

Despite the fact that only very few fishers hold more than 200 shares (Figure E3.4), there may be substantial economies of scale from having fewer fishers holding a greater number of shares. These economies of scale would most likely result in a more efficient allocation of resources, as operators who can fish at the lowest cost would harvest the resource. This would, in turn, increase returns to society, as the net benefit received, above the cost of harvesting the resource, would be maximised. In

addition, costs to operators taking advantage of economies of scale in production would be expected to be lower, and hence returns would improve, resulting in greater economic viability.

Despite the benefits accruing from economies of scale in production, issues of equity in resource allocation and potential concentration of fishing effort in particular areas of the fishery may work against this principle. In addition, increased concentration may lead to market power if shareholding is concentrated in the hands of a few large operators. However, increased concentration does not always lead to market power. As Paul (2001) states, increased production may well lead to concentration to exploit economies of scale without enabling firms to exploit market power. In addition, the extent to which operators could exercise market power would be dampened by competition on the domestic market from lower priced imports and product from other states.

Another issue is that in some areas of the fishery the productivity of the stock would not support a single operator holding 350 shares. In addition, without significant improvements in technology, any one fishing business would not be able to harvest the resource at a level greater than is currently the case. For this reason, concentration may not be possible.

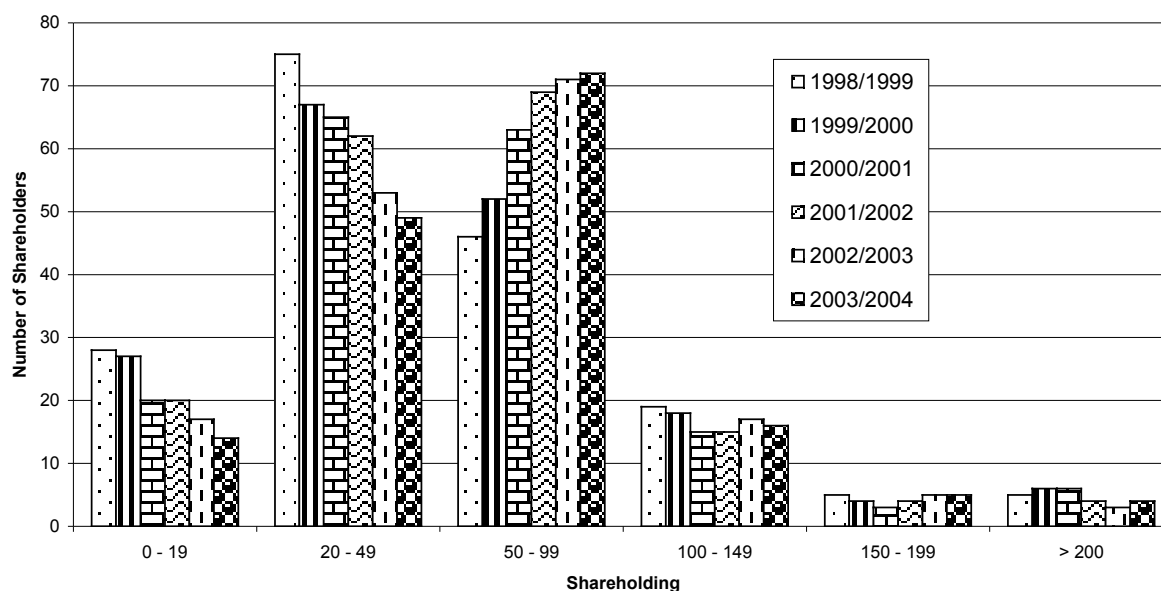


Figure E3.4 Shareholdings by operators in the Lobster Fishery 1998/1999-2003/2004

Note: Does not include transfer of quota throughout the year. Source: NSW Department of Primary Industries Fish Catch Records, 2004.

- **5.1 (b):** Limit the quantity of quota that shareholders can acquire through quota transfer during each fishing period

Allowing for trade in quota between individuals within the Lobster Fishery has the potential to increase efficiency in the fishery. However, restrictions on the level of quota that can be traded may influence that outcome. Restricting quota trade could reduce efficiency if the amount of quota that individuals wish to transfer in is more than the restriction on the amount they can acquire through quota transfer. On the other hand, the incentive to purchase shares that is created for individuals who wish to continually acquire amounts of quota more than twice their initial allocation may encourage greater stewardship of the resource and may encourage restructuring in the fishery through the purchase of shares by more efficient operators.

A further benefit of an upper limit on the volume of quota traded on an individual basis is the control it provides over substantial regional shifts in fishing effort and localised depletion of the

lobster resource. Because lobster is a migratory stock, localised depletion may affect stock abundance in other regions of the fishery with consequential effects on the economic position in those regions. However, this benefit must be weighed against the cost to efficiency from limiting the flexibility of individuals to lease in and out quota in order to respond to fluctuations in stock abundance. There may be better ways to control region shifts in effort that have less of an impact on economic efficiency.

The amount of quota allocated to an individual fisher depends on the level of shares they hold. In 1999/2000, one share equated to 13.6 kg of quota and in 2001/2002, one share equated to 14.6 kg of quota. Tables E3.3 and E3.4 show the levels of quota trade between regions for 1999/2000 and 2001/2002 respectively. The two periods presented are times when significant changes in the seasons occurred between the regions (particularly in the Far North region). As such they show the importance of quota trade when conditions are variable.

It can be seen, that during 1999/2000, all regions except the Mid North were net exporters of quota. Although Table E3.3 shows that the Mid North is a net importing region, it does not show the levels of intra-region trade (i.e. the trade in quota that occurs between fishers within the same region). Average share holdings in each of the regions, Far North, Mid North, Sydney South and Far South, was 50, 51, 68 and 69 shares respectively.

Table E3.3 Quota Trade 1999/2000

1999-2000							
Region	District	No. fishers	Catch per fisher (kg)	Shares equiv.	Net quota transferred (kg)	Net quota transferred per fisher	Shares equiv.
Far North	Tweed	0	0	0	-3146	0	0
	Clarence/Richmond	11	604	44	-1452	-132	-10
	Coffs Harbour	15	720	53	1756	117	9
	Total	26	1324		-2842	-109	-8
Mid North	Hastings	5	1080	79	2708	542	40
	Hunter	6	571	42	2662	444	33
	Manning	16	594	44	600	38	3
	Port Stephens	21	1030	76	10858	517	38
	Wallis Lake	13	993	73	14657	1127	83
	Total	61	4267		31485	516	38
Sydney South	Central Coast	11	362	27	-4934	-449	-33
	Illawarra	21	708	52	-4530	-216	-16
	Sydney North/Sydney South	8	1256	92	-1769	-221	-16
	Total	40	2326		-11233	-281	-21
Far South	Batemans Bay	15	821	60	-15003	-1000	-74
	Far South Coast/Montague/Shoalhaven	9	589	43	-1952	-217	-16
	Total	24	1410		-16955	-706	-52

(Source: NSW Department of Primary Industries Fish Catch Records, 2003.)

During 1999/2000 around 5% of fishers acquired quota close to twice the amount of their initial quota allocation, and around 10% acquired more than one times their initial quota allocation. The average shareholding of the 5% who acquired close to twice their initial allocation was 37 shares,

and the average shareholding of the 10% who acquired more than one times their initial allocation was 47. This compares to the average shareholding for the fishery at the time of 59 shares.

Table E3.4 shows the level of quota transfer for 2001/2002. During this period, both the Far North and Far South were net exporters of quota, whereas the Mid North and Sydney South regions were net importers. Despite the Far North and Far South regions remaining net exporters of quotas, the levels of trade have changed significantly. This implies a large degree of variability in stock availability between the north and south coast of NSW.

During 2001/2002, average share holdings in each region, Far North, Mid North, Sydney South and Far South, was 50, 51, 68 and 72 shares respectively. This is not a significant change from 1999/2000, however, as is indicated in Table E3.4, the volume of quota traded between regions has changed significantly. This indicates that fishers use the quota trade system to adjust for their desired exposure to the Lobster Fishery instead of selling or buying shares.

During 2001/2002, 3% of fishers were close to acquiring twice their initial allocation of quota, and around 9% acquired more than one times their initial quota allocation. The average shareholding of those fishers who acquired close to twice their initial allocation was 32.4 shares, and the average shareholding of those who acquired in more than one times their initial allocation was 41. This compares to the average shareholding for the fishery at the time of 60 shares.

Table E3.4 Quota Trade 2001/2002

2001-02							
Region	District	No. fishers	Catch per fisher (kg)	Shares equiv.	Net quota transferred (kg)	Net quota transferred per fisher	Shares equiv.
Far North	Tweed	0	0	0	400	0	0
	Clarence/Richmond	12	287	20	-1189	-99	-7
	Coffs Harbour	13	435	30	0	0	0
	Total	25	723		-789	-32	-2
Mid North	Hastings	6	490	34	2221	370	25
	Hunter	6	333	23	2800	467	32
	Manning	15	412	28	63	4	0
	Port Stephens	20	851	58	-172	-9	-1
	Wallis Lake	9	465	32	-400	-44	-3
	Total	56	2551		4512	81	6
Sydney South	Central Coast	9	561	38	200	22	2
	Illawarra	17	1092	75	1609	95	6
	Sydney North/ Sydney South	10	1279	88	2777	278	19
	Total	36	2933		4586	127	9
Far South	Batemans Bay	17	534	37	-12847	-756	-52
	Far South Coast/ Montague/ Shoalhaven	9	1706	117	4197	466	32
	Total	30	2240		-8650	-288	-20

(Source: NSW Department of Primary Industries Fish Catch Records, 2003.)

Depending on the level at which it is set, an upper cap on quota trade may not impact many lobster fishers. Despite this, limiting the amount of trade reduces the flexibility of fishers to respond to good and bad seasons, and, hence, such a measure should be viewed with caution. In addition, if the limit on quota trade is set at a high level, it will have only a marginal effect in providing an incentive for fishers to increase their total number of shares. If restructuring is desired, an additional management response, such as 5.1 (a), is needed.

- **5.1 (a):** Investigate the introduction of minimum shareholding provisions for the Lobster Fishery to provide for further restructuring, and implement the outcome of the investigation.

It was shown in earlier sections of this assessment, and in more detail in Chapter B of this EIS, that fishing businesses holding a smaller number of shares in the Lobster Fishery may be less viable than fishing business holding a larger number of shares. However, better economic information on the fishery is required to confirm (or otherwise) this observation. Management response 5.1 (e) provides for the collection of such information.

If it is shown that there is a structural problem in the fishery, and industry restructuring is desired, minimum shareholdings are a tool through which restructuring can be achieved. In addition, a minimum shareholding requirement encourages fishers to make a greater financial commitment to the fishery to ensure its long-term sustainability. However, in some regions it may not be viable to have a large shareholding, and, as such, a significant exposure to the fishery due to the variable nature of the stock in that area. This is so, even when taking account of the ability of fishers to trade in and out quota to adjust to changing market circumstances.

An investigation of the appropriate level of minimum shareholding in the Lobster Fishery should take account of the average level of shareholdings across the fishery and in each fishing district, as well as the share equivalent of catches taken in the fishery. In this way, if minimum shareholdings are to be used as an adjustment tool, they can be set at the most appropriate level.

In Table E3.5 average shareholdings per district are presented, without taking into account quota trading activities. It can be seen that a significant number of districts hold a small average number of shares. This is particularly the case in the Mid North and Far North regions of the fishery, reflecting the fact that when stock is particularly variable, it may not be optimal for fishers to have a large exposure to lobster fishing activities. This is also reflected in the multi-endorsed nature of many of the fishing businesses holding lobster shares. For example, in the Far North of the fishery, fishing businesses with lobster shares hold, on average, endorsements in 2 other fisheries.

As an example of how fishers would be affected by the introduction of minimum shareholdings, a minimum level of 35 shares is considered. A minimum shareholding of 35 shares in 2001/2002 would have affected around 27% of fishers in the Far South region who hold less than 35 shares, 45% of fishers in the Mid North region, and 34% and 36% in the Far North and Sydney South regions respectively. This indicates that in 2001/02 fishers in the Mid North of the fishery would have been most impacted by a move to require a minimum shareholding of 35 or greater shares. However, given the regional variability in the stock year on year, and the tendency for fishers to have increased the size of their shareholding (Figure E3.5), this situation may be very different if analysed for a different time period. For example, in 2003/04 it is likely that less fishers per region would have been affected by a minimum shareholding, as the average size of shareholdings across the Lobster Fishery has increased since 2001/02 (Figure E3.5).

Table E3.5 Average shareholdings per district 2001/2002

Region	District	No. active fishers	No. shares¹	Average shares per fisher
Far North	Tweed		115	n.a
	Clarence/ Richmond	12	542	45
	Coffs Harbour	13	786	60
	Total	25	1443	58
Mid North	Hastings	6	312	52
	Hunter	6	303	51
	Manning	15	636	42
	Port Stephens	20	1465	73
	Wallis Lake	9	481	53
	Total	56	3197	57
Sydney South	Central Coast	9	567	63
	Illawarra	17	1639	96
	Sydney North	4	217	54
	Sydney South	6	704	117
	Total	36	3127	87
Far South	Batemans Bay	17	1761	104
	Far South Coast/ Montague/ Shoalhaven	13	706	54
	Total	30	2467	82
	Total	147	10234	70

(Source: NSW Department of Primary Industries Lobster Share Register, 2003.)

The effect of the introduction of minimum share requirements in the Lobster Fishery on operators is ambiguous due to the difficulty in predicting the pattern of share trading that might result. If minimum shareholdings are introduced, some individuals with low share holdings may choose to exit the fishery allowing remaining operators to consolidate their business and perhaps experience economies of scale. However, if a large proportion of small shareholders choose to leave and there are not enough buyers (i.e. the remaining operators may not be required to buy additional shares to stay in the fishery), then there will be a large number of shares on the market, potentially forcing the share price down. However, as long as smaller sized shareholders are selling their shares at marginal cost, this will not cause any adverse effects on efficiency in the fishery. Further, if smaller operators are less efficient than larger operators who wish to expand their share allocation, then this situation has the potential to increase overall efficiency. However, it should be noted that this outcome should have already been realised under the current management structure as long as fishers were behaving rationally.

If, on the other hand, small shareholders decide to stay in the fishery, there may be upward pressure on the share price. This will have a positive effect on the value of shares in the fishery, but may have a negative effect on share purchases if the purchase price is above its marginal value to operators. This means that, effectively, fishers would be investing in an asset at a higher cost than it is worth to them. This would lead to an overall increase in costs (assuming sellers of shares are selling at their marginal value), thus reducing efficiency in the fishery.

The decision on whether fishers decide to sell their shares or attempt to remain in the fishery will depend on the flexibility of switching operations. As most fishers are multi-endorsed, if holding a certain minimum number of shares is above what would be economically optimal for the fishing

business, fishers could substitute effort away from lobster fishing to other fishing activities. The ease at which this is done will influence the extent to which the economic viability of fishers is affected. An easy substitution into other activities means that effort will be reallocated to its next highest value, meaning impacts on fishers could be minimal. If it is difficult to switch activities, then fishers have the potential to lose all income from lobster fishing without it being replaced in part with income from other activities. This may cause some fishing business to leave the market, as it is no longer viable for them to continue.

Fishers with a small shareholding may also choose to increase their shareholding if they can lease excess quota to other fishers, or they may choose to travel to other regions of the fishery, though this is less likely due to the high cost of doing so. If returns from leasing out quota were high enough, fishers may choose to continue to fish the same number of shares as previously, but lease out the excess they do not want to fish. As was demonstrated in Table E3.3 and Table E3.4, quota leasing is used in preference to sales and purchases of shares as a means of increasing or decreasing involvement in the fishery.

- **5.2 (a):** Investigate the feasibility of implementing an exchange accessible by all lobster fishers transferring quota and implement the outcomes of the investigation

As discussed, quota leasing allows for effort to move from high cost to low cost fishers. This movement reduces total cost in the fishery, and as such improves resource rents and efficiency. Currently, transaction costs associated with trading quota in the Lobster Fishery are high. This has the effect of reducing potential resource rents and efficiency in the fishery. High transaction costs associated with quota trade were cited in Chapter B as one of the risks facing the economic viability of the Lobster Fishery.

An improvement in the way in which the quota system is managed through establishing an exchange which is accessible to all fishers at a minimum cost, will help promote efficiency of the quota trading system. The effect of a more accessible quota trading system through the use of an exchange would be to lower transaction costs imposed on quota trade. These lower transaction costs may take the form of a faster process, thus decreasing the opportunity cost of time spent by fishers attempting to trade quota (i.e. time spent finding other fishers with quota available). Lower transactions costs may also result in a decrease in the fee for quota trade, and a decrease overall fishing costs, as fishers can better respond to good fishing conditions irrespective of whether or not they have the initial quota for such activities. As these represent direct cost savings, they should result in improvements in overall efficiency and economic viability in the Lobster Fishery. However, there may be some initial costs imposed as a result of set-up costs and through education and training for managers and fishers on how to use the new system.

E3.2 Social Issues

Introduction

The EIS guidelines require an assessment of likely changes in social impacts as a result of implementing the draft FMS at three levels:

- 1 on fishers, their families or any local communities
- 2 on Indigenous interests and values, and
- 3 on heritage items and values.

In particular, the guidelines require an assessment of whether the risk of social impacts are changed (and the potential magnitude of this change) by the management responses in the draft FMS.

E3.2.1 Impact of the draft FMS on fishing communities

The social implications of the draft FMS for fishers and their families will be discussed according to each management objective, rather than the individual management responses, as this provides a broad guide as to the likely social impacts of implementing the FMS.

Particular attention has been paid to the likely social implications of management objectives that influence economic viability, and as such affect the social capital of fishers. Reference has been given to the skills base of fishers in assessing what further implications exist for strategies that reduce the economic viability of operators.

E3.2.1.1 Impact on the amenity value of fishing operations

Many of the draft fishery management objectives are aimed at improving the sustainability of the fishery and conservation of species that interact with fishing operations. Individuals within society gain value from not only the use of a resource, but also the knowledge that the resource is being preserved. These values are often termed 'existence values', as they describe the value gained by individuals in society from the knowledge that resources will be preserved, and will continue to exist for the benefit of future generations. Several management objectives improve or preserve the non-use (existence) values generated for members of society, and thus have a positive effect on the welfare of individuals within society. These are:

- **Objective 1.1:** Mitigate the impact of lobster fishing on ecosystem integrity (i.e. species, populations and ecological communities);
- **Objective 1.2:** Minimise the impact of lobster fishing activities on non-retained species;
- **Objective 1.3:** Mitigate the impact of activities within the fishery on marine and terrestrial habitat and their associated biota;
- **Objective 1.4:** Prevent the introduction and translocation of marine pests and diseases by rock lobster fishing activities;
- **Objective 2.1:** Maintain the spawning biomass of eastern rock lobster at or above 25% of pre-exploitation level;
- **Objective 2.2:** Provide protection to components of the lobster stock to enhance biological sustainability;
- **Objective 2.3:** Effectively manage byproduct taken by the fishery;
- **Objective 2.4:** Promote the recovery of overfished species;
- **Objective 3.1:** Identify, and minimise or eliminate, any impact of lobster fishing activities on threatened species, populations and ecological communities (including mammals, birds, reptiles, fish, invertebrates and vegetation), and where possible promote their recovery;
- **Objective 5.3:** Appropriately manage food safety risks in the harvesting of fish in the fishery;
- **Objective 6.1:** Ensure a transparent and focused approach to compliance, research and management of the Lobster Fishery;

- **Objective 6.2:** Maximise compliance in the Lobster Fishery;
- **Objective 6.3:** Provide effective and efficient communication and consultation mechanisms for the Lobster Fishery;
- **Objective 6.4:** Implement this Strategy in a manner consistent with related Commonwealth and State endorsed programs aimed at protecting aquatic environments, and achieving the objectives of ecologically sustainable development;
- **Objective 7.1:** Improve the community's understanding of commercial lobster fishing;
- **Objective 7.2:** Promote scientific research and monitoring to gain knowledge of eastern rock lobster, byproduct and bycatch species and the impacts of fishing on other species and the environment, and the status of the fishery as a whole, including economic and social factors; and,
- **Objective 7.3:** Maintain and improve the quality of the catch and effort information collected from endorsement holders.

Many of the objectives are concerned with maintaining biodiversity in the fishery. Improvements in biodiversity will influence society's perceptions of lobster fishing activities. If fishing activities are conducted in a non-intrusive manner (or by keeping adverse effects to a minimum) benefits will flow to society. For example, the benefits to recreational users (for example diving) are expected to improve. This has potential to improve the perception of lobster fishers in the community and thus improve links to other sectors. These improved relations can be seen as an improvement in the social capital of fishing communities.

Improvements or maintenance of the biological health of the fishery caused by the draft management objectives should improve or maintain current non-use values. As society values biodiversity, these are indirect benefits caused from such management actions. Further, as these contributions are diffuse, members of fishing communities will not be the only ones to benefit. This can be viewed as the implementation of social responsibilities by fishers, especially if the costs of conducting fishing operations in a manner consistent with the management objectives are greater than the costs without.

Draft management objectives 2.1 and 2.2 are concerned with maintaining or improving the current levels of lobster stock within the fishery. Maintaining the biological stock of the fishery will not only influence the returns to fishers, but also the ability for them to maintain linkages with the community which allows fishers to contribute to the community. These linkages maintain current levels of social capital and enhance the non-use values that are generated through from the fishery. Objective 5.3 will improve the safety standards of food handling in the fishery. These improvements also have the potential to improve individuals' satisfaction from consuming lobster products and could possibly increase linkages between fishers and other members of the community as they seek out better prepared local product.

Objectives 6.1, 6.2, 6.3 and 6.4 deal with the issue of compliance. By creating a situation where processes are transparent, members of society can be sure that the desired objectives are being met, and can find out the way in which these measures are being met. Further, by creating a structure where fishers are unlikely to break the management regulations, there will be reduced uncertainty over whether or not the fishery is being managed as desired.

Objectives 7.1, 7.2 and 7.3 will improve information available to the community about lobster fishing activities. Making society aware of fishing practices that are undertaken in a manner which minimises impacts on the environment will further influence the non-use values generated by the fishery. Also, increased information created by research programs will add to the knowledge base of society, which has a positive impact on overall welfare.

E3.2.1.2 Impact on social capital

Any changes to the economic viability of fishers, which results in them leaving the industry may have significant social impacts. Employment opportunities in areas outside of Sydney are poor and unemployment rates are often high. Unemployment rates for regional areas in which fishers live vary between 5% for the Hawkesbury statistical region and 16% for the Clarence statistical region; this is compared with an unemployment rate in Sydney of 6% in 2003 (ABS 2003).

Objectives in the draft FMS that influence social capital are the same as those that influence the economic viability of fishers. They are listed below:

- **Objective 2.2:** Provide protection to components of the lobster stock to enhance biological sustainability, specifically management response 2.2 (a);
- **Objective 4.2:** Provide for fair and equitable sharing of the eastern rock lobster resource within the Lobster Fishery, specifically management response 4.2 (a);
- **Objective 5.1:** Promote the long term economic viability of lobster fishing and assess the economic benefits of the fishery to the community, specifically management responses 5.1 (a), 5.1 (e) and 5.1 (f); and
- **Objective 5.2:** Maximise the efficiency of trading quota, specifically management response 5.2 (a).

The aim of objective 5.1 is to improve long-term economic viability in the fishery by improving the efficiency with which fishers harvest the resource, thereby improving overall returns from the fishery, and hence returns to the community. Society as a whole will benefit as fishers will be harvesting the lobster resource at a lower cost.

There may be some short-run restructuring implications for fishers as a result of the implementation of recommendations and management actions in objective 5.1. These may result in changes in social capital if fishers chose to exit the Lobster Fishery. However, the extent to which there is a social loss to communities from fishers exiting the industry is unknown, as they may choose to continue fishing in other fisheries, or take up alternative employment in the area. Additionally, restructuring in the fishery may assist the exit of fishers from the industry who are nearing retirement age, and allow for a new generation of fishers to enter the industry. This new generation of fishers will bring new skills to the fishery.

Many lobster fishers, particularly those located in the Far North of fishery have been in the industry for long period of time. The median number of years that lobster fishers have been in the commercial fishing industry is 21-25 years (Figure E3.5), with fishers in the Far North having a longer family association with the industry (i.e. 71% are second, third or fourth generation fishers) (Roy Morgan, 2001a). This compares with 55, 32 and 41% of fishers being second third or fourth generation fishers in the Mid North, Sydney South and Far South regions respectively. Further, lobster fishers have spent significant periods of time living within the same postcode area, with the median length of residency within the same postcode being 26-30 years (Roy Morgan, 2001a). This suggests

that fishers have had time to build links with other members of the community, be it through associations with clubs or other informal memberships, or through contacts to which they sell their produce to locally. Hence, exit of fishers from the industry may negatively impact on social capital, unless they are able to find alternative employment within their existing communities.

The viability of fishing operations will determine whether fishers are able to remain in the industry. Fishers receiving negative returns may leave the industry and seek alternate employment. However, most lobster fishers are multi-endorsed and as such, negative returns may only lead them to making decisions to move out of lobster fishing whilst remaining in the commercial fishing industry. Despite this, reducing the profitability of one fishing activity may lead to a fall in overall viability of the business, making them more susceptible to variation in profitability of other fisheries.

Alternative employment opportunities for fishers in the Far North appear to be less than for other sections of the fishery. A significant proportion of fishers in the far north have been in the industry for a substantial period of time (Figure E3.6) and thus changing industries could be difficult. Hence, significant changes in the economic viability of fishers in the Lobster Fishery could have significant social impacts.

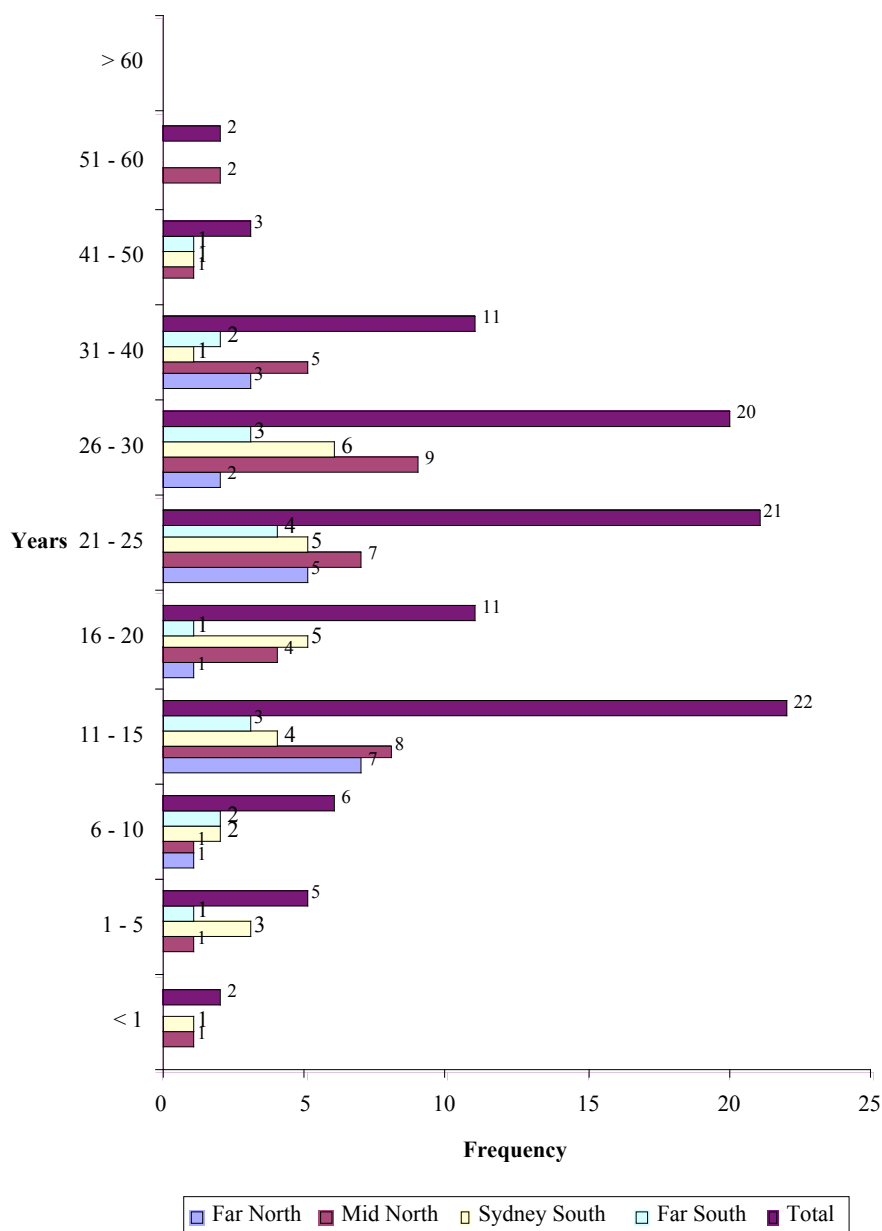


Figure E3.5 Years in the commercial fishing industry

(Source: Roy Morgan, 2001a)

Changes in the economic viability of fishing operations as a result of the introduction of minimum shareholdings may also have an impact on the families of some fishers. A significant proportion of fishers hold a relatively small number of shares, and 43% of fishers have families with dependants under the age of 16 (Roy Morgan, 2001a).

An important implication of any change in incentives of fishing business to fish is that it has the potential to cause reallocation of resources between fisheries. This can lead to conflicts between ex-lobster fishers and fishers in different fisheries. This potential conflict is discussed below.

Despite a risk to social capital as a result of reduced economic viability of lobster fishers, the outcomes of the draft management objectives that could impact on the viability of fishers is unclear. Further, the age structure of the fishery may pose a greater risk to loss in social capital than any reduction in economic viability.

As many fishers are likely to retire in coming years, there is a risk that some of the knowledge base in the fishery will be lost. Also, established links with local communities that rely on produce from the fishing activities of these individuals may not be replaced by links with new entrants into the fishery. However, new links may be formed by new fishers entering the industry, and older fishers exiting the industry may perform a mentoring role to these new entrants, hence sharing knowledge and contributing to the social capital in the fishery. This new generation of fishers is also likely to be more highly educated, bringing a new set of skills to the industry.

E3.2.1.3 Impact on other fisheries

Interactions of lobster fishing activities with other types of fishing, if negative, can have social ramifications. Adverse interaction between fishers operating in different fisheries can affect links within communities. Further, issues to do with access to resources can cause conflict between members of society. Management objectives can influence these outcomes in both a positive and negative manner. For example, objectives that result in lobster fishers moving away from current activities and into other fisheries, may cause competition over access to limited resources in other fisheries (assuming current levels of effort in these fisheries are already high). However, strategies that minimise the negative interactions between different fishing activities can have a positive effect.

The objectives set out in the draft FMS that are likely to have an effect on the interaction between fishers are:

- **Objective 4.1:** Provide an appropriate allocation of the rock lobster resource between harvesting sectors, acknowledging the need of seafood consumers to access fresh quality product;
- **Objective 4.2:** Provide for fair and equitable sharing of the eastern rock lobster resource within the Lobster Fishery;
- **Objective 4.3:** Provide for fair and equitable management of the interactions between the Lobster Fishery and other commercial fisheries (NSW, interstate and Commonwealth);
- **Objective 4.4:** Identify and mitigate negative impacts of the Lobster Fishery on Aboriginal or other cultural heritage; and
- **Objective 4.5:** Promote harmony between the commercial fishery and other resource users, including recreational fishers, Indigenous fishers and local communities, through fair and equitable sharing of the resource.

Further to the objectives listed above, any responses or objectives that are likely to cause a shift in fishing effort away from lobster (through reduced economic viability), such as those identified in section E3.2.2, will possibly lead to conflicts between ex-lobster fishers and fishers in different fisheries if there is increased pressure for access to other resources.

Interactions between lobster fishing gear and the gear from other fishing activities causes loss and damage to lobster fishing equipment. This loss can create social conflict between users of different marine resources. Objectives 4.1, 4.2, 4.3, 4.4 and 4.5 should in some way redress these conflicts by introducing a cross fishery consultation process, and a dispute settlement framework.

E3.2.2 Impact of the draft FMS on Indigenous interests and values

E3.2.2.1 Directly related goals and objectives

The overall vision for the management of the Lobster Fishery is stated in the FMS as:

A lobster fishery that is ecologically sustainable and profitable and that works to improve the understanding and management of this valuable species through a high standard of research and compliance and pro-active co-operation amongst stakeholders.

The objectives listed under Goal 4 are intended to respect and protect the interests of Indigenous people in the management and resources of the fishery. In addition to the objectives that are directly relevant to the interests of Indigenous people, a number of objectives also address issues that are of interest to Indigenous people. These issues include the sustainable management of the rock lobster resource, sharing of information about the condition of the rock lobster resource and effective compliance strategies (Goal 6).

To assess the potential for interactions between the commercial lobster fishery and Indigenous fishers to be detrimental to the interests of Indigenous people, impacts on sites, places, cultural practices and the economic autonomy of Indigenous communities along the NSW coast are considered.

Table E3.6 shows the extent of consistency between the objectives under Goal 4 of the FMS, actions proposed in relation to these objectives, the objectives and priority actions of the Indigenous Fisheries Strategy and the Aboriginal community objectives for the commercial lobster sector that have been deduced from the information presented in this report.

E3.2.2.2 Other relevant goals and objectives

The Indigenous Fisheries Strategy Implementation Plan includes two actions relating to capacity building and skill development in the Indigenous community to enhance their ability to participate as licensed fishers in the commercial sector. This issue was also raised during the current consultation.

The Indigenous community objectives relate to sharing of cultural and resource management information, but also to Indigenous community participation in the management of conservation issues and in the economic benefits accruing from the fishery, by enhancing the community's capacity to be constructively involved.

The draft FMS does include some objectives outside Goal 4 that relate to these matters, although the Indigenous community is not noted as a specific stakeholder. Additional goals, objectives and actions that have relevance to the values and objectives expressed by the Indigenous community are noted in Table E3.7.

Two goals in particular relate to the issues that have been raised by the community as concerns about management of the fishery (and other fisheries) and in terms of their participation in natural resource management generally, Goal 6 (compliance).

Table E3.6 Assessment of the consistency between the responses under Goal 4 of the draft Lobster Fishery Management Strategy, the Indigenous Fisheries Strategy and Indigenous community values and objectives.

Indigenous Community Values and Objectives	IFS Implementation Plan Priority Actions	Rock Lobster FMS Objective
		<p>Goal 4 <i>Appropriately share the resource and carry out fishing in a manner that minimises negative social impacts.</i></p>
<p>Communities value access to marine resources in the shore and nearshore area of the NSW coast for customary or traditional fishing, for community subsistence and for the transfer of traditional knowledge. The species that occur on rocky headlands, nearshore reefs and islands, and around shallow reefs close to shore, including rock lobster, are an important part of contemporary Indigenous community diet. Different species are targeted at different times of year with the aim of providing food for the whole community (or at least an extended family group).</p> <p>On the south coast, the Indigenous community has traditionally targeted rock lobster during the winter months. The recreational and commercial fishing sectors also target rock lobster (less seasonally). The values and objectives of all these sectors need to be taken into consideration when managing this resource.</p>	<p>Review current Indigenous cultural access to fisheries, review options with IFWG and prepare advice after reviewing input from communities.</p> <p>Note this action is supported by other NSW Department of Primary Industries projects to better define Indigenous cultural fishing practices and preferred species (eg through research flowing from the Recreational Fishing Survey)</p> <p>Current estimates of Indigenous catches are patchy and often qualitative.</p>	<p><i>Objective 4.1</i></p> <p>Provide an appropriate allocation of the rock lobster resource between harvesting sectors, acknowledging the need of seafood consumers to access fresh quality product.</p> <p><i>4.1(a)</i></p> <p>Refine, as far as practicable, estimates of total catches of eastern rock lobster, taking into account commercial catch and estimates of recreational, Indigenous and illegal catches, for use on stock assessment models and reports to the TAC Committee.</p> <p>Measures to enhance accuracy of documentation and reporting of catches in the commercial sector are described in the FMS.</p>

Table E3.6cont.

Indigenous Community Values and Objectives (Section 4.4)	IFS Implementation Plan Priority Actions	Rock Lobster FMS Objective
<p>Access to marine species or to places for the purpose of teaching younger members of the community about traditional values, particularly respect. In general, these places and species are those that occur on or near to the shore.</p> <p>The Aboriginal community has expressed clear aspirations for developing opportunities for greater direct participation in the commercial sector</p>		<p>Improved documentation of total catch will be achieved through ongoing surveys of both the unreported component of the commercial catch and recreational/Indigenous catches. Estimates of total recreational (and Indigenous) catch are based on the results of the National Survey of recreational fishing, which will be repeated periodically. NSW Department of Primary Industries should consult with IFWG about survey design and delivery to achieve effective and culturally appropriate coverage of Indigenous fishers.</p>
<p>To ensure that there is clear and open communication between fishery managers and the Indigenous community about catches, methods, impacts, benefits and opportunities to be involved in management.</p> <p>To enhance the skills and capacity of the Indigenous community to participate in the fishery sector, both as fishers and in terms of active involvement in the Management Advisory Committee.</p>	<p>Develop and facilitate a model for community input to fishery management planning (and marine park management) and progressive involvement in fishery management strategies (to be completed in 2004).</p> <p>Cultural awareness training completed for all existing NSW Department of Primary Industries staff, all management advisory committees and new NSW Department of Primary Industries staff (as part of Induction).</p>	<p><i>Objective 4.4</i></p> <p>Identify and mitigate negative impacts of the Lobster Fishery on Aboriginal or other cultural heritage.</p> <p><i>4.4(a)</i></p> <p>Manage the Lobster Fishery in a manner consistent with the Indigenous Fisheries Strategy and Implementation Plan</p>

Table E3.6cont.

Indigenous Community Values and Objectives (Section 4.4)	IFS Implementation Plan Priority Actions	Rock Lobster FMS Objective
To ensure that the commercial Lobster Fishery is managed in a manner that is consistent with sustainable resource use – i.e. that does not result in irreversible damage to habitats, or irreversible decline in the rock lobster population.	Project manager to identify strategies to maintain levels of Indigenous involvement in commercial fishing; Develop an employment strategy for NSW Department of Primary Industries in consultation with the IFS Working Group (completed June 2003); Review aquaculture and commercial fishing opportunities, consult with IFWG and prepare advice to communities on the skills required to sustain these businesses.	4.4(b) Modify the activity, where relevant, in response to new information about areas or objects of cultural significance in order to minimise the risk from lobster fishing activities.
As for Objective 4.1 and 4.4.	As for Objective 4.1 and 4.4.	Objective 4.5 Promote harmony between the commercial fishery and other resource users, including recreational fishers, Indigenous fishers and local communities, through fair and equitable sharing of the resource. 4.5(a) In consultation with the Lobster MAC, identify areas of high interaction between the Lobster Fishery and other resource users and respond appropriately to resolve any conflicts.

Table E3.7 Assessment of the consistency between the objectives in the draft Lobster FMS (other than Goal 4), the IFS and the Values and Objectives expressed by the Indigenous Community

Indigenous community objective	IFS Implementation priority	Rock Lobster FMS objective
To ensure that there is clear and open communication between fishery managers and the Indigenous community about catches, methods, impacts, benefits and opportunities to be involved in management and fishing	Develop and facilitate a model for community input to fishery management planning (and marine park management) and progressive involvement in fishery management strategies (to be completed in 2004).	Goals 1 (Manage the Lobster Fishery in a manner that promotes the conservation of biological diversity in the marine environment), Goal 2 (Maintain the stock of eastern rock lobster at a biologically sustainable level and manage byproduct taken in the Lobster Fishery) and Goal 3 (Promote the conservation of threatened species, populations and ecological communities and protected species of fish likely to be impacted by the operation of the Lobster Fishery), as well as Goal 4 address this community aspiration.
To enhance the skills and capacity of the Indigenous community to participate in the fishery sector, both as fishers and in terms of active involvement in the Management Advisory Committee	<p>Project manager to identify strategies to encourage and maintain levels of Indigenous involvement in commercial fishing, following up the recommendations of the June 2003 workshop on measures to enhance Indigenous participation in the commercial sector.</p> <p>Develop an employment strategy for NSW Department of Primary Industries in consultation with the IFS Working Group (completed June 2003).</p> <p>Review aquaculture and commercial fishing opportunities, consult with IFWG and prepare advice to communities on the skills required to sustain these businesses.</p>	<p>Objective 7.2(b) may assist with the identification of opportunities for Indigenous participation and appropriate skill development programs.</p> <p><i>Objective 7.2(b)</i></p> <p>Develop a strategy, in consultation with the Lobster MAC, for improving the understanding of economic and social information relating to the Lobster Fishery, taking into account the information gaps outlined in the economic and social assessment in the Environmental Impact Statement for the fishery.</p>
To ensure that the commercial Lobster Fishery is managed in a manner that is consistent with sustainable resource use – i.e. that does not result in irreversible damage to habitats, or irreversible decline in the rock lobster population		Goals 1 and 2 directly address this community aspiration.

Table E3.7 cont.

Indigenous community objective	IFS Implementation priority	Rock Lobster FMS objective
<p>To ensure that fishery regulation and compliance methods are sensitive to Indigenous community dynamics and culture.</p>	<p>During the current consultation, Indigenous fishers stated that they are negatively impacted by current recreational fishing regulations. The IFS does not directly address this issue.</p>	<p>Goal 6 (Objective 6.1) of the FMS states : <i>‘Ensure a transparent and focused approach to compliance, research and management of the lobster fishery.’</i> District compliance plans have been developed for all areas of NSW and guide the focus of compliance activities. NSW Department of Primary Industries should ensure that these compliance plans, as they relate to the activities of Indigenous fishers, reflect as much as possible the cultural values and rights of Indigenous people. There may be a role for further information about compliance processes (addressing the transparent issue), so that Indigenous fishers have access to more information about the context in which compliance activities are being undertaken. Filling the Indigenous representative position on the Lobster MAC will also help to improve communications about compliance enforcement.</p>

E3.2.2.3 Impact evaluation and recommendations

The Indigenous communities along the NSW coast have a long standing and important relationship with marine resources. Rock lobsters are a popular marine resource to Indigenous coastal communities. There is therefore a high likelihood that Indigenous fishers and commercial rock lobster fishers will interact.

The Planning guidelines for this assessment require that the risks to Indigenous people's values are noted, both for the current situation and with the strategies nominated in the FMS in place. The impact assessment has addressed five key issues about the relationship of the commercial lobster fishery and the fishery practices and values of the Indigenous community. These issues are noted in Table E3.8, together with a summary statement about the anticipated risk to Indigenous values with current management and with the strategies noted in the FMS in place.

The concept of risk incorporates both a probability factor (how likely an impact is to occur) and a consequence or magnitude factor (how severe the impact would be). A standard risk assessment approach is difficult to apply with the type of information that is available about Indigenous fishery and marine habitat values. Table E3.8 therefore presents a simple qualitative assessment and ranking of risk.

Table E3.8 indicates the objectives and actions proposed in the Rock Lobster FMS present generally low risks to Indigenous values. The FMS will not result in additional impacts on Aboriginal sites or places, and the measures proposed are expected to reduce currently recognised impacts, within the limitations imposed by the existing Fisheries Management Act.

Some broad areas for consideration by NSW Department of Primary Industries, which would help to address concerns and frustrations about fishery management in the Aboriginal community are outside the scope of the lobster FMS alone, and would require a broader review of fisheries policy.

E3.2.2.4 Differentiation of Indigenous fishing

During the consultation program for the assessment of various fishery management strategies, the main issue raised repeatedly was a concern and rejection of the inclusion of Indigenous fishers with recreational fishers. The Aboriginal community representatives have repeatedly stated that the Recreational regulations do not provide the flexibility necessary to take Indigenous cultural obligations and practices into account. Nor do they reflect the long standing involvement of Aboriginal communities in low key commercial/subsistence/cultural fishing in coastal areas and the loss of identity that comes with marginalisation of access to fishing. This results in people being unable to fulfil their cultural responsibilities. This issue cannot be addressed directly in the FMS for the commercial Lobster Fishery. However, it is important to note that the issue is relevant to the commercial sector generally in that Indigenous fishers argue that they would prefer to be regarded as a distinct fishing sector which recognises Indigenous people and respects their cultural traditions. Recognition of Indigenous fishers as a distinct management group could be accommodated within a sustainable fishery management strategy (in terms of total catch and in terms of protecting lobster habitat). Recognition of a separate category of Indigenous fisher may also reduce the workload of compliance enforcement, and could be expected to have significant benefits for the Aboriginal community. These benefits relate both to capacity to deliver cultural obligations within the community and the reduction of strains on communities managing high levels of unemployment, fines and jail sentences.

Table E3.8 Risks to Indigenous Values under the existing management regime and with the FMS in place.

Broad issue/value	Risk – existing management	Risk – FMS strategies implemented
Aboriginal sites – the physical evidence of past Aboriginal land use	Low. There is a low probability that the commercial Lobster Fishery will impact Aboriginal sites.	Low. Further information obtained as a result of FMS strategies being implemented will result in a more complete knowledge of the location and significance of Aboriginal sites and so less risk that the fishery will impact such sites.
Aboriginal places – the locations that are associated with stories about the landscape or with personal and community totemic associations with the natural world	Low	Low. The involvement of Indigenous people in the management of the fishery (eg through encouraging membership of the Lobster MAC) will help to improve awareness and understanding of the cultural importance of fishing places along the coast.
Aboriginal marine totem species	Low	Low (as above)
Aboriginal cultural landscapes – the places and species in the landscape that are important to Aboriginal people. As a separate issue from Aboriginal places, this refers to the presence and distribution of Aboriginal foods and medicines in the marine landscape	Low to moderate	Low to moderate. This traditional knowledge is the basis for links to country and is passed down through communities during their participation in activities that appear to be subsistence based but also have cultural and spiritual purposes. Current conflicts about access to the resource in some areas (compliance issues) appear to derive at least, in part, from the implementation of cultural responsibilities
Aboriginal socio-economic participation in the commercial fishing sector.	High – currently very low participation	Low to moderate – the strategy may facilitate enhanced opportunities for economic participation and skill development, in association with the actions that are priorities in the Indigenous Fisheries Strategy and are further explored in the Indigenous Commercial fishing opportunities action plan. Adoption of key recommendations of the Indigenous Fisheries Advisory Committee will help to open up opportunities and reduce the risk that commercial fishing strategies present to Indigenous interests.

E3.2.2.5 Protocols to reduce impacts to Aboriginal cultural heritage sites

While the risk which commercial rock lobster fishing poses to cultural heritage sites and places is considered to be low, the extent of the risk will vary from location to location. The definition of the risk for an individual location will depend heavily on the availability of local knowledge (eg provided by discussions with local Aboriginal people and local NPWS officers).

Where the potential for an impact on cultural heritage is known to exist, it is important that this potential is addressed by liaison and management actions at the local level. This will ensure compliance with the requirements of the NPW Act, and will also enhance co-operation and understanding of cultural concerns. An example is the presence of Aboriginal cultural heritage material at the boat ramp at Arrawarra. This ramp is also adjacent to a stone structure considered to be an Aboriginal fish trap.

Several management actions are proposed to ensure that risks to cultural heritage is minimised. These include:

- consultation with local Aboriginal community representatives in relation to any proposed commercial fishery facility that would be located on a shoreline. This would include maintenance of existing ramps, new launching ramps and regional boat storage or maintenance sites. In general, such facilities will require separate environmental assessment and development consent including assessment of potential impacts on Aboriginal cultural heritage. Often these facilities are used by the fishing community generally, rather than by only operators in one commercial sector, and the key requirement is that consultation occurs;
- preparation of cultural awareness information for holders of lobster endorsements;
- ongoing consultation with local Aboriginal communities about developments in the commercial sector. This will occur, for instance, through Aboriginal representation on management advisory committees (MACs). NSW Department of Primary Industries should consider further actions to encourage Indigenous people to participate in MACs, which currently have a very low level of Indigenous participation. Actions to consider include allowing additional supporting representatives, allowing alternative representatives, training and capacity building in committee processes, assistance with dissemination of information from the MACs to Indigenous communities (individuals and groups) and/or facilitating cross sector workshops; and
- inclusion of clauses to be aware of and protect Aboriginal cultural heritage within the Lobster Fishery Code of Practice. For example, the Ocean Haul Code of Conduct, while not specifically identifying cultural heritage, states that 'Endorsed fishers will comply with local Council and NPWS bylaws' and 'Endorsed fishers will use local Council or NPWS approved access points'.

In addition to these participation issues, two areas would benefit from further research and consultation and the information arising from these studies would greatly enhance the certainty that risks are being effectively managed.

The first key issue for further research is to obtain more information about traditional cultural fishing practices in all regions of the NSW coast. This should include fishing practices, fishing purpose, participation, locations, links to totems, places and other objects of value to local Aboriginal communities. It is important that any special characteristics of Indigenous fishing practices are documented and also made more widely available – to illustrate a particular set of community cultural values and the long standing connections between Aboriginal people and sea country. It is critical that the concept of Indigenous fishing is more widely understood, if any progress is to be made towards recognising Indigenous fishers as a specific group.

The second issue is to further explore measures to encourage and maintain Aboriginal participation in the commercial sector, including the Lobster Fishery. It should not be anticipated that

this issue can be resolved through the Lobster FMS alone. However, lobster fishers and the Indigenous community should both participate in discussions about potential opportunities to enhance Indigenous participation in the commercial fishery, including relevant access and capacity building arrangements.

The implementation of the Lobster FMS, in association with the Indigenous Fisheries Strategy, is likely to have some benefits for Indigenous stakeholders.

E3.2.3 Impact of the draft FMS on heritage values

The draft Fishery Management Strategy requires that fishers respond to new information about heritage resources. Although the risk that rock lobster fishing activities will detrimentally impact on historic heritage resources is generally low, the operation of the Lobster Fishery does present an opportunity to further reduce risks in the long term by contributing to improved spatial data about the locations of shipwrecks.

A key constraint to the accurate assessment of risk is that details about the locations and condition of many shipwrecks are poor. Lobster fishers may from time to time encounter shipwreck remains on the sea floor. When this occurs, fishers could report location (GPS co-ordinates, water depth) and any other information they detect about the structure to the NSW Heritage Office and NSW Department of Primary Industries. This information will add to the database, so that fishers can be alerted about potential obstacles on the sea floor (with heritage and safety implications), and the Heritage Office will have more accurate information about the location of shipwrecks.

Implementation of routine reporting of potential shipwreck sites to the Heritage Office will contribute to the demonstration of due diligence (by showing that fishers are aware of potential risks and are taking steps to reduce them), as well as refining the available information.

A second appropriate management response is to provide licence holders with basic information about their responsibilities under the *Heritage Act*, including the provisions relating to damage to structures, exclusion zones and collection of any historic artefacts that may be observed.

Note that the Heritage Act requires notification of the Heritage Office if a relic is found (or suspected) and also requires that relics not be disturbed without obtaining a permit. In rare cases, this would mean that rock lobster fishing in the vicinity of a structure that has been reported to the Heritage Office should cease until the nature and significance of a relic has been investigated and confirmed.

E3.2.3.1 Protocols to reduce impacts to heritage sites

These recommendations are made on the basis of:

- the review of the heritage assets in the area of operation of the Lobster Fishery;
- the limited descriptions of the fabric and the precise locations of some of the material evidence offshore relating to shipwrecks;
- synthesis of the archaeological and historical contexts that is available from the review;
- the appreciation of the significance of the heritage resources; and
- consideration of the management issues and potential impacts of the proposed use.

It is recommended that in general in connection with the operation of the commercial rock lobster fishery, the attention of all authorities and agencies has been, and that of all commercial fishers, their contractors and employees will be, directed to:

- a) the provisions of the Commonwealth *Historic Shipwrecks Act 1976* and in particular to:
 - i) the definition of shipwreck under that Act (s.4A);
 - ii) the provisions of ss.4A, 5, 7, 9, 10, 11, 13, 14, 15 and 17 of that Act;
- b) the provisions of the NSW *Heritage Act 1977*:
 - i) the definition of relic under the Act (s.4);
 - ii) the provisions of sections 24-34, 35A-55B, 57, 60, 130, 136-7, 139 and 140 of that Act;
- c) submarine shipwrecks and/or relics may be exposed or covered from time to time as the result of current fluctuations and movement of ocean floor sediments. If an item suspected of being part of an historic shipwreck or other shipwreck becomes visible as a result of water conditions or inadvertent disturbance it should be reported in the first instance to the Minister pursuant to the *Historic Shipwrecks Act 1976* and/or to the NSW Heritage Office pursuant to the *Heritage Act 1977*;
- d) if any activity is proposed that will, or may, cause the disturbance of a shipwreck/relic that is registered on the SHR, an application should be made pursuant to s.57 of the *Heritage Act* for issue of an excavation permit pursuant to s.60 of the Act;
- e) if any activity is proposed that will, or may, cause the disturbance of a shipwreck/relic that is not registered on the SHR, an application should be made pursuant to s.139 of the *Heritage Act* for issue of an excavation permit pursuant to s.140 of the Act;
- f) the basic requirements that, in relation to any commercial fishing activity, if:
 - i) a shipwreck or relic is suspected or if there are reasonable grounds to suspect a relic that is likely to be disturbed, damaged or destroyed by commercial fishing activity; and/or
 - ii) any relic is discovered in the course of commercial fishing activity that will be disturbed, damaged or destroyed by further such activity;

The NSW Heritage Office must be informed forthwith and commercial fishing activities suspended that might have the effect of disturbing, damaging or destroying such relic, until the requirements of the Heritage Office have been satisfied.

E3.3 Changes to socio-economic viability due to the draft FMS

The EIS guidelines require an assessment of whether the risk to the economic viability of the fishery is changed as a result of management actions in the draft FMS (and the potential magnitude of this change).

Overall, it is expected that the risks to the economic viability of lobster fishers identified in Chapter B of this EIS will be reduced as a result of implementation of management actions in the draft FMS. However, significant risks to economic viability of lobster fishers from factors that are outside the control of the existing management of the fishery, such as competition from lower priced imports,

remain. These risks can not be addressed through the FMS and need to be managed through other avenues or as part of fishers' business planning.

The draft FMS contains several management responses that are based on the continuation of existing programs such as share management and research and monitoring (including stock assessment and the observer program). As such, the changes in the risk to economic viability from the draft FMS are largely unchanged from existing arrangements.

The specific risks identified in Chapter B of this EIS, and the methods through which they have been reduced, are presented below.

E3.3.1 Factors affecting catch

The risk assessment undertaken in Chapter B identified a high level of risk to viability due to availability of stock (e.g. underlying stock and its affect on size limits and TACC) and a high level of risk from loss of fishing gear. Methods of harvesting and discarding of catch posed a low level of risk to economic viability in the Lobster Fishery.

Several management responses have been developed which address the status of the stock, and resource sustainability more widely, which, in turn, effect the TACC and, hence, economic viability. As discussed in earlier in this section, many of these measures are an extension of current management processes and research and, as such, are unlikely to pose a threat to economic viability in the Lobster Fishery.

Management response 2.2 (a) poses actions to deal directly with the risk to catch by providing protection to the spawning stock through, in particular, a reduction in the maximum size of lobster. This action, and other actions that may be implemented in order to provide enhanced protection to the spawning stock, are likely to reduce, to some extent, the threat to economic viability from reductions in the TACC. Though, the risk still remains that a sudden change in the TACC may be required due to, for example, a sudden disease outbreak. As a result, the high level of risk to economic viability from stock availability remains.

The risk to economic viability from loss of fishing gear is expected to be reduced through management responses: 1.1 (e) which seeks to map all major lobster fishing grounds and define the areas in NSW waters open to lobster fishing; and 4.5 (a) which sets out to resolve conflicts in resource use where they exist between lobster fishers and other resource users. The lack of documented information on trap loss will also be addressed through management response 1.1(b), which would require fishers to report trap losses on an annual basis. The information received will allow an analysis of the actual (as opposed to perceived) risk of trap loss to the economic viability of lobster fishers. It is also expected that similar management responses contained within the FMS's prepared for other commercial fisheries in NSW will further mitigate the risk from loss of fishing gear.

E3.3.2 Quality of social and economic data

Key information gaps on costs and earnings of lobster fishers, as well as inaccuracies in available data, have been identified as posing an intermediate-high level of risk to the economic viability of the Lobster Fishery. A more accurate data set, collected more regularly, would improve the information base available to the lobster industry and NSW Department of Primary Industries to make informed business and management decisions, and would support efforts to refine the level of community contribution.

The draft FMS provides for improvements in the quality of information that is collected on fishers' costs and earnings through an economic and social survey of lobster shareholders proposed as a high priority research project (Chapter D, Table D4.8), and through the following management responses:

- **5.1 (e):** Refine the performance indicator for monitoring trends in the commercial viability of typical fishing businesses within each designated commercial fishing activity, so as to be based on net returns;
- **5.1 (f):** Investigate the data available to assess the economic multiplier (flow-on) effects of the Lobster Fishery to the broader community, and develop strategies to improve the quality / usefulness of such data;
- **5.1 (g):** Collect information to detect patterns in the quantity and price of share transfers and the quantity of quota traded, and investigate the feasibility of collecting data on the price of quota traded; and
- **7.2 (b):** Develop a strategy, in consultation with the Lobster MAC, for improving the understanding of economic and social information relating to the Lobster Fishery, taking into account the information gaps outlined in the economic and social assessment in the Environmental Impact Statement for the fishery.

The extent to which the recommendations arising from these management responses are implemented, will determine improvements in the quality of information on fishers' costs and earnings and the associated reduction in the risk to economic viability. It is likely that if they are implemented in full, the economic viability of the Lobster Fishery will improve through more informed business and management decisions and hence the risk to economic viability from insufficient costs and earnings data will be reduced.

E3.3.3 Knowledge of industry structure

There is an intermediate level of risk to economic viability in the Lobster Fishery as a result of a lack of knowledge of the structure of businesses in the lobster fishery. Existing economic data would suggest that smaller lobster businesses are more unprofitable than larger ones, and that these smaller fishers may be reluctant to exit the industry. If this is the case, some form of structural adjustment may be necessary.

The following management responses may assist in the gathering of better information on industry structure:

- **5.1 (a):** Investigate the introduction of minimum shareholding provisions for the Lobster Fishery to provide for further restructuring, and implement the outcome of the investigation.
- **5.1 (g):** Collect information to detect patterns in the quantity and price of share transfers and the quantity of quota traded, and investigate the feasibility of collecting data on the price of quota traded; and
- **7.2 (b):** Develop a strategy, in consultation with the Lobster MAC, for improving the understanding of economic and social information relating to the Lobster Fishery, taking into account the information gaps outlined in the economic and social assessment in the Environmental Impact Statement for the fishery.

The extent to which the recommendations arising from these management responses are implemented, and result in improvements in the information available on which to assess industry structure, the risk to economic viability from knowledge gaps about industry structure will be reduced.

E3.3.4 Management charges

Management charges in the fishery were identified as posing a low level of risk to economic viability in the Lobster Fishery. Accordingly, efforts should continue to ensure the cost effective delivery of key management services.

The risk to lobster fishers' economic viability posed by management charges may change as a result of the implementation of the draft FMS, but it is difficult to determine by how much this will change, and in what direction.

E3.3.5 Quota trading system

The risk to economic viability from high transaction costs associated with leasing quota in the Lobster Fishery, is intermediate. These high transactions costs may discourage lobster fishers from trading in small packages of quota and may force costs of leasing quota above the value that fishers place on it. The draft FMS provides for the investigation of the feasibility of implementing an exchange accessible by all lobster fishers transferring quota. This management response goes part of the way towards improving the efficiency with which fishers transfer quota, and is likely to reduce some of the risk to economic viability in the fishery from high transactions costs of trading quota.

In order to fully remove the risk to economic viability in the fishery from high transaction costs so that quota moves to fishers who place the highest value on it, a system whereby quota can be transferred electronically between fishers should be investigated. However, this would rely on an up-to-date database of catch records, and would rely on the costs of implementing such a system being less than the efficiency gains from doing so.

E3.3.6 External risk mitigation

There are several management responses that are targeted towards the fishery's activities but are expected to mitigate risks that are external to the fishery. For example, management responses concerned with reducing black market catch have the effect of reducing lobster fishers incentive to sell product outside the quota system. If the management responses were successful, the reduction in black market sales would benefit operators and thus improve their viability through increased market share.

CHAPTER F JUSTIFICATION FOR THE PROPOSED COMMERCIAL FISHING ACTIVITY

F1 The need for the Lobster Fishery

This section examines the need for undertaking the fishing activity proposed in the draft Fishery Management Strategy (FMS) and the consequences of not undertaking the activity. The Lobster Fishery exists because it satisfies a number of significant community needs, each of which are discussed under separate headings below. The NSW Lobster Fishery is the only commercial fishery in Australia that targets eastern rock lobster, a highly valuable and marketable seafood product.

Should the Lobster Fishery not continue, some of the resources used by the fishery would become available to other users, or would contribute to ecological processes and diversity. However the sole target species in the fishery can not be legally taken by other commercial fisheries in NSW, and it is unlikely that increased catches by other resource harvesters would offset the loss of product if the Lobster Fishery ceased to operate.

F1.1 Supply of seafood to the community

Over the past seven years the Lobster Fishery has provided, on average, over 100 tonnes of eastern rock lobsters annually for general consumption by the community and for export to overseas consumers. The supply of lobsters to local markets by commercial fishers satisfies demand from Australian consumers who do not wish to, or are unable to, venture out and catch lobsters themselves. The Lobster Fishery supplies a specific species (eastern rock lobster) that generally has a higher per unit value than many species taken in other NSW commercial fisheries, and supplies a small amount of byproduct.

F1.2 Economic considerations

In 2001-02 the Lobster Fishery was estimated to have a total revenue at point of first sale of approximately \$4.74 million. All businesses contributed to the local economy through the purchase of inputs and factors of production. This revenue for the fishery provides an important source of employment for fishers and has multiplier effects in regional communities.

The economic survey conducted during the preparation of this EIS, and other studies undertaken on the expenditure of fishers in NSW (see McVerry, 1996), have shown that around 27% of expenditure from fishing businesses moves outside the region of operation. Therefore approximately 73% of the first sale value of the catch stays within the communities where fishing takes place. This translates to approximately \$3.32 million of fishing revenue generated from the Lobster Fishery that was potentially spent in the local regions in 2001-02.

F1.3 Employment considerations

In January 2004 there were 161 fishing businesses in NSW with shareholdings in the Lobster Fishery, comprising approximately 149 individual endorsed fishers. The fishery also directly employs crew members as well as those assisting on land to build traps and provide transport services. Data