B3 Physical Impacts

B3.1 Water quality

B3.1.1 Sources of pollutants/contaminants from the operation of the fishery

The operations of the Lobster Fishery that could potentially be sources of pollutants affecting water quality are: antifouling agents, discharge of chemicals, fuel or bilge water, discharge/dumping of debris, on-board processing waste and disturbing sediments on the bottom caused by the activity of setting and retrieval of pots.

Antifouling agents are painted on boat hulls to reduce marine growth and the consequent loss of performance of the vessel. Over the past two decades, the active ingredient of the most effective antifouling paints – tributyltin (TBT) – has been shown to harm the marine environment (Batley *et al*., 1992; Scammell *et al*., 1991). It accumulates in the food chain, killing and impacting sea life other than that attached to hulls. Now, under a convention passed by the International Maritime Organisation (IMO) in October 2001, antifouling paints containing TBT are not to be applied to vessels less than 25 m in length, and such coatings on vessels longer than 25 m are to be completely removed from service by the beginning of 2008 (www.cmit.csiro.au, 2003). Therefore, all the vessels in the Lobster Fishery should no longer being using TBT based paints. But it is not known whether the older vessels in the fishery still contain traces of this paint on their hulls, nor what proportion they make up. Vessels in the fishery will generally have their hulls treated with antifouling paint (non-toxic) once a year in dry docks. Recently, the federal government has published a Code of Practice for Antifouling and In-water Hull Cleaning and Maintenance (Scammell and Baker, 2003). Whilst the code of practice is not compulsory boat owners who adhere to it will further minimise pollution to the water from anti-fouling paint.

Serious accidental or deliberate discharges of chemicals, fuel or bilge water from Lobster Fishery vessels are likely to be rare because fishers are aware of their public responsibility and are careful not to allow discharges of this nature to occur. Modern engines and fuel systems are easily managed so individual spills are only likely to be minor. Some oil and fuel could be spilt during routine maintenance and re-fuelling at ports but these are usually handled by established oil pollution response plans for each port (Waterways Authority, 2003). The Environment Protection Authority (now Department of Environment and Conservation) reported no minor, moderate or major oil spills occurring from Lobster Fishery commercial fishing vessels from 1996-1999 (EPA, 2000). All bilge water must be discharged into proper pump-out facilities available at ports from which Lobster Fishery vessels operate, so spillage of bilge water into the sea is unlikely.

Debris potentially dumped or discharged from vessels could include plastic, paper and pieces of fishing gear. Such materials are non-toxic but may injure marine wildlife (Jones, 1994, 1995). Some items such as plastic bags, can be ingested by marine animals mistaking them for food such as jelly fish. There have been very few studies on the instances of marine debris along the NSW coast. Frost and Cullen (1997) in a study of four northern beaches of NSW found no commercial fishing gear on these beaches. Members of the public are very conscious of gross litter and commercial fishers have become increasingly conscious of obvious pollution within their environment. Therefore, incidents of accidental discharge or dumping of debris by the Lobster Fishery would be very minor.

On-board process waste would come from body parts of fish and shellfish. Dumping of process waste into the sea is probably minimal.

The majority of boats used in the inshore fishery are less than 6m in length and are not operated in lengthy trips to sea. Under such conditions there is little potential for continual transfer of human and other organic wastes into the water. For boats operating in the offshore fishery, it is now compulsory under NSW Waterways Authority regulations for commercial vessels less than 10 years old to have holding tanks fitted.

B3.1.2 Describe existing measures to mitigate impacts on water quality

See section B3.4 below, which summarises this response for the risks from the fishery related to all physical components.

B3.2 Noise and light regimes

B3.2.1 Potential noise and light sources and their impacts

B3.2.1.1 Noise issues

Noise from vessels in the Lobster Fishery come from the propeller, engine, auxiliary engines for winches and in a few cases refrigeration units. The level of noise generated by these sources for Lobster Fishery vessels is unknown and will depend upon the size of the engines. Based on similar fishing vessels overseas it is likely they contribute to the low frequency spectrum of underwater noise (Mitson and Knudsen, 2002). It is not known how far the noise from these sources penetrate the ocean during a typical day or night of fishing nor the level of noise generated.

There are a range of marine species that potentially could be affected by the noise of Lobster Fishery vessels including cetaceans, finfish and some marine birds. However, very little is known about the acoustic sensitivity of these animals for Australian waters. Whales and dolphins have been shown to have varying responses to human generated noise overseas (Richardson and Wursig, 1997). Impacts of noise from vessels will depend on the auditory sensitivity of the organism, the frequency level and magnitude of the noise generated by the vessel and frequency and duration of interactions between the fishing vessel and the organism. Noise from Lobster Fishery vessels could affect wildlife if fishing occurs in areas where noise-sensitive wildlife live. Given lobster fishing does not usually occur immediately adjacent to land (unlike estuary fisheries) no land based fauna would be affected. Very little is known about the effects of noise from vessels (including recreational and other commercial vessels) in Australian waters on marine life.

Disturbance to land based residents and wildlife from noise is restricted to leaving and returning to port, consequently the impact is probably minimal.

B3.2.1.2 Light issues

The impact of lights is considered to be basically irrelevant for the Lobster Fishery, as setting and retrieval of pots is generally done during daylight hours.

There is negligible risk of mammals or birds being adversely affected by the light or noise caused by operations of this fishery.

B3.3 Air quality, energy and greenhouse gas emissions

B3.3.1 Sources of odours or other air impacts

Boats used in the Lobster Fishery are small to medium sized vessels generally of wood, aluminium and/or fibreglass construction using diesel marine engines or petrol outboard motors. Vessels in the inshore fishery generally have aluminium planing hulls, are generally about 5m in length, powered by 25hp (or greater) outboard engines. In the offshore fishery, larger multipurpose vessels with displacement hulls are commonly used.

Table B3.1 contains a summary of the characteristics of the fishing fleet. No data are available for the typical use of boats in terms of hours used.

Table B3.1 Fishing Fleet Characteristics for the NSW Lobster Fishery.

Characteristic	Number of vessels	Median	Range
Engine power (kilowatts)	189	86.4	4.5 to 484.7
Boat Length (metres)	189	7.2	3 to 29

Maintenance is the responsibility of the fishing vessel owner. Manufacturers' maintenance instructions should be followed to ensure engine efficiency and emission control systems work properly. Lack of compliance by vessel owners with instructions can result in lower levels of energy efficiency (i.e. fuel wasting) and higher greenhouse emission rates. There is no specific information on 'typical' marine engine maintenance practices but given the size and type of the industry there is likely to be a varied response to maintenance.

Diesel and petrol fuels have similar CO_2 emission factors as shown in Table B3.2. On that basis the fuels are not dissimilar in their potential greenhouse impact although this would depend on other factors such as comparative efficiency between diesel and petrol motors and motor size availability.

Table B3.2 CO_2 Emission Factors

Fuel	CO_2 Emission Factor (kg CO_2/GJ)
Diesel	69.0
Petrol	65.3
LPG	58.8

Source: Factors and Methodologies, The Greenhouse Challenge (Australian Greenhouse Office 2001)

B3.3.2 Air quality

The use of wet exhausts helps to limit the level of air pollution caused by boat engines. Activities of the Lobster Fishery are dispersed in time and space, thus there is no concentration of boats leading to a high level of air emissions within a small area. The boat fleet for this fishery is a miniscule proportion of all boat use within the state. Lobsters are not cooked on board vessels, so there is no issue with regard to emissions of cooking apparatus or odours. There are no significant air quality issues associated with the operations of this fishery.

B3.3.3 Energy and greenhouse assessment

Energy and greenhouse effects are considered together as the only potential for greenhouse gas inputs is from the energy consumed in the boat engines. Overall, the numerical size of the fleet and the

size of the boats and engines used, means that the overall consumption of energy resources and subsequent greenhouse gas emissions are not significant. The Lobster Fishery consists of small businesses operating in a low technology environment. Potential measures to reduce energy and greenhouse emissions may not be practicable for many of these ventures due to initial cost.

Renewable energy sources for fishing vessel operation could include solar and wind energy. However utilisation of these energy alternatives is not currently considered economically viable or appropriate for vessels in the fishery.

Potential measures to maximise energy efficiency and hence minimise the emission of greenhouse gases for commercial fishing vessels involved in rock lobster fishing have not been investigated in detail. These measures fall into two main areas, material and technology selection, and operational practice. Specific measures applicable to each of these aspects of commercial fisheries are outlined below.

B3.3.3.1 Material and technology selection

Material and technology selection options may significantly affect energy usage and greenhouse gas emissions. Opportunities for the reduction of greenhouse impacts and improvement of energy efficiency include:

- Improved performance marine engines.
- The US EPA and the State of California EPA's Air Resources Board (ARB) (www.arb.ca.gov) and the US EPA (www.epa.gov/oms/marine.htm) introduced parallel regulations commencing in 2001 requiring manufacturers to market improved performance marine engines. According to the ARB the regulations were introduced due to concerns that many conventional two-stroke marine engines burn fuel inefficiently and 'discharge up to 30 percent unburnt fuel into the environment'; the ARB recommend switching from a two-stroke to a more efficient four-stroke marine engine. ARB analysis shows that advanced technology marine engines burn up to 30 percent less fuel and oil.
- Selection of equipment with low embodied energy content.
- Energy use minimisation control equipment, including timer controls, thermostats, and sensors and controls to optimise: flow rates, temperatures, pressures and other energy relevant variables.
- Matching equipment size and machinery to catch and journey requirements to minimise energy utilisation.
- Use of energy efficient lighting systems and controls.
- Potential application of the Australian appliance energy rating system (www.energyrating.gov.au) to assist consumers in selecting energy efficient marine engines and vessels. California's ARB has also introduced a marine engine and watercraft labelling system to indicate to purchasers which vessels 'meet', 'exceed' or 'greatly exceed' their new regulatory requirements.

B3.3.3.2 Operational practice

A number of decisions made during operational practice can have significant impacts on energy efficiency and greenhouse gas emissions. Relevant facets of operational practice include:

- Development of systematic and cyclic maintenance programs.
- Implementation of energy and greenhouse management processes, such as:
    - Ongoing education for the Lobster Fishery business owners and employees in energy and greenhouse mitigation strategies through the distribution of information through industry associations and the boat and fishing licence registration system; and
    - Energy and greenhouse audits
    - Ongoing consideration of new technologies as they become available and economically viable.

B3.4 Summary of physical issues

The assessment found that all components of the biophysical environment were at low or negligible risk from the operations of the Lobster Fishery. The primary reasons for this are:

i) Regulations control and define certain activities that minimise or eliminate the potential for contamination of the environment e.g. disposing of bilge water, types of antifouling paint.

ii) Heightened awareness of fishers of gross pollution from their vessels including debris, noise and light. There is also high motivation by fishers to improve the image of their fishery to the general public resulting in diligent self-regulation of behaviour among fishers

iii) The small number of boats operating in the fishery compared to other types of craft including recreational, other commercial and larger foreign vessels. Furthermore, because vessels in Lobster Fishery are not greatly concentrated in any one port, do not always operate at exactly the same time of the day or year and primarily operate away from the coast, greenhouse gas emissions, light and noise disturbance are more dissipated than other fisheries, such as those operating within estuaries.

Therefore, there is no need for further detailed assessment of the risk to the biophysical environment as per DIPNR Guidelines and there are no issues arising that the need to be addressed by the draft FMS.

B4 Economic Issues

Fisheries management structures are in place to ensure commercial harvest practices are sustainable, and to maximise the benefit over time obtained from a community-owned resource. Without appropriate management structures, commercial fishers do not internalise the costs they impose on others as a result of removing fish from their natural state. These costs include: impacts of lobster fishing on the environment; costs imposed on other groups whose benefit from using the resource may be lowered as a result of commercial fishing activities; and the costs imposed on groups for whom the animals have a higher value if left in the sea.

The economic and social benefits of leaving fish in their natural state, be it to maintain future productivity of the stock, or to preserve the species, are not taken into account by commercial fishers. These benefits do not appear in markets, and thus without any external influence, will not be included in fishers costs. Thus, there is a role for governments to ensure that fishers 'internalise' the benefit as a cost of taking fish from their natural environment.

The management of fisheries aids the long-term economic viability of fishers by attempting to minimise the external costs created by fishing activities. As such, the long-term viability of fishers is dependent on appropriate controls on fishing activities. There is a need for these controls to be implemented in the most efficient manner, in order not to impose inefficiencies on the fishing industry.

When the benefits of taking fish from their natural environment, as a cost of using the resource, are taken into account, the optimum use of the resource over time can be assured, and a return in excess of normal profits (i.e. resource rent) may be appropriated from the resource. However, in order to do this, the full range of economic and social benefits from leaving fish in their natural environment must be determined. This involves quantification of the non-extractive and non-use benefits (i.e. ecological function values, and existence values) of the resource, which is often difficult to do.

In preparing the Fisheries Management Strategy (FMS) and Environmental Impact Statement (EIS), the optimal use of fish stocks over time, and the benefits and costs accruing to users and non-users of the resource are taken into account wherever possible. However, as non-extractive and non-use benefits are often difficult to quantify, and a lack of data prevent the full range of use values from being quantified, a precautionary approach is often taken in achieving the goals set out within the FMS.

B4.1 Introduction

The aim in this section of the EIS is to provide an overview of the economic factors pertinent to the operation of the NSW commercial Lobster Fishery. As will be shown, it is the culmination of these factors that allows an assessment of the economic viability of operators in the Lobster Fishery to be made. Indeed, several of these factors pose a risk to the economic viability of the Lobster Fishery.

The presentation of material in this section of the EIS will follow closely the guidelines issued by the Department of Infrastructure, Planning and Natural Resources. First, presentation of the factors pertinent to the operation of the NSW commercial Lobster Fishery, e.g. number of operators; area of the fishery; volume and value of production, will be undertaken. Next a discussion of the economic viability of the Lobster Fishery will be undertaken, as well as identification of the economic factors,

both internal and external, that may pose a risk to economic viability. Finally, an assessment of the risks, including the likelihood and consequence of each risk, to the economic viability of the Lobster Fishery will be undertaken, focussing mainly on those factors that are internal to the operation of the fishery.

B4.1.1 Identification of study area

Fishers licensed in the NSW commercial Lobster Fishery are situated along the entire NSW coast. The area within which fishers can operate extends the length of the NSW coast out to the 4000 m depth contour (approximately 80 nautical miles (nm) from the coast).

For the purpose of this economic assessment the NSW coast has been divided into four major regions based on the geography and underlying biological characteristics of the stock (Figure B4.1). Catch and effort information is recorded in a latitudinal format allowing for easy categorisation into the four regions within this assessment. However, information such as the location of shareholders and the location of boats used in the Lobster Fishery is recorded for Fisheries District along the NSW coast. To allow comparison with catch and effort information, Fisheries Districts have been placed within each region (Table B4.1).

Table B4.1 Identification of Fisheries Districts within regions for the purposes of economic assessment.

Region	District
Far North	Tweed
	Richmond
	Clarence
	Coffs Harbour
Mid North	Hastings
	Manning
	Wallis Lake
	Port Stephens
	Hunter
Sydney South	Central Coast
	Sydney North
	Sydney South
	Illawarra
Far South	Shoalhaven
	Batemans Bay
	Montague
	Far South Coast

Source: NSW Fisheries, 2003. Note: For the purpose of comparison, the whole of the Hunter Fisheries District is within the Mid-North Region, the whole of the Coffs Harbour Fisheries District is within the Far North region, and the whole of the Shoalhaven Fisheries District is within the Far South Region.

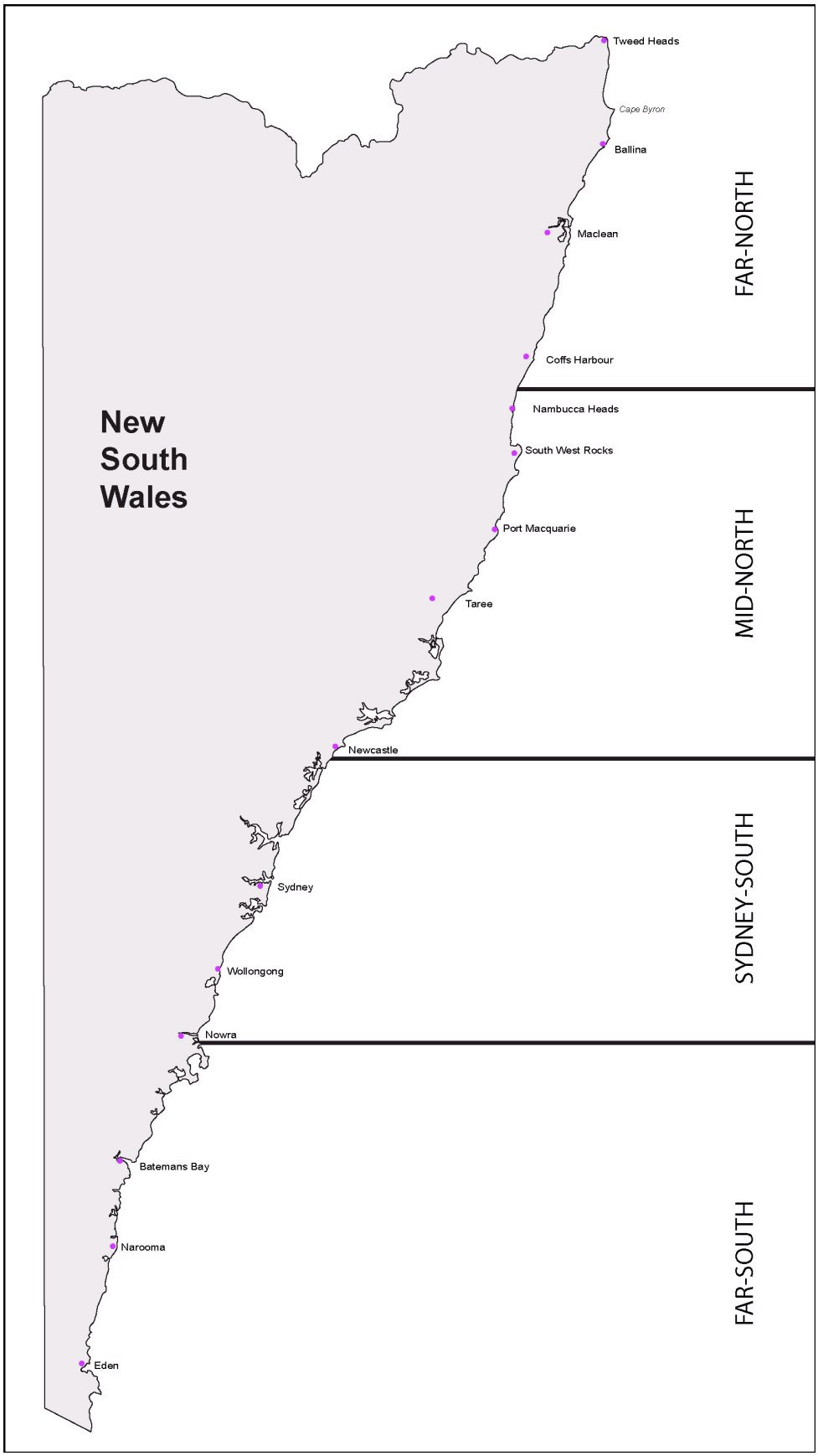


Figure B4.1 Map of NSW Coast defining the four regions used for comparison.
(Source: NSW Fisheries, 2003.)

B4.1.2 Information sources

The major information source in this report is NSW Department of Primary Industries fish catch returns. To supplement this data, results of economic and social surveys of the NSW fishing industry were used (Roy Morgan, 2001a, 2001b). The survey methods and results are reported in Appendices B1 and B2. The survey results allow inferences to be made about the population of lobster fishers; however, these inferences should be viewed in light of the survey coverage (see Appendices B1 and B2).

There has been one previous study by Hassall and Associates (1999) on the economic performance of fishers and fishing businesses in the Lobster Fishery. A brief review of a cross section of fishing businesses in NSW was also undertaken by IPART (1998), to establish the capacity of fishers to pay management charges. A variety of other published data and reports on commercial fishing activities are also available. These data and reports have been used to supplement NSW Department of Primary Industries and survey data wherever relevant.

B4.1.3 Number of lobster fishers and vessels by region

In 2001/02 there were 175 shareholders in the Lobster Fishery, and 147 active fishers. The distribution of shareholders along the NSW coast for 2001/02 is illustrated in Figure B4.2. The greatest concentration of fishers is in the mid-north coast and, in particular, in Port Stephens. There is also a high concentration of fishers in Batemans Bay in the Far South and Lake Illawarra in the Sydney South region.

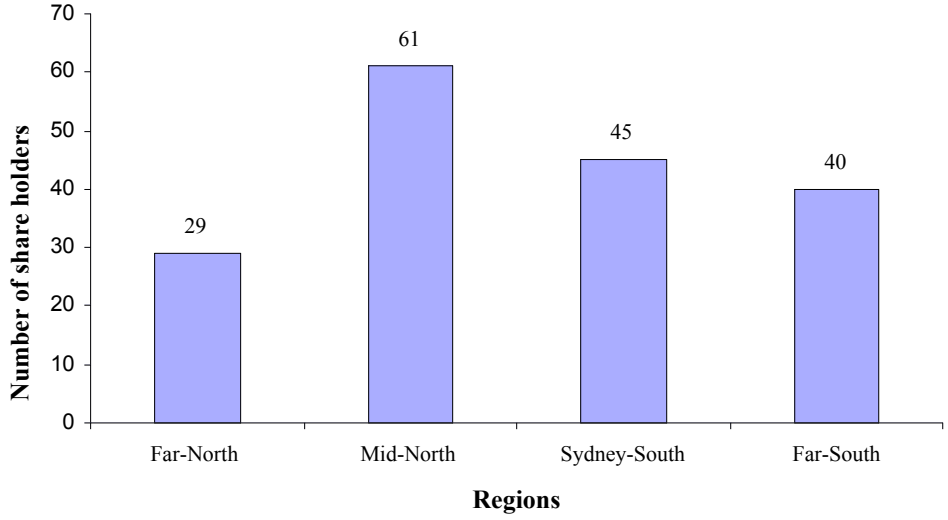


Figure B4.2 Distribution of shareholders - fisheries regions in NSW, 2001/02

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

Of the 147 lobster fishers actively participating in the Lobster Fishery in 2001/2002, around 65% also participated in other NSW commercial fisheries, in particular ocean trap and line, estuary general and ocean hauling fisheries (NSW Department of Primary Industries fisheries licensing database, 2003).

In September 2003 there were 117 licensed fishing boats (LFBs) holding a licence condition permitting its use in the Lobster Fishery. Of the 117 LFBs, 53 held an offshore general (i.e. OG1) licence condition, permitting the vessels to be used in commercial fishing operations outside 3 nm.

The distribution of LFBs working in the Lobster Fishery is illustrated in Figure B4.3. The Mid North region has the greatest number of boats. Within this region, Port Stephens has the highest concentration. High boat numbers were also present in Illawarra and Batemans Bay. It is important to note, vessels worked in the Lobster Fishery are often used in multiple NSW commercial fisheries, as many lobster fishers are also endorsed in other fisheries. Further, fishers may have multiple boats due to these different activities and differences between requirements for inshore and offshore fishing.

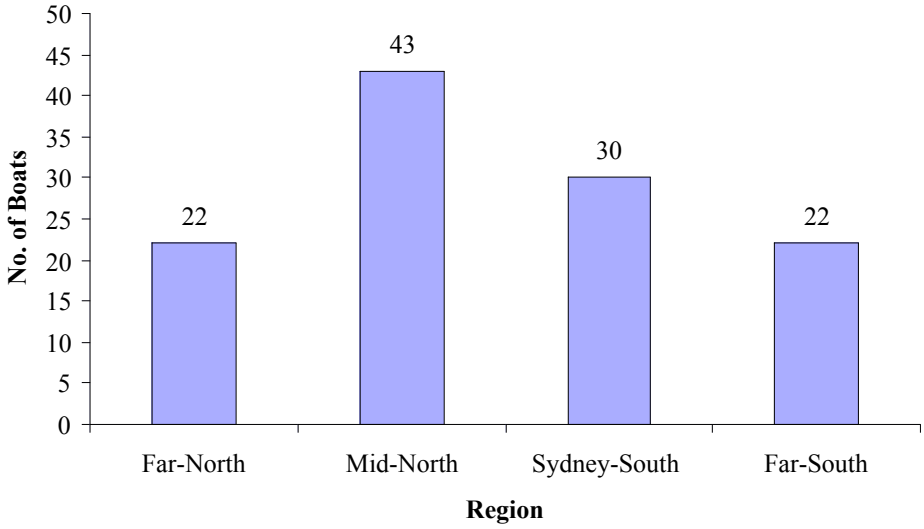


Figure B4.3 Distribution of Licensed Fishing Boats used in the Lobster Fishery in 2003
(Source: NSW Department of Primary Industries fisheries licensing database, September 2003.)

B4.1.4 Location of fishing

Regional restrictions or zoning of activities do not apply to commercial lobster operations in NSW. Consequently, fishing operations are not restricted to the district or region in which a lobster fisher resides, as is the case with some other NSW commercial fisheries (e.g. the Estuary General Fishery). Lobster fishers may work the entire length of the NSW coast with the exception of closed areas, such as sanctuary zones within declared marine parks. Hence, fishers may not always fish close to their place of residence, and may change where they fish during the year. However, in general, most fishers choose to fish close to where they live (NSW Department of Primary Industries Fisheries Licensing database, September 2003).

The location of trap lifts indicates where fishing activity is being undertaken. In 2001/02, trap lifts were highest in the Sydney South region of the fishery, followed by the Mid North region (Figure B4.4). For the Sydney South region, these trap lifts correspond to an average of 1896 traps lifts per lobster fisher, with an average of 947 for fishers in the Mid North region.

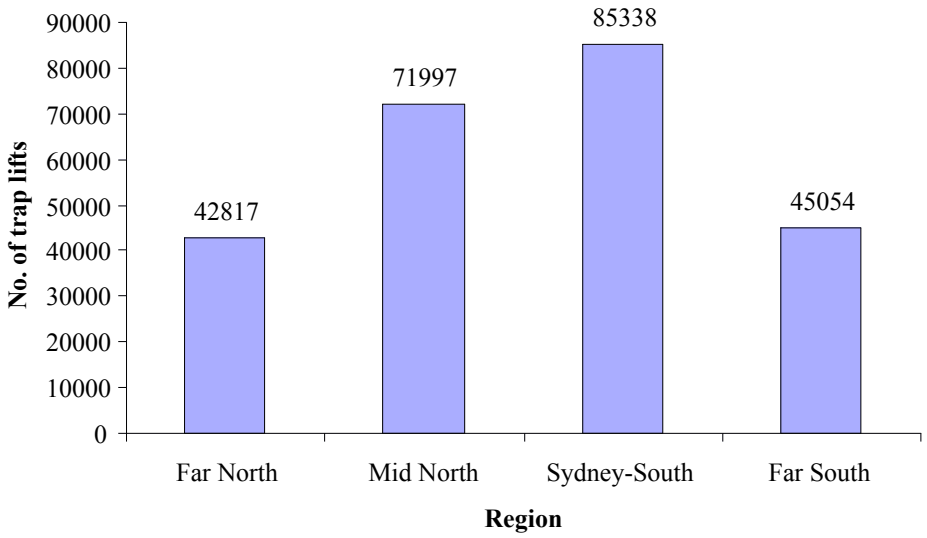


Figure B4.4 Location of trap lifts along the NSW coast, 2001/02

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

B4.1.5 Volume and value of catch

Whilst both volume and value of lobster catch have fluctuated since 1995/96, both have maintained an upward trend (Figure B4.5). In addition, up until 1999/00, the volume of lobsters caught had increased. However, catches fell in 2000/01 and 2001/02 before rising again in 2002/03.

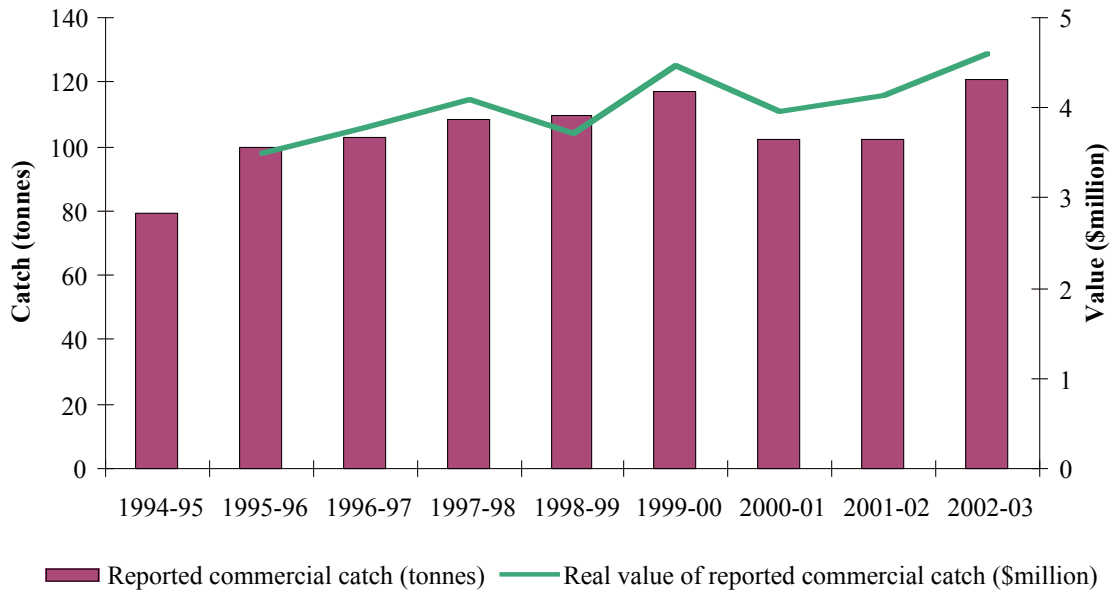


Figure B4.5 Volume and value of lobster catch, 1994/95 – 2002/03
Notes: Values are in 1995/96 dollars. CPI is an index for all groups, ABS catalogue number 6401.0.
(Source: NSW Department of Primary Industries Fish Catch Records, 2003; SFM, 2004; Reserve Bank of Australia, June 2004.)

The upward trend in the real value of lobster catch over the period under consideration indicates a general improvement in economic returns to fishers, notwithstanding increases in operating costs. If costs have increased by more than gross returns, then net returns will be lower.

Despite an upward trend in the aggregate value of lobster catch over the period 1994/95 to 2002/03, there has been a gradual fall in revenues generated from lobster fishing in the Far North from 1997/98 to 2002/03, with the Sydney South region experiencing a gradual increase (Figure B4.6).

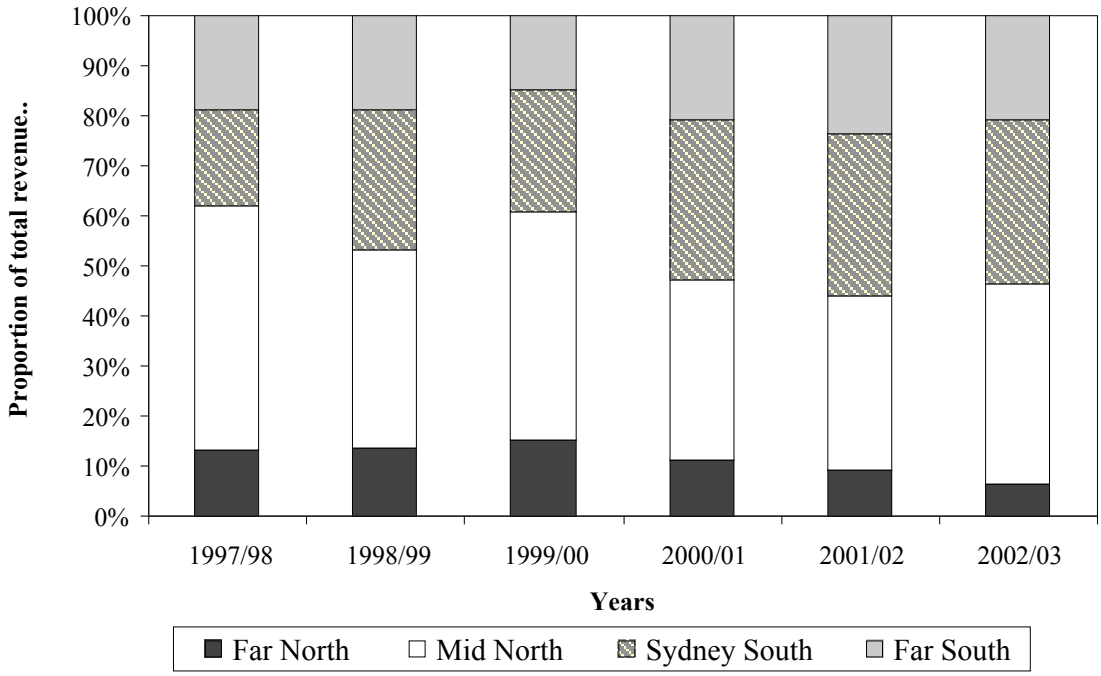


Figure B4.6 Revenues generated from lobster fishing 1997/98 – 2002/03

Note: CPI is an index for all groups, ABS catalogue number 6401.0.

(Source: NSW Department of Primary Industries Fish Catch Records, 2003; SFM, 2004, Reserve Bank of Australia, June 2004.)

B4.1.5.1 Illegal catch

The volume of total reported commercial catch is illustrated in Figure B4.5. In addition to this legal catch, there is a component of unreported illegal catch. This illegal catch adds to the overall volume of lobster being taken from the fishery. Estimates made by NSW Department of Primary Industries indicate that unreported catch currently represents around 17% of total catch (both legal and illegal) (Liggins *et al.*, 2003). However, this has decreased significantly from previous estimates, which were as high as 55%, as a result of major management initiatives (including the introduction of a lobster tagging program in 1994). Despite this, the volume of illegal catch is still believed to be significant (see Figure B1.6, Section B1), and represents a risk to the economic viability of lobster fishers selling legal catch by reducing potential returns.

The effect of black market fishing on the operation of the Lobster Fishery was examined as part of a report on illegal fishing (Palmer, 2004). In this report it is stated that "lobster theft remains a serious problem along the entire NSW coast due to its high market value" (Palmer, 2004, p.25). The report includes a number of recommendations that are currently being considered by Government.

B4.1.5.2 Total Allowable Commercial Catch (TACC)

In July 1994 the first Total Allowable Commercial Catch (TACC) was set for the Lobster Fishery. In the first few years after it's introduction, the TACC was close to being caught in most years. However, more recently catches have moved further away from the TACC, such that in 2000/01 and 2001/02 catches represented only 68 % of the TACC (Liggins *et al.*, 2003). Several reasons have been touted for the inability of catches to reach the TACC, including that the TACC exceeds the catch which could be taken within the constraints of the existing production technology, stock abundance, environmental and market conditions (Bose, Campbell and McIlgorm, 2000).

B4.1.5.3 Prices

Eastern rock lobster fetches consistently higher prices than lobsters imported from other states. Most eastern rock lobsters are sold whole on local fresh seafood markets, either live or cooked. Lobster prices have maintained an upward trend since 1990/91, falling slightly in 1995/96, 1998/99, and more recently in 2002/03 (Figure B4.7). Historically, lobster prices remained low until around 1948-49. The mean annual wholesale price for lobsters sold on the Sydney Fish Market auction floor in 2001/02 was $46.33 per kg, the highest on record (Liggins *et al.*, 2003).

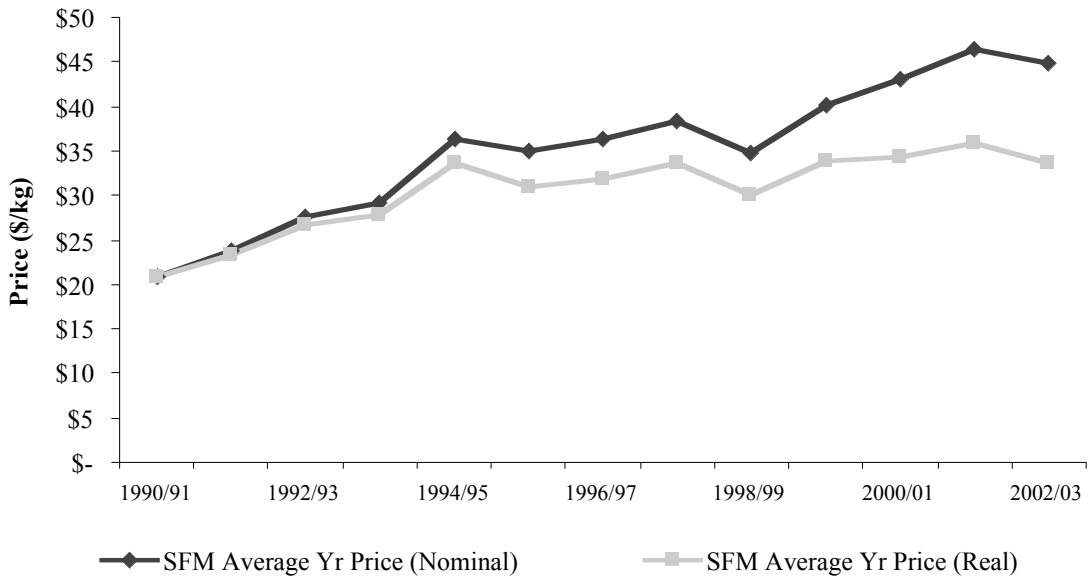


Figure B4.7 Average price paid for eastern rock lobsters on the Sydney Fish Markets, 1990/91 – 2002/03

Note: CPI is an index for all groups, ABS catalogue number 6401.0.
(Source: SFM, 2004, Reserve Bank of Australia, June 2004.)

Prices in Figure B4.7 are for lobster that was sold through the Sydney Fish Markets. Approximately 45% of lobster was sold through the Sydney Fish Market in 2001/02 (SFM, 2004). The remainder was sold through Fisherman's Co-operatives, other registered fish receivers (RFR's), or restricted registered fish receivers (RRFR's). In general, prices of lobster sold through fisherman's co-operatives, RFR's and RRFR's follows closely prices on the Sydney Fish Markets (pers. comm. LobMAC, September 2003). Hence, although representing only 45% of total landings, prices on the Sydney Fish Market's are believed to be a reasonable guide for lobster prices in general.

B4.2 Investment in the fishing fleet and processing facilities

B4.2.1 Investment in the fishing fleet

No single estimate of investment in the lobster fishing fleet is available, however estimates of boat values and licence values may provide some guidance as to the average level of investment by fishers in the lobster component of their operations. In addition, information gathered from discussions with members of LobMAC on investment in storage, handling and cooking facilities, both on land and on board, provide further guidance.

B4.2.1.1 Boat values

Fishers working in the Lobster Fishery from boats are required to use commercially licensed fishing boats (LFBs). Vessels used by lobster fishers hold a condition on the boat licence to indicate it is a boat used by a lobster fisher. In September 2003 there were 117 LFBs holding such a condition on their licence. Of these, the majority were between 4-6m long (approximately 66%), with only three vessels over 15m in length (Figure B4.8).

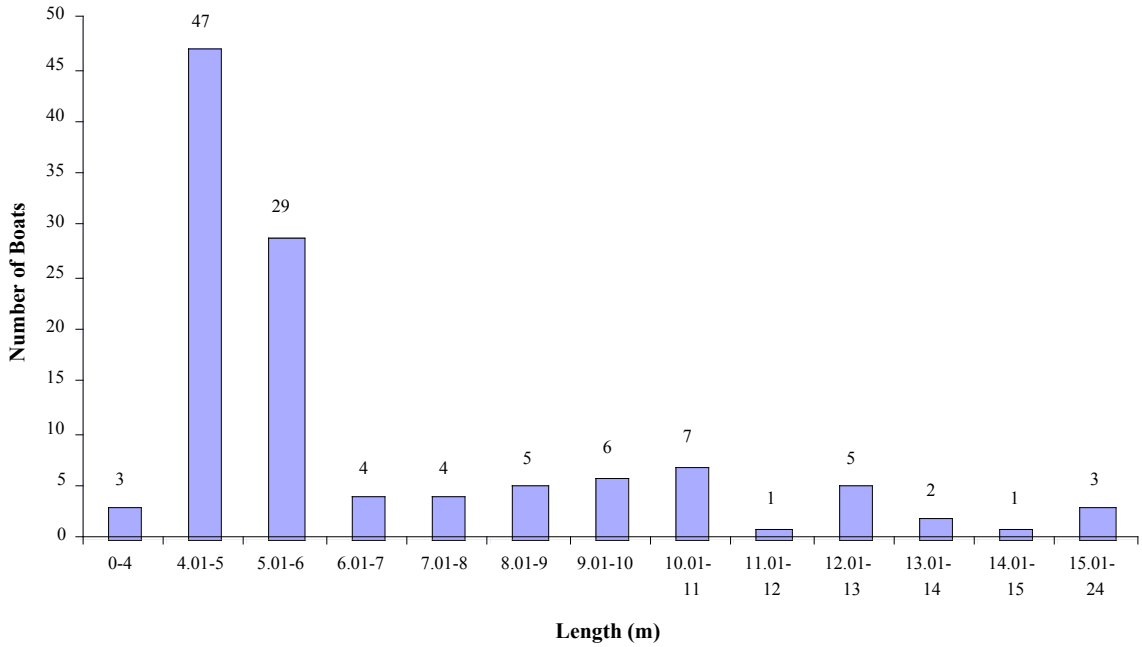


Figure B4.8 Length Distribution of LFBs operating in the Lobster Fishery
(Source: NSW Department of Primary Industries fisheries licensing database, September 2003.)

On average, vessels in the Mid North and Far South of the fishery are the longest, with vessels in the Far North of the fishery being the shortest (Table B4.2). The average boat value is highest in the Mid North of the fishery, and lowest in the Sydney South region. The distribution of boat lengths across the regions is consistent with that for the fishery as a whole.

Table B4.2 Average vessel length and value by region, 2001/02

Region	Average Boat Length	Average Boat Replacement Value
Far North	6.4	$31,534
Mid North	7.8	$58,815
Sydney South	6.5	$28,913
Far South	7.7	$35,111

(Source: NSW Department of Primary Industries fisheries licensing database, 2003.)

B4.2.1.2 Other capital items

In addition to investment in a fishing vessel, there are also operators who invest capital in storage, handling and processing facilities on board the vessel, as well as on land. The degree to which operators will invest in such facilities depends to a large extent on the size of the operation, and the degree to which local co-ops provide facilities for storing and cooking lobster.

In general, operators in the Far North coast and upper sections of the mid-north coast rely more on co-ops for storage and cooking of lobsters than operators further down the Mid North coast, and operators in the Sydney South and Far South regions of the fishery. The lower reliance of operators in southern sections of the Mid North coast on co-ops is due, both, to the inability of co-ops to provide adequate storage facilities, and the absence of any cooking facilities. Despite this, operators in this section of the fishery do not, in general, have their own storage and cooking facilities, preferring, in the case of cooking facilities, to rely on registered fish receivers, through which the majority are selling their product.

In the Sydney South and Far South regions of the fishery a larger proportion of operators have their own cooking and storage facilities on land in purpose built sheds, resulting in a greater capital investment in these sections of the fishery. Many also have their own transport services, packaging facilities, boxes, ice etc allowing them to have more influence over quality control.

A few operators also have facilities on board boats to keep lobsters alive prior to landing. This facility enhances the quality of the lobster and gives the animal a greater chance of survival once landed (i.e. for sale of live product).

B4.2.1.3 Licence values

Commercial fishing licences

NSW commercial fishing licences are not transferable between individuals, and therefore, do not attract a market value. In order to enter the NSW commercial fishing industry, individuals need to buy a fishing business and apply for an individual commercial fishing licence (See the Commercial Licensing Policy for further information: http://www.fisheries.nsw.gov.au/com/files/licencing-policy.doc). In addition, fishers need to renew their commercial fishing licence each year.

Fishery endorsements can be attached to commercial fishing licences in order to provide access by the licence holder to specific defined fisheries, including the Lobster Fishery. The licence, and any endorsement attached there to, are subject to conditions that limit the scope of the licence and/or endorsement.

Commercial fishing boat licences

Boat licences, unlike commercial fishing licences, are transferable between individuals and may be transferred either as part of the whole business or, in specific cases, separately to the rest of the

business. As with commercial fishing licences, fishery endorsements can be attached to fishing boat licences (but only in the case of the prawn trawl fishery), and are subject to specific conditions that limit the scope of the licence and/or endorsement. Boat licences attract a market value, which varies depending on the size of the boat, its capacity and/or the licence conditions/endorsements attached. The majority of boats in the Lobster Fishery are within the 4-6 m range in length. The general market value of a boat licence in this length range may vary between $20,000 and $150,000 depending on the diversity of the business activities (Dominion, 2001), but this would most likely be boat licences that have validated catch history associated with them. In general, boat licences are of higher value if they also hold an authorisation that allows fishing in waters outside 3 nm (known as an OG1 authorisation). Boats may be used either exclusively in the Lobster Fishery, or in multiple NSW commercial fisheries.

B4.2.1.4 Management charges

Government policy requires category one share management fisheries to pay for the attributable costs of managing the fishery. That is, shareholders must pay a management charge to recover the costs of administering management, research and compliance services for the commercial fishery. The current cost recovery arrangements for the commercial Lobster Fishery are based on recommendations arising from a report by the Independent Pricing and Regulatory Tribunal (IPART, 1998)

Management charges for the Lobster Share Management Fishery are prescribed under section 76 of the Fisheries Management Act 1994 (the FM Act). In 2003-04 all lobster shareholders were required to pay a management charge of $61.70 per share. Management charges are payable in proportion to the number of shares held by an individual in the Lobster Fishery.

Cost recovery in share-managed fisheries is consistent with the principles set out by the National Competition Policy. In brief, cost recovery is generally considered an instrument for achieving competitive neutrality. By creating a market for services, greater efficiency and targeting of those services results as there is a greater onus on the service provider to provide a cost-efficient service. In addition, through cost-recovery, costs for services are apportioned to those groups who benefit from them, and, hence, the benefits of the services to the groups that receive them are more transparent.

Management charges are adjusted annually to take into account changes in the services provided by NSW Department of Primary Industries and changes in the Consumer Price Index (Table B4.3).

Table B4.3 Management charges in the Lobster Fishery

Year	Charge per share ($)	Total shares	Total charges
99/00	$48.00	10234	$491,232
00/01	$58.00	10234	$593,572
01/02	$58.00	10234	$593,572
02/03	$59.70	10234	$610,970

(Source: NSW Fisheries, 2003)

Note: Figures are in nominal dollars.

Current management services for which costs are recovered are: quota administration costs (including costs of lobster tags as well as registering and dispatching tags); catch recording (data entry and monitoring; quota reconciliation; processing transfer applications; and costs of logbooks); management charge payment administration (preparing and sending statements of charge, registering

payments, following up late payments); Lobster Management Advisory Committee (LobMAC) administration costs (costs of meetings and expenses for members); day to day duties (enquiries (public, industry, intra-departmental, Ministers Office)); TAC Committee reporting; annual reporting; preparation of correspondence etc); research (including the costs of conducting assessments of the exploitation status of the stock, undertaking risk assessments, monitoring recruitment and abundance, monitoring length and sex composition etc.); and compliance, including the costs of employing a single compliance officer.

In addition to the above, a number of set administrative fees are charged on a fishing licence, including: the initial licence application/renewal fee; a contribution to industry costs; and a Fisheries Research and Development Corporation (FRDC) research levy.

Fishing business value

The transferable components, and consequently market value, of any fishing business vary depending on the entitlements, boat licences, registered gear (such as nets) and/or lobster shares associated with the business. Fishing businesses with lobster shares may be transferred as multi-entitlement businesses, or just as individual share packages (lobster shares and associated quota only).

For a new entrant to enter the Lobster Fishery, a minimum of 55 shares is required in order for the individual to be eligible for a commercial licence and endorsement in the fishery. Based on the current value of shares, and not including the cost of purchasing a licensed fishing boat and associated capital, the minimum capital investment in the fishery for a new entrant would be in the order of $46,500, excluding GST (where applicable), stamp duty, transfer fees, boat licence values and the above mentioned commercial fishing licence administrative fees. An estimation of the value of a whole lobster fishing business is difficult given the variability in business components, including number of shares, boats and possible entitlements in other NSW commercial fisheries.

B4.2.2 Processing facilities

The Lobster Fishery mostly harvests a single species, eastern rock lobster, which is sold to local markets and exported either live or cooked. The export market is small, representing around 3% of the total value of catch (pers. comm. LobMAC, September 2003). Whether or not lobster is exported depends on the relative prices between the export and domestic market. Prices received on the domestic market are generally higher than on the export market. In addition, the small quantities of rock lobster caught are understood to be a limiting factor in export trade.

The main method of processing rock lobsters is to cook them prior to sale. As well as meeting the demands of the market, where there is a preference for cooked lobster, this is also a way for lobster fishers to retain product that would otherwise be discarded due to showing sluggish signs of life. Cooking of lobster may occur where rock lobsters are sold live, at the premises of the registered fish receivers (RFRs) and restricted registered fish receivers (RRFRs), including fishing co-operatives. In 2000/02, approximately 80% of the eastern rock lobsters sold through the Sydney Fish Market were cooked prior to sale (SFM, 2004).

Lobster fishers along the coast may either land their catch, store catch in holding pens, or store catch in live tanks. Storage of lobster may enhance the value of the lobsters by staggering market supply. Every NSW lobster fisher may store live lobsters in a set holding pen that does not exceed the dimensions of legal commercial lobster traps. Similarly, every NSW lobster fisher may store live lobsters in holding tanks on their own premises or elsewhere (for example fisherman's cop-

operatives). On each occasion when rock lobsters are stored live (either in holding pens, holding tanks or otherwise), commercial fishers are required to record the location on their daily log sheet. NSW Department of Primary Industries fish catch records (September 2003) indicate that in 2001/02 of the 147 fishers participating in the Lobster Fishery, 31 fishers placed lobsters in pens on at least one occasion.

B4.2.2.1 Disposal of lobster

Lobster fishers have the opportunity to dispose of product through RFR's, including the Sydney Fish Market and fisherman's co-operatives, or RRFR's[6] [7]. The percentage of product that is disposed of through different receivers varies markedly by region. For example, in the Far North of the fishery a high proportion of product is disposed of through local co-ops, while in the Sydney South Region only a very small percentage of product is disposed of through local co-ops (NSW Department of Primary Industries Fish Catch Records, 2003). This is a result of transport costs, the number of RFR's, or RRFR's in a region (figure 4.9), fishers' location relative to local co-ops, and services provided by, and commission charged at, local co-ops.

Services provided by co-ops and the charges levied on fishers differ markedly along the NSW coast. For example, some co-ops provide cooking and storage facilities, while others do not. In addition, some co-ops charge fishers a percentage of the total value of the product landed, others charge a fixed $/kg charge regardless of the value of catch, and some charge a $/kg amount that varies with the value of the catch. For high value products such as lobster, charges levied as a percentage of the total value of the product may work out higher than a $/kg charge. As a result, lobster fishers may travel considerable distances to land product elsewhere, including at co-ops in other districts where charges are lower.

[6] Up until 1999, commercial fishers were required to sell commercial catch through a recognised market, such as the Sydney Fish Market or a Fisherman's Co-operative trading society. In areas not serviced by a recognised market, fishers were permitted to sell their commercial catch to individuals or companies holding a Certificate of Exemption (COE), or direct to the public, if the fisher held a consent under the FM Act. With the deregulation of the marketing system in 1999, a system of fish receivers emerged. Co-operatives and COE holders were granted RFR certificates and consent holders were granted Restricted Registered Fish Receiver RRFR certificates. Any commercial fisher, business or company may apply for a Fish Receiver certificate.

[7] RFR's may be located at the Sydney Fish Markets.

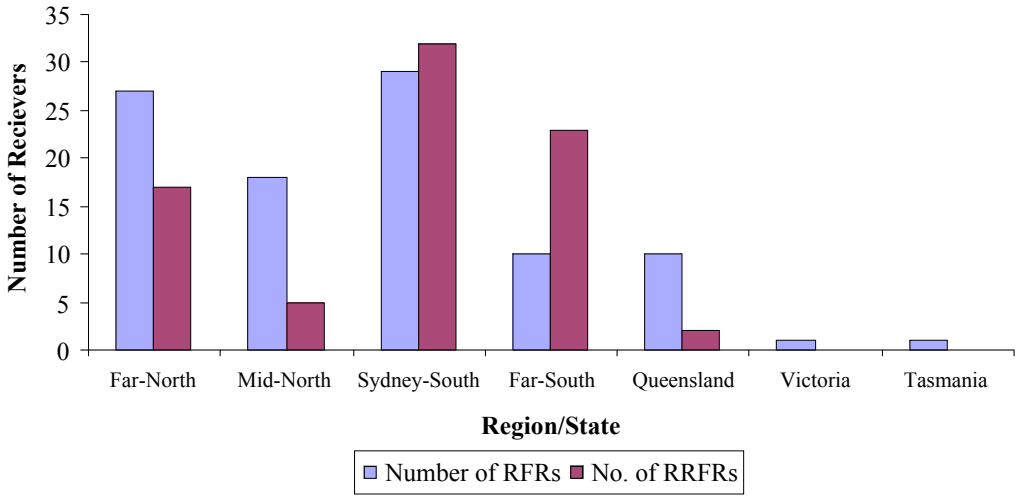


Figure B4.9 Distribution of Registered Fish Receivers and Restricted Registered Fish Receivers along the east coast.

Note: In September 2003 there were 96 RFRs and 79 RRFRs operating in NSW.

(Source: NSW Department of Primary Industries fisheries licensing database, September 2003.)

B4.3 Direct and indirect employment

Direct employment in the NSW lobster fishing industry includes persons who are employed in the catching sector (e.g. boats owners, skippers and crew) as well as persons who are employed on land to build traps and provide transport services. Indirect employment in the NSW lobster fishing industry includes persons who are employed outside the industry but their work has links to the fishery (e.g. registered fish receivers).

Indirect employment as a result of lobster fishing also includes persons employed in industries that provide general goods and service to lobster fishers, such as those persons employed in oil refineries, shops, petrol stations etc. The jobs generated in these industries are as a result of the expenditure of lobster fishers in a region. They are a component of the flow–on (or multiplier) effects of lobster fishing dealt with in section B4.4.3.

B4.3.1 Direct and indirect employment

B4.3.1.1 Direct employment

In September 2003, 161 licensed fishing businesses operated in the Lobster Fishery. Of these, 128 were owner operated, 20 had a nominated fisher, and 13 were inactive (some of these leased out quota). Further, 141 licensed fishing businesses were owned by men, five by women, two were estates, five were partnerships and eight were companies.

The number of persons directly employed as a result of lobster fishing varies with the business size. Typically a large specialist lobster operation will employ a skipper and crew member offshore, and a casual employee on-shore to assist with trap making and transport of product. Smaller operations generally employ only one person offshore, with casual employment sometimes used to assist with on-shore activities. Some shareholders may work together reducing the need to employ other crew; this may be a reason for low employment in the industry.

The number of employees in the Lobster Fishery also depends on whether product is being handled and/or stored at co-ops, or whether the operator is handling and/or storing the product themselves, and also whether the business is operating inshore or offshore. In general, inshore fishers employ fewer crew than offshore fishers.

Statistics on employment in the Lobster Fishery collected through the Roy Morgan Social Survey (Roy Morgan, 2001a) suggest that of the 109 survey respondents out of a population of 151 fishers, around 40% employed at least one other licensed or unlicensed fisher in their lobster fishing operations in 2000/01, 55% did not have any other employees, and the remainder either couldn't say or weren't in a position to answer the question. Of those persons who were employed in the Lobster Fishery, around half were employed full time, with the remainder employed on a part-time or casual basis. In Table B4.4 the breakdown of full time and part time/casual employment in the Lobster Fishery is given.

Table B4.4 Employment of additional labour (i.e. in addition to survey respondents) in lobster fishing as at May/June 2001

	Full Time		**Part Time/Casual**		
No. of Employees	Frequency	Number	Frequency	Number	**Total Employees**
0	7	0	7	0	0
1	18	18	14	14	32
2	4	8	5	10	18
3	1	3	1	3	6
4+	3	>12	4	>16	>28
Total	33	>41	31	>43	>84

(Source: Roy Morgan 2001a)

In interpreting the Figures in Table B4.4, it is important to note that lobster fishers may engage in several different fishing activities, and that employed labour may also be used against these activities. As a result, the actual employment figures may be lower than those reported.

Lobster fishers often utilise family members as labour. Information is available through the Roy Morgan Social Survey (2001a) on the number of fishers who employed their partner in their fishing business. Of the 109 respondents, 29 employed their partner in their fishing business; 14 were employed on a full time basis, and 15 on a part time/casual basis.

Labour and lobster businesses

Labour commitment in the Lobster Fishery includes days spent fishing by operators and crew members, as well as time spent on delivery, repairs, maintenance, management and administration. Time contributed by family members is also part of the labour commitment to a fishing business. Apart from payment to crew members, the payment of wages is generally not recorded as part of the ongoing operation of a fishing business. Hence, the days spent on tasks, such as those mentioned above, is often not recorded, and the costs associated with these tasks are not accounted for. In order to get an estimate of the time spent on "unpaid tasks" associated with running a fishing business, fishers were asked as part of the Roy Morgan economic and social surveys to report the number of days spent fishing and working on fishing related tasks, as well as the number of full and part time unpaid workers, both family and other (Roy Morgan 2001a, 2001b). This data indicates that the average lobster fisher spends 56% to 67% of their time on "unpaid" tasks (Table B4.5). Contact with fishers indicates that a considerable amount of time on shore is spent in constructing traps to replace those lost in the fishing process.

Table B4.5 The annual average unpaid and paid days fishing by businesses in the Lobster Fishery

	less than 35 shares	35 to 75 shares	75+ shares	Average business
Number of respondents	10	7	9	9
Fisher days unpaid	129	139	120	129
Fisher days paid	232	234	180	214
Fisher unpaid days as % of paid	**56%**	**59%**	**67%**	**60%**
Family days unpaid	33	30	42	35
Family unpaid days as % of paid	**14%**	**13%**	**23%**	**16%**

(Source: Roy Morgan 2001b.)

B4.3.1.2 Indirect employment

Indirect employment includes persons employed in the trade and transport sectors, co-ops, cold stores, supply sector etc. Whilst actual figures on the level of employment in co-ops as a result of lobster fishing was not available, anecdotal information from discussions with lobster fishers suggests that this employment may be substantial. Persons employed in co-ops as a result of lobster fishing are involved in handling and packaging of lobster; with some also employed in the transport sector. Employment in co-ops differs by region.

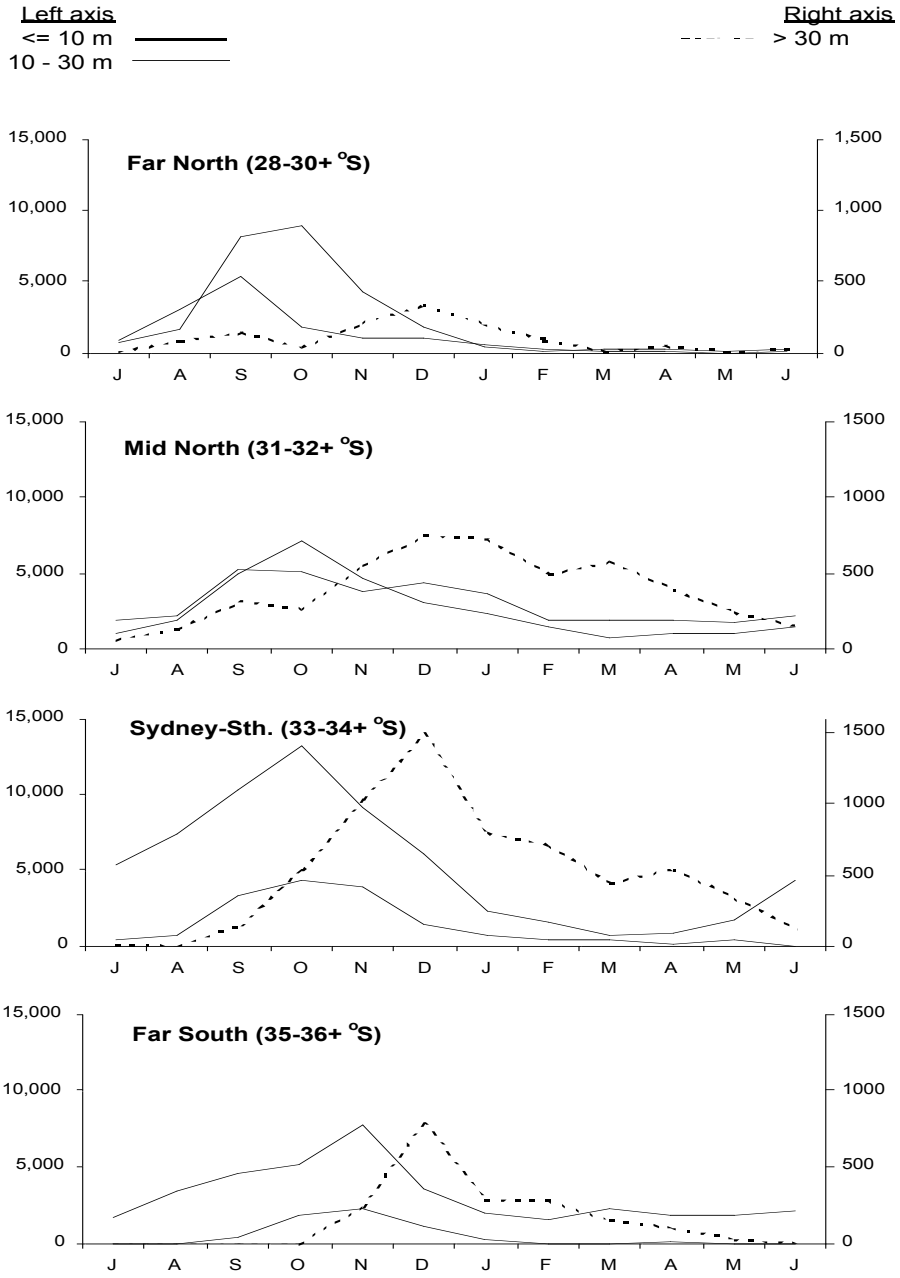
The number of RFR's and RRFR's handling lobster is another indication of the level of indirect employment in the Lobster Fishery.

B4.3.2 Seasonality of employment

Information on seasonality of employment in lobster fishing was not collected in the Roy Morgan Social Survey (2001a), however the following conclusions were drawn from anecdotal evidence compiled from discussions with lobster fishers, as well as analysis of NSW Department of Primary Industries Fish Catch Records relating to effort.

The Lobster Fishery is seasonal in nature, with fishing gear engaged in varying intensities at different times of the year (Figures B4.10-13). The degree of seasonality depends on the size of the operation as well as on the nature of the fishing activity (i.e. offshore versus inshore). In general, the larger offshore fishers have their gear in the water almost year round, with, on average, gear in the water for at least 9 months of the year, with some operators who have both inshore and offshore activities operating year round. For smaller inshore operators, gear is generally employed for shorter periods of time (i.e. for as little as three months of the year) (pers. comm. with LobMAC, September 2003).

Given the seasonal nature of the Lobster Fishery, it follows that employment would generally be most concentrated at times of the year when effort is highest. In the off-season, labour would either be engaged in other fishing and non-fishing activities and, in the case of a large operator, also engaged in on-shore activities such as trap making.



Figures B4.10-13 Distribution of effort (number of trap lifts) by region, by depth, by month during 2001-02.
(Source: Liggins *et. al*. 2003).

B4.3.3 Income from other fisheries and activities not related to fishing

Information on income earned outside lobster fishing was collected in the Roy Morgan Social Survey (2001a) and is supplemented by data available through NSW Department of Primary Industries fish catch database.

B4.3.3.1 Household disposable income

Median household disposable income (i.e. income from all sources) for 109 lobster fishers interviewed in the Roy Morgan Social Survey (2001a) was between $50,000 and $59,999 per year in 1999/2000 (Figure B4.14).

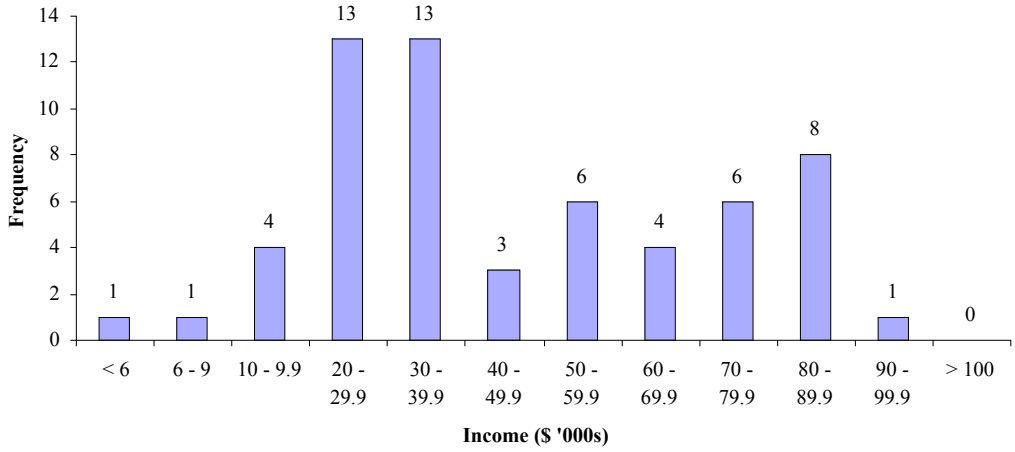


Figure B4.14 Household disposable income of lobster fishers
(Source: Roy Morgan, 2001a).

B4.3.3.2 Income from fishing

Most of the income earned by lobster fishers was earned fishing, with only a small proportion, 17%, earning an income outside fishing (Table B4.6).

Table B4.6 Composition of income source for lobster fishers

Percent range	Income fishing [1]	Income fisheries related work [1]	Income general investments [1]	Income other industries [1]
0 - 20%	7	104	100	96
21 - 40%	0	1	2	3
41 - 60%	4	0	1	3
61 - 80%	6	0	1	0
81 - 100%	91	1	1	3
Can't Say	1	3	4	4

(Source: Roy Morgan, 2001a.)
Notes: 1. Figures are for 109 survey respondents.

The majority of revenue earned by lobster fishers is earned by only a small number of fishers (Figure B4.15). For instance, in 2001/02 54% of revenue was taken by 20% of fishers. A total of 61% of lobster fishers earned less than $60,000 in gross revenue. The most frequent income category is between $20,000 and $40,000, indicating that the majority of fishers are making relatively low returns from fishing (Figure B4.16).

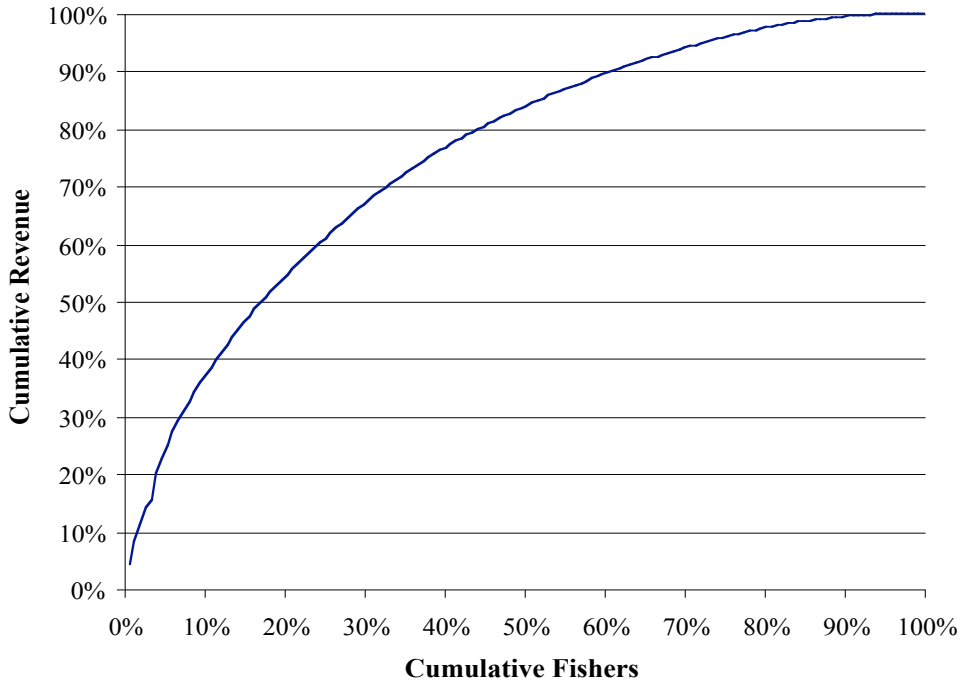


Figure B4.15 Cumulative revenue from all types of fishing, and number of fishers, for fishers with endorsements in the Lobster Fishery.
(Source: Roy Morgan, 2001a)

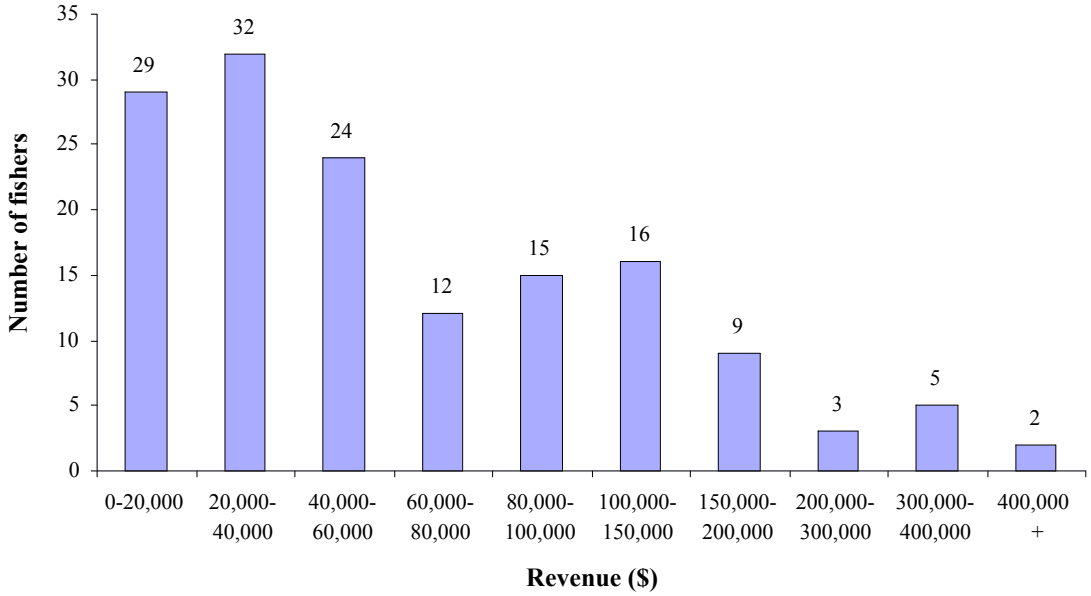


Figure B4.16 The frequency of gross incomes from all types of commercial fishing in NSW for fishers with endorsements in the Lobster Fishery.
(Source: NSW Department of Primary Industries fish catch records, 2003; SFM, 2004)

Most lobster fishers hold endorsements in other fisheries. The most common endorsement to be held in conjunction with a lobster endorsement is an ocean trap and line endorsement for the purpose of fish trapping (NSW Department of Primary Industries fisheries licensing database, 2003). This is mainly as a result of the similar gear technology involved in fish trapping.

In 2001/02, around 37 percent of lobster fishers actively participated in another fishery (Table B4.7). Slightly less than this participated in 2 other fisheries, with only 7 % participating in 3 other fisheries. The most common fishery in which lobster fishers participated was the Ocean Trap and Line Fishery (Table B4.8).

Table B4.7 Participation in other fisheries by active lobster fishers, 2001/02

Endorsements held	Number of endorsement holders
Lobster only	51
Lobster plus 1 other fishery	54
Lobster plus 2 other fisheries	31
Lobster plus 3 other fisheries	10
Lobster plus 4 other fisheries	1

(Source: NSW Department of Primary Industries fisheries licensing database, 2003)

Table B4.8 Other commercial fisheries in which lobster fishers participated in 2001/02

Fishery	Number of endorsement holders
Abalone	2
Estuary General	37
Estuary Prawn Trawl	3
Fish Trawl	2
Ocean Hauling	25
Ocean Prawn Trawl	9
Ocean Trap and Line	72

(Source: NSW Department of Primary Industries fisheries licensing database, 2003.)

The number and type of other fisheries in which lobster fishers participate has changed over time, partly as a result of the establishment of marine parks and Recreational Fishing Havens. For example, a few ocean trap and line endorsements were bought out when the Solitary Islands Marine Park was implemented, and some Estuary General and Ocean Haul entitlements were bought out when Recreational Fishing Havens were put in place along the coast.

The number of other fisheries in which lobster fishers participate depends on the productivity of the stock in the region fished, the seasonality of catches in the region, and the type of environment in which fishing takes place. For example, in the Far North region of the Lobster Fishery the productivity of the stock is currently low, hence fishers have relied on income from fisheries other than just lobster to make a living. However, this has not always been the case. For example in 1999/00, the Far North region of the Lobster Fishery was more productive than in other regions. Hence, reliance on income from other fisheries may have been lower at this time.

As mentioned above, the seasonality of lobster catches has a bearing on the number of other fisheries in which lobster fishers hold an endorsement. Among the four regions fished, there are marked differences in the abundance of lobsters at certain times of the year. For example, in the Far North of the fishery, lobsters are abundant for a much shorter time than in the south (see section B4.3.2), hence fishers in the Far North have tended to rely more on other methods of fishing (Table B4.9). Again, this may not have always been the case as variations are likely to have occurred over time.

Table B4.9 Endorsements (including lobster) held by active lobster fishers by region, 2001/02

Region	Average number of endorsements held
Far North	3
Mid North	2
Sydney South	2
Far South	2

(Source: NSW Department of Primary Industries fisheries licensing database, 2003)

The type of environment in which lobster fishers conduct their operations also has a bearing on the combination of endorsements held. For example, fishers who are fishing around predominantly rocky, as opposed to sandy, bottoms are more likely to hold an endorsement in the ocean trap and line fishery, as fish trapping takes place around reefs. In addition, whether fishers are operating inshore or offshore often determines associated fishing activity. For example, an inshore fisher is more likely to hold an estuary general/estuary prawn trawl endorsement in combination with their lobster endorsement.

There were 147 active lobster fishers in 2001/02 (where active denotes fishers who filled in a catch return). Of these, 21% earned all of their fishing related income from lobster fishing. Of the remainder, 40% earned incomes equally across two fisheries including lobster, 37%, working across three or four fisheries, and 3% earned incomes working across five fisheries (Table B4.10).

Table B4.10 Percentage of income from lobster fishing, 2001/02

Number of fisheries worked	Number of fishers	Revenue from lobster fishing
1	31	100.0%
2	59	50.7%
3	40	35.0%
4	15	33.7%
5	2	17.4%

(Source: NSW Department of Primary Industries Fish Catch Records, 2003; SFM, 2004)

For fishers active in only the Lobster Fishery in 2001/02, the majority earned revenue of less than $20,000 from fishing (Table B4.11). For fishers active in two or more fisheries, revenues from fishing are more dispersed. It is worth noting that for some fishers who are earning less than $20,000 from fishing, fishing is a sideline activity, i.e. these fishers are likely to earn greater income from activities other than fishing.

Table B4.11 Distribution of annual fishing revenue by number of fisheries worked, 2001/02

	Number of fisheries worked				
Revenue	**1**	**2**	**3**	**4**	**5**
$0-$20,000	17	10	2	0	0
$20,000-$40,000	4	13	9	6	0
$40,000-$60,000	6	9	7	1	1
$60,000-$80,000	1	4	6	1	0
$80,000-$100,000	1	5	6	3	0
$100,000-$150,000	1	8	6	1	0
$150,000-$200,000	1	4	1	2	1
$200,000-$300,000	0	2	0	1	0
$300,000-$400,000	0	2	3	0	0
$400,000+	0	2	0	0	0

Notes: Figures are for the 147 active fishers in the Lobster Fishery

(Source: NSW Department of Primary Industries Fish Catch Records, 2003; SFM, 2004)

B4.3.3.3 Regional dependence on lobster fishing

The largest proportion of income from lobster fishing is received in the Far South and Sydney South regions (Table B4.12). This suggests that fishers in the Far South and Sydney South who hold a lobster endorsement are more dependent on lobster fishing for income than in the other two regions. The percentage income from lobster fishing is lowest in the Far North coast.

Table B4.12 Regional distribution of incomes from lobster fishing

Region	**District**	**No. fishers**	**Average Percent income lobster fishing**
Far North	Tweed	0	0%
	Clarence/Richmond	12	32%
	Coffs Harbour	13	53%
	Total	**25**	**43%**
Mid North	Hastings	6	64%
	Hunter	6	30%
	Manning	15	34%
	Port Stephens	20	63%
	Wallis Lake	9	54%
	Total	**56**	**50%**
Sydney South	Central Coast	9	50%
	Illawarra	17	69%
	Sydney North	4	60%
	Sydney South	6	85%
	Total	**36**	**65%**
Far South	Batemans Bay	17	71%
	Far South Coast/ Montague/ Shoalhaven	13	45%
	Total	**30**	**59%**

(Source: NSW Department of Primary Industries Fish Catch Records, 2003; SFM, 2004,)

The proportion of income received from lobster fishing is related to the abundance of lobster in a region and the number of lobster fishers. For example, in the Far North coast the abundance of lobster is more variable than in other regions, resulting in a heavier reliance on other fishing methods. For example, in 1999/00, when the abundance of lobster in the Far North was high relative to other years, fishers received 58% of income from lobster fishing, while in 2001/02, when abundance was lower, fishers received only 32% of income from lobster fishing (Figure B4.17).

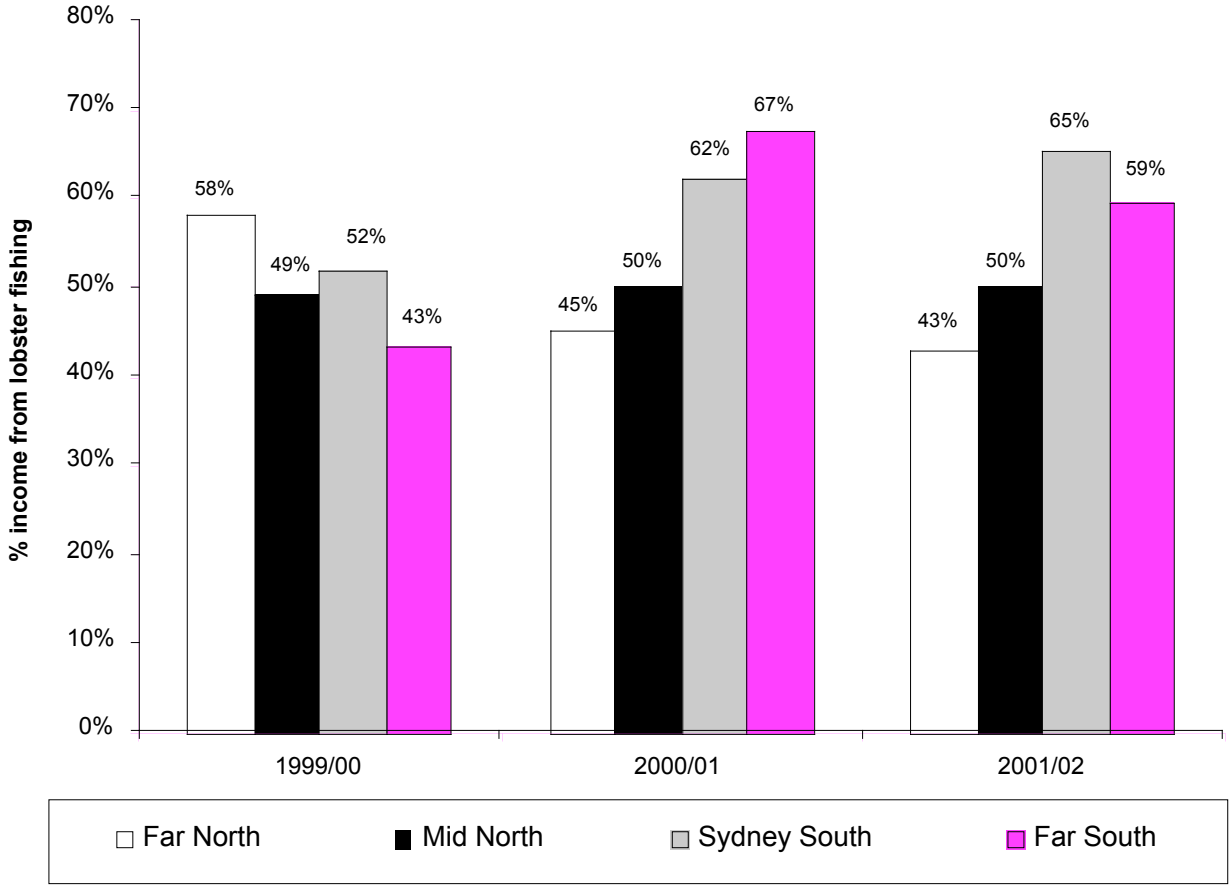


Figure B4.17 Regional incomes from lobster fishing, 1999/00 – 2001/02
(Source: NSW Department of Primary Industries fish catch records, 2003; SFM, 2004)

B4.3.4 Demographic profile of direct and indirect employees

The results from the Roy Morgan Social Survey give an indication of the demographic profile of those directly employed in the Lobster Fishery. These results are presented in more detail in Chapter B5.

B4.4 Economic Return

As has been demonstrated above, several factors, both internal and external, contribute to the economic return of lobster fishers, where economic return is defined as the long-run benefit to fishers from commercial harvesting of the resource. Some of these factors pose a risk to the economic return of lobster fishers. For example, changes in charges levied by Co-op's, changes in the abundance of lobster and changes in management charges, may effect economic return. Quantification of some of the factors that effect economic return, such as changes in the abundance of lobster, may be difficult. In this case, a precautionary approach is taken in determining the risk to economic return from such factors (i.e. in the absence of information about the risk to economic return from such factors, it is assumed that the risk is high).

In this section, an overview of the contribution of lobster fishing to state, regional and individual income is presented. This is followed by an analysis of the risks to economic return.

B4.4.1 Contribution of lobster fishing to state, regional and individual income

The contribution of lobster fishing to state and regional income includes both direct income earned by fishers, and indirect income earned in the economy as a result of lobster fishing. Indirect income earned in the economy as a result of lobster fishing includes income generated in industries that supply goods and services to the Lobster Fishery. This indirect income is part of the flow-on, or multiplier effects, of commercial fishing. These are dealt with in more detail in section 4.4.3.

In analysing the contribution of lobster fishing to regional income, it is important to determine where the income being earned is spent, as this is where the income will have the greatest impact.

B4.4.1.1 State income from lobster fishing

In 2001/02 the Lobster Fishery contributed 5% to total state revenue received from commercial fishing (excluding inland fishing) (refer to Figure 4.18). This figure has stayed constant over time (Table B4.13). Lobster fishing, and fishing overall, makes only a very small contribution in terms of total State output of all goods and services. Lobster fishing activities in NSW in 1999/00 contributed $4.151 million to state gross product, which accounted for 0.002% of total state product (ABS 2003a p.12 and ABS 2002 p.499). Fishing activities as a whole contributed 0.05% to total state product, with fishing activities as a whole in Australia contributing 0.37% to national Gross Domestic Product (ABS 2003a p.12, ABS 2002 p.499).

Table B4.13 Commercial lobster fishing value as a percent of total commercial fishing revenue in NSW.

Financial Year	Lobster as a percent of total revenue
1997/98	5%
1998/99	5%
1999/00	5%
2000/01	4%
2001/02	5%

(Source: NSW Department of Primary Industries fish catch records, 2003; SFM, 2004)

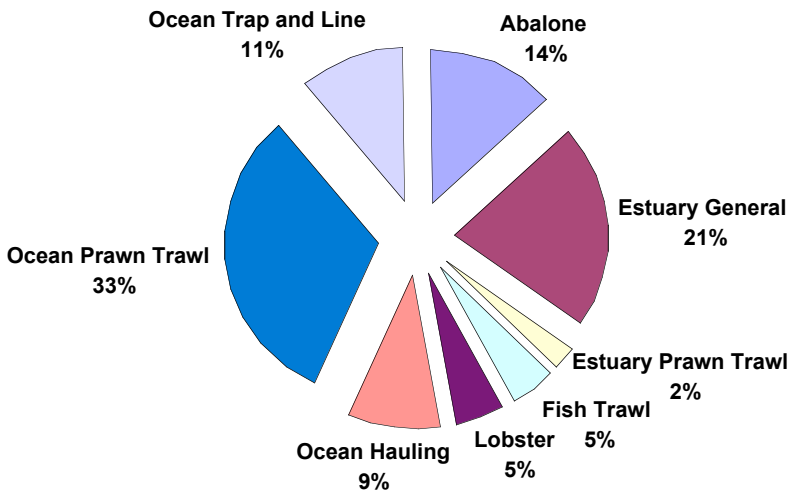


Figure B4.18 Contribution of lobster fishing to total state revenue from fishing 2001/02
(Source: NSW Department of Primary Industries fish catch records, 2003, SFM, 2004). Note: * Excludes value from inland fishing

B4.4.1.2 Regional income from lobster fishing

The contribution of income from the Lobster Fishery to the total value of commercial fishing is found to be most concentrated in the Sydney South region, and over time this has increased (Figure B4.19). In other regions, the contribution of the Lobster Fishery to regional income from commercial fishing has fluctuated year on year, reflecting, not only changes in revenue earned from lobster, but also changes in revenues earned in other fisheries.

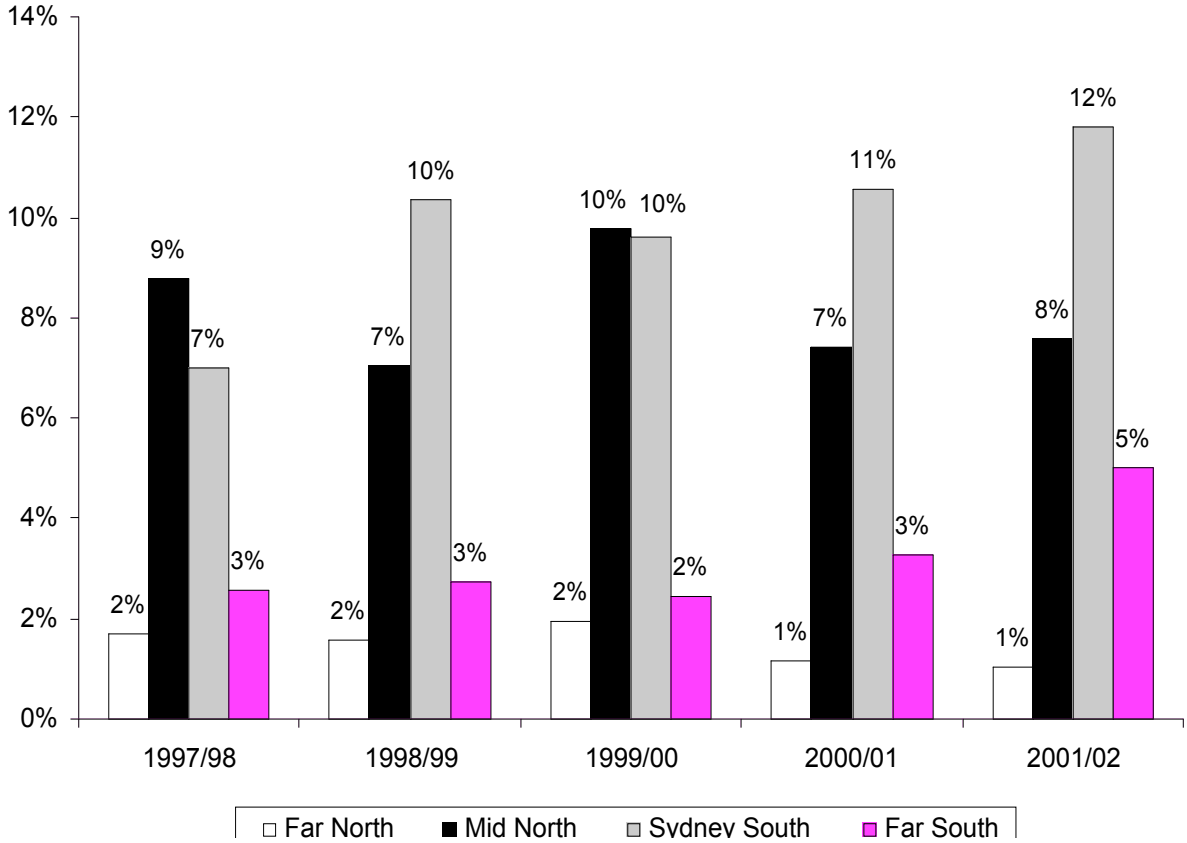


Figure B4.19 Contribution of lobster fishing to total regional income from fishing 1997/98 - 2001/02 (Source: NSW Department of Primary Industries fish catch records, 2003; SFM, 2004). Note: Excludes value from inland fishing

B4.4.1.3 Individual income from lobster fishing - Gross return

The contribution lobster fishing makes to individual fisher incomes depends to a large extent on the abundance of stock in a region, the number of other endorsements fished, and the costs of going lobster fishing (including operating costs, management charges and co-op fees).

Gross revenue earned from commercial lobster fishing in 2001/02 was lowest in the Far North coast, where the abundance of stock was also low. This is evidenced by a smaller number of fishers in this region, heavier reliance on other methods of fishing to complement the lobster component of the business, and a smaller shareholding (Table B4.14).

With the exception of 1999/00, average incomes of lobster fishers in the Far North coast have been lower than in other regions of the fishery (Figure B4.19). This is directly linked to the abundance of the stock[8]. As such, incomes in the Far North coast may pick up again to levels similar to those in 1999/00.

[8] Abundance of lobster stock may vary greatly between offshore and inshore. Hence, a more complete picture of the financial position of fishers would account for the difference in earnings for offshore and inshore operators. Information on the volume of catch by depth may provide some guidance here. These figures are presented in Section B1.1.2.

Table B4.14 Gross revenue from lobster fishing 2001/02

Region	District	No.active fishers	No. shares[1]	Average shares per fisher	Total income lobster fishing	Average lobster income per fisher	Percent income lobster fishing
Far North	Tweed		115	n.a			0%
	Clarence/ Richmond	12	542	45	$162,353	$13,529	32%
	Coffs Harbour	13	786	60	$262,035	$20,157	53%
	Total	**25**	**1443**	**58**	**$424,388**	**$16,976**	**43%**
Mid North	Hastings	6	312	52	$141,027	$23,504	64%
	Hunter	6	303	51	$95,388	$15,898	30%
	Manning	15	636	42	$432,758	$28,851	34%
	Port Stephens	20	1465	73	$786,010	$39,301	63%
	Wallis Lake	9	481	53	$197,148	$21,905	54%
	Total	**56**	**3197**	**57**	**$1,652,331**	**$29,506**	**50%**
Sydney South	Central Coast	9	567	63	$234,971	$26,108	50%
	Illawarra	17	1639	96	$821,484	$48,323	69%
	Sydney North	4	217	54	$78,971	$19,743	60%
	Sydney South	6	704	117	$376,726	$62,788	85%
	Total	**36**	**3127**	**87**	**$1,512,152**	**$42,004**	**65%**
Far South	Batemans Bay	17	1761	104	$411,654	$24,215	71%
	Far South Coast/ Montague/ Shoalhaven	13	706	54	$705,177	$54,244	45%
	Total	**30**	**2467**	**82**	**$1,116,832**	**$37,228**	**59%**
Total		**147**	**10234**	**70**	**$4,705,703**	**$32,012**	**41%**

(Source: NSW Department of Primary Industries fish catch records, 2003; SFM, 2004; NSW Department of Primary Industries Fisheries Share Registry, 2003). Note: 1. Numbers are for total shareholders in the fishery and include unused quota. In addition, they do not account for quota transfers, or transfer of shares that may occur throughout the year.

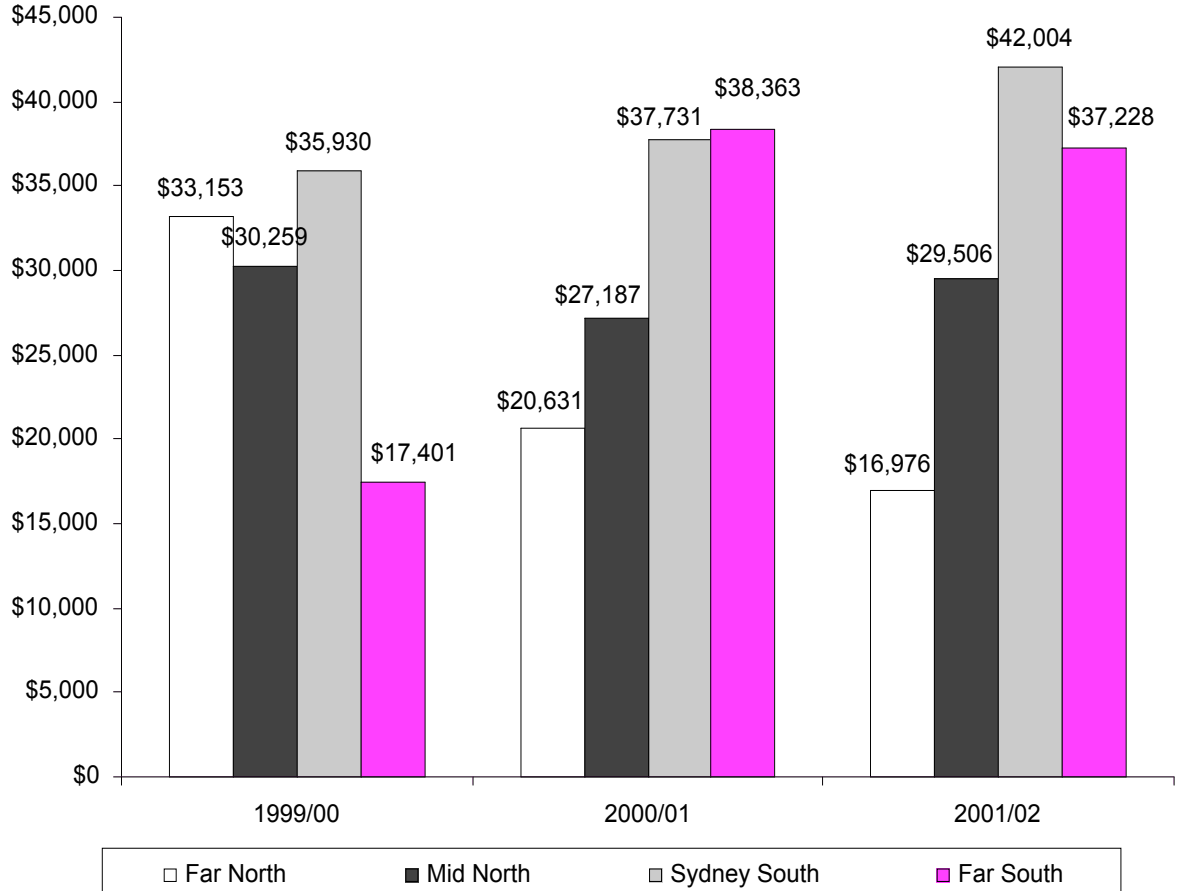


Figure B4.20 Average per fisher income from lobster fishing by region, 1999/00 – 2001/02
(Source: NSW Department of Primary Industries fish catch records, 2003; SFM, 2004)

Even though lobster fishers in the Far North of the fishery earned almost as much as fishers in the Sydney South region in 1999/00, the number of shareholders, and average shareholding per fisher was lower than in the Sydney South region (Figure B4.20, Table B4.15). This would imply that fishers in the Far North region were earning higher revenue per share than fishers in the Sydney South region. However, given that the figures presented for the number of shareholders in Table B4.15 do not account for share transfers during the year, for quota leasing, or for latent effort, incomes from fishing in a region cannot be directly compared to the number of shares in a region.

Table B4.15 Shareholdings and average number of shares per active fisher 1999/00 – 2001/02

	1999-2000			2000/01			2001/02		
Region	**Shares total**	**Fishers**	**Average**	**Shares total**	**Fishers**	**Average**	**Shares total**	**Fishers**	**Average**
Far North	1406	26	54	1406	29	51	1443	25	50
Mid North	3428	61	56	3430	66	52	3197	61	51
Sydney South	2931	40	73	3240	47	67	3127	45	68
Far South	2469	24	103	2158	30	72	2467	40	72
Total	10234	151	68	10234	172	60	10234	171	60

(Source: NSW Department of Primary Industries Fisheries Share Registry, 2003.)

Fishers' gross return from fishing depends on the ability to take advantage of storage (and hence choose when product is sold), the type of outlets through which product is sold and the quality of the product being sold. It was shown in Section 4.2.2 that a proportionately larger share of fishers in the Far South and Sydney South regions have storage facilities on site, while fishers in the mid and Far North coast tend to rely more on co-ops for storage. As a result, fishers in the south tend to have more of an influence over the price received for their product. In general, fishers in the Mid and Far North coast rely more on co-ops to sell product, while in the Far South and Sydney South a higher proportion of fishers sell product direct to the Sydney Fish Market and to RFR's and RRFR's (Section 4.2.2). This may influence prices received for lobster, though anecdotal evidence suggests prices all along the coast follow the Sydney Fish Market price.

The quality of marketed lobsters depends to a large extent on handling practices on-board and once the lobsters are landed. Fishers who have facilities to allow lobsters to swim while onboard generally achieve a higher quality product than fishers who keep lobsters alive with only restricted or no movement in tanks.

Financial return from lobster fishing also depends on fishers' ability to divert resources from other fishing and non-fishing activities towards lobster, and to lease quota in/out, when lobsters are more/less abundant in a particular region. In general, quota will move to regions where fishers' place the greatest value on the quota. This value is a combination of demand and supply factors, including the spatial abundance of lobster. For example, in 2001/02 when lobster was less abundant in the Far North of the fishery than in previous years, quota was transferred out of this region (Table B4.16). Quota was also transferred out of the Far South, although further examination reveals that most of this transfer out was from Batemans Bay, with the Shoalhaven district leasing in a significant volume of quota over the same time period, i.e. the trade was intra-regional.

Table B4.16 Quota flows by region 1999/00 to 2002/03

	Quota flows (kg)											
	1999/00			**2000/01**			**2001/02**			**2002/03**		
Region	To	From	**Net**	To	From	**Net**	To	From	**Net**	To	From	**Net**
Far North	3133	2243	**-890**	2017.9	923.3	**-1095**	3688.7	923.3	**-2765**	9041	1752	**-7289**
Mid North	5519	21511	**15992**	2981.4	5855.6	**2874.2**	6872.1	8447	**1574.9**	9912	18308	**8396.1**
Sydney South	7008	2776	**-4232**	2342	5210	**2869**	6966	11347	**4381**	7972	15909	**7937**
Far South	12923	3446	**-9477**	9305	4863	**-4443**	13027	9836	**-3191**	14706	8563	**-6143**

(Source: NSW Department of Primary Industries Fisheries Share Registry, 2003.)

B4.4.1.4 Individual income from lobster fishing - Net return

Overall fishing business level

Information on the net return from lobster fishing was collected for a single fishing year, 1999/2000, through a survey undertaken by Roy Morgan Research (Roy Morgan, 2001b). As such, the data provides only a snapshot of the economic return from lobster fishing. A more accurate representation of the economic return from lobster fishing would consider the stream of net returns over time.

A description of the methods used in the Roy Morgan survey is given in Appendix B1.1 (Volume 3). Due to the possible bias that may be introduced through the survey methods, namely the possibility for fishers to overestimate the costs associated with running a fishing business, a range of

possible scenarios have been considered for the returns to fishers from differing cost structures. It is also possible that fishers may have underestimated the returns from fishing, and, hence, a similar set of scenarios could be constructed for differing returns from fishing. However, initial examination of the data on returns to fishing indicates that underestimation of returns is unlikely.

The first scenario considered is that the survey data represents a true reflection of the costs and returns of an average fishing business holding an endorsement in the Lobster Fishery in 1999/2000. If this is the case, then, on average, the profitability of fishing businesses holding endorsements in the Lobster Fishery was negative in 1999/2000. This was especially the case for lobster fishers with small shareholdings (i.e. less than 35 shares, and between 35 and 75 shares) (Table B4.17). The average economic rate of return across all businesses with commercial lobster fishing endorsements was -5% in 1999/2000. For businesses with less than 35 shares and between 35 and 75 shares, the average economic rate of return was –17% and –15% respectively.

If the results of the survey are correct, then of the 23 fishing businesses with lobster shares surveyed, out of a total of 151 active fishers in 1999/2000, only 40% were earning an economic profit in 1999/2000.

In 1999/2000 direct operating expenses, such as bait, fuel, boat repairs, fishing gear repairs, freight costs and imputed labour, represented, on average, 80% of total revenue from fishing[9]. The most significant cost was the cost of labour (representing around half of the direct costs associated with running a fishing business in 1999/2000).

[9] Operating expenses may vary greatly between inshore and offshore operations. For example, costs of fuel and repairs and maintenance are generally much higher for an offshore lobster fisher as compared to an inshore lobster fisher. The data collected in the survey are for the average fisher (i.e. representing both inshore and offshore operators). It was not possible to split the data according to the location of fishing due to data confidentiality.

Table B4.17 Average net return per fishing business holding a lobster endorsement, 1999/2000

	<35 shares	35-75 shares	>75 shares	Average for survey
$				
Gross Revenue	**60,524**	**62,605**	**119,602**	**81,525**
Direct costs:				
Co-operative expenses	2,017	3,313	5,036	3,349
Bait	1,337	2,125	4,481	2,602
Boat fuel	4,250	4,921	11,702	6,988
Boat repairs	2,148	1,667	8,673	4,313
Fishing gear	2,927	5,318	7,542	5,052
Vehicle fuel	2,973	3,005	2,107	2,679
Freight and other costs	1,904	690	3,379	4,823
Imputed labour [1]	36,402	31,422	35,693	35,073
Total direct costs	**53,959**	**52,461**	**78,613**	**64,879**
Indirect costs:				
Boat registration/fees	849	445	1,214	888
Vehicle registration	824	953	956	898
Insurance	488	513	1,339	789
Fishery management charges	1,343	2,987	7,329	3,782
Commercial fishing licence fees	1,222	864	1,543	1,256
Accounting and legal	567	581	1,596	928
Telephone, fax, stationery	814	1,022	1,467	1,086
Power	546	339	1,267	752
Rates and Rents	291	511	123	280
Bank charges	301	350	296	310
Interest/borrowing costs	781	1,552	2,118	1,413
Depreciation	3,010	4,588	2,813	3,285
Repairs to bulding/plant	175	420	0	168
Repairs to motor vehicles	1,137	1,517	589	1,029
Travel and other expenses	544	140	1,968	966
Total indirect costs	**12,891**	**16,781**	**24,617**	**17,831**
Total costs	**66,850**	**69,242**	**103,230**	**80,039**
Gross profit	**-6,326**	**-6,637**	**16,372**	**1,486**
Capital asset value [2]	**65,940**	**78,144**	**113,919**	**85,281**
Net rate of return	**-10%**	**-8%**	**14%**	**2%**
Economic rate of return (including 7% opportunity cost of capital) [3]	**-17%**	**-15%**	**7%**	**-5%**

(Source: Roy Morgan 2001b)

Notes: See Appendix B1.3 (Volume 3) for details on calculation of various components of the Table. 1. Calculated using standard wage rates for primary producers (ABARE, 2003). 2. Is the return on the written down capital value of equipment. 3. The economic rate of return to capital includes the opportunity cost of capital, i.e. the return that could be made on that capital if it was put to the next best alternative use. In this example it is 7%, which is the 'riskless' long-term government bond rate. However, as fishing cannot necessarily be considered 'riskless' this may not be the most appropriate rate. Further work is needed to determine a discount rate that properly reflects the 'risk' associated with fishing.

In calculating the individual economic return from lobster fishing, economic profit, as distinct from accounting profit needs to be determined. Accounting profit is defined as the excess revenue earned over costs prior to tax, whereas economic profits are accounting profits less a return for risk, entrepreneurial skill and opportunity costs. These extra returns will mean that firms will expect to earn a certain margin above pure accounting profits. This margin is termed the firm's discount rate. In

Table B4.17 the discount rate is the opportunity cost of capital, specifically the 'riskless' long-term government bond rate of 7% (in line with ABARE, 2000). Hence, this discount rate does not include a return on risk or entrepreneurial skill. As fishing cannot be considered 'riskless', and many lobster fishers use some degree of entrepreneurial skill in conducting their fishing activities, the 'riskless' long-term government bond rate may not be the most appropriate discount rate.

It is standard practise to calculate an imputed labour payment when estimating economic returns in primary industries where wages are not recorded (ABARE, 2003). The cost of labour was imputed by applying a standard wage for an operator/manager in a primary industry to the number of days fished, and then another rate for full-time crew members, and other full time labour (including family labour). Further details on the calculation of imputed labour in provided in Appendix B1.3. The costs of employing part-time paid, unpaid or family labour in a fishing business were not included because information was not collected in the survey on the number of days worked by this group. For this reason, the true cost of labour may be higher than that reported in Table B4.17. On the other hand, it may be lower than that reported in Table B4.17, as fishers may take lower wages than the imputed rate to keep the business operational, or forgo payment for all the time involved with the fishing business. In addition, the fisher's partner or family member may work for less than the imputed pay rate. For these reasons, the imputed wage calculation may be unreasonable (Standen, 1972; ABARE, 2000).

Indirect costs, such as boat and vehicle registrations, insurances, fishery management charges, rates, bank and business administration expenses, represented around 17% of revenue in 1999/2000. About 50% of lobster fishers sampled had no interest payments to meet, and approximately 25% had annual interest payments of more than $2,000 per annum.

In interpreting the results for net returns to fishers, it is important to take into account that the survey represents only a small sample of lobster fishers (17%), so inferences made about the population of fishers from the survey results should be treated with caution. There may also be differences in fisher costs due to, for example, differences in the location of fishing (inshore versus offshore), transport costs and co-op charges. In addition, the information in Table B4.17 is only for one year, 1999/2000. Costs and returns may have changed since this time due to technological innovation and changes in, for example, the number of fishers, catch rates and management charges (management charges have increased since 1999/2000, mainly as a result of the requirement for lobster fishers to contribute towards the preparation of an EIS for the fishery).

The figures on net return presented in Table B4.17 consider only the return to boat capital, rather than the return on investment in shares. However, the interest/borrowing costs may include payments on monies borrowed to purchase shares. Net return at full equity would include a calculation of the current value of shares as well as any debt owing on these shares.

It was not possible to calculate net return at full equity using the survey data as information on individual shareholdings and debt owing on these shares was not made available to NSW Department of Primary Industries due to the confidentiality of this information.

In discussing efficiency and farmer welfare in the NSW farming sector, Standen (1972) noted that replacement cost based measures for depreciation and off-farm imputed earnings may be invalid measures of opportunity costs of these resources in the rural industry context, tending to overstate off-farm benefits. For some fishers the opportunity cost of labour outside fishing may be close to zero, or if pensionable age, social security payments of up to approximately $10,000 per annum. Commonly fishers indicate they forgo payment for lifestyle and autonomy. This may even extend to short-term

periods where fishers forgo wages, cease fishing or move to other industries until the fishing improves. This substitution between fishing and other industries may be an efficient strategy for fishers to remain in fishing in the long term. In addition, opportunity costs of capital can be forgone, as can depreciation, with fishers hoping to keep current assets operational beyond their envisaged lifespan, or to locate a second hand vessel if a replacement is required.

If the costs reported through the survey are an overestimation of the costs of going fishing, then the return to fishers holding endorsements in the Lobster Fishery was considerably greater in 1999/2000 than that reported in Table B4.17. Consider, for example, if costs have been overestimated by a factor of 10% (Table B4.18). Under this scenario, fishers in the survey sample would have been making, on average, a 4% return on their capital invested in the fishery in 1999/2000. However, fishers with less than 35 shares and between 35 and 75 shares would still have been making a negative return on capital in this year. If, on the other hand, costs are overestimated by a factor of 20%, all groups of shareholders would be making a positive return in 1999/2000.

Table B4.18 Average net return per fishing business holding a lobster endorsement under different cost scenarios, 1999/2000

$	<35 shares	35-75 shares	>75 shares	Average for survey
total revenue	**60,524**	**62,605**	**119,602**	**81,525**
direct costs				
10% reduction	48,563	47,215	70,752	55,988
20% reduction	43,167	41,969	62,891	49,767
30% reduction	37,771	36,723	55,029	43,546
indirect costs				
10% reduction	11,602	15,103	22,155	16,047
20% reduction	10,313	13,425	19,693	14,264
30% reduction	9,024	11,747	17,232	12,481
total costs				
10% reduction	60,165	62,318	92,907	72,035
20% reduction	53,480	55,394	82,584	64,031
30% reduction	46,795	48,469	72,261	56,027
net return				
10% reduction in costs	359	287	26,695	9,490
20% reduction in costs	7,044	7,212	37,018	17,494
30% reduction in costs	13,729	14,136	47,341	25,498
capital asset value	65,940	78,144	113,919	85,281
rate of return on capital				
10% reduction in costs	1%	0%	23%	11%
20% reduction in costs	11%	9%	32%	21%
30% reduction in costs	21%	18%	42%	30%
economic rate of return				
10% reduction in costs	**-6%**	**-7%**	**16%**	**4%**
20% reduction in costs	**4%**	**2%**	**25%**	**14%**
30% reduction in costs	**14%**	**11%**	**35%**	**23%**

(Source: Roy Morgan 2001b)

The significant difference in net returns to a fishing business holding lobster shares as a result of adjustments to cost data reported in the survey, highlights the importance of ensuring the accuracy of the survey data. Efforts should be made to update the survey data before using it to make future management decisions in the fishery, such as the level at which to set the community contribution.

Lobster component of the fishing business

For the lobster component of a fishing business, economic performance can be identified by, apportioning capital, revenue and costs earned from different forms of fishing, by effort and revenue afforded to each method[10]. Again a range of scenarios are considered for possible overestimation of the reported costs of fishing. In the first scenario, where the survey is taken to represent a true reflection of the costs and returns from fishing, the economic rate of return for the lobster component of a fishing business is lower than for the fishing business overall, -11% compared to –5% (Tables B4.17 and B4.19). This is in part due to the relative increase in boat fuel costs and average management charges as a proportion of total costs that are attributable to the lobster component of the fishing business. Those fishers with less than 35 lobster shares had a –37% economic rate of return in 1999/2000, and those with greater than 75 shares had a rate of return of –11% for the lobster component of their business in 1999/2000 (Table B4.19).

When possible inaccuracies in the cost data reported in the survey are taken into account, the net returns to the lobster component of an average fishing business become positive if costs are reduced by more than 20% (Table B4.20). However, those businesses with less than 35 shares continue to be below the level for long-term viability even when costs are reduced by as much as 30%.

[10] It should be noted that this pro-rating methodology assumes fixed costs are distributed equally across all fishing undertaken by producers. In fact some businesses may have few fixed costs attributed to lobster fishing and thus only incur marginal costs when infrequently fishing for lobster.

Table B4.19 Average net return from lobster fishing, 1999/2000

	<35 shares	35-75 shares	>75 shares	Average for survey
$				
Gross Revenue	**15,497**	**29,080**	**74,811**	**39,081**
Direct costs:				
Co-operative expenses	722	1,096	2,542	1,436
Bait	437	698	2,855	1,335
Boat fuel	1,141	1,386	7,384	3,366
Boat repairs	575	587	7,014	2,817
Fishing gear	971	1,206	4,736	2,332
Vehicle fuel	926	1,217	1,401	1,154
Freight and other costs	768	262	1,809	1,020
Imputed labour [1]	11,975	16,708	26,848	18,177
Total direct costs	**17,515**	**23,161**	**54,589**	**31,638**
Indirect costs:				
Boat registration/fees	264	98	685	374
Vehicle registration	263	313	614	396
Insurance	128	175	694	335
Fishery management charges and license fees	1,398	2,958	7,147	3,944
Accounting and legal	167	292	957	469
Telephone, fax, stationery	219	473	1,128	590
Power	75	47	49	60
Rates and Rents	68	192	67	95
Bank charges	66	119	200	124
Interest/borrowing costs	140	621	1,665	775
Depreciation	632	811	902	765
Repairs to bulding/plant	54	68	0	38
Repairs to motor vehicles	341	341	517	402
Travel and other expenses	107	17	860	349
Total indirect costs	**3,921**	**6,525**	**15,484**	**8,716**
Total costs	**21,436**	**29,686**	**70,073**	**40,354**
Gross profit	**-5,940**	**-606**	**4,738**	**-1,273**
Capital asset value [2]	**19,671**	**14,952**	**62,290**	**34,473**
Net rate of return	**-30%**	**-4%**	**8%**	**-4%**
Economic rate of return (including 7% opportunity cost of capital) [3]	**-37%**	**-11%**	**1%**	**-11%**

(Source: Roy Morgan 2001b)

Table B4.20 Average net return from lobster fishing under different cost scenarios, 1999/2000

$	<35 shares	35-75 shares	>75 shares	Average for survey
total revenue	**15,497**	**29,080**	**74,811**	**39,081**
direct costs				
10% reduction	15,764	20,845	49,130	28,474
20% reduction	14,012	18,529	43,671	25,310
30% reduction	12,261	16,213	38,212	22,146
indirect costs				
10% reduction	2,315	3,210	7,988	4,483
20% reduction	2,058	2,853	7,100	3,985
30% reduction	1,801	2,497	6,213	3,487
total costs				
10% reduction	18,079	24,055	57,117	32,957
20% reduction	16,070	21,382	50,771	29,295
30% reduction	14,062	18,710	44,425	25,633
net return				
10% reduction in costs	-2,582	5,025	17,694	6,124
20% reduction in costs	-574	7,698	24,040	9,786
30% reduction in costs	1,435	10,370	30,386	13,448
capital asset value	65,940	78,144	113,919	133,980
rate of return on capital				
10% reduction in costs	-4%	6%	16%	5%
20% reduction in costs	-1%	10%	21%	7%
30% reduction in costs	2%	13%	27%	10%
economic rate of return				
10% reduction in costs	**-11%**	**-1%**	**9%**	**-2%**
20% reduction in costs	**-8%**	**3%**	**14%**	**0%**
30% reduction in costs	**-5%**	**6%**	**20%**	**3%**

(Source: Roy Morgan 2001b)

In interpreting the figures in Tables B4.19 and B4.20 it is important to consider that the data is for a single year. Net returns fluctuate year on year in accordance with fluctuations in the abundance of lobster and changes in market conditions. As such, the status of the lobster stock provides an important context for viewing net values. High returns may be generated when stock is more abundant, and lower returns when stock is less abundant.

Given that changing market conditions is an important driver in fluctuations in net returns over time, information on market trends should be obtained.

Regional differences in net returns from lobster fishing

It is not possible to estimate regional differences in net return per fisher due to the small sample size and, hence, confidentiality issues. However, it is possible to show the difference that changes in co-op charges (which represent perhaps the most significant cost difference between regions) make to the net return from lobster fishing.

Fisherman's Co-operative charges are either levied as a percentage of gross value of product (that is as a percentage of lobster revenue presented in Table B4.17), or as a $/kg charge. In order to test the sensitivity of lobster fishers' economic returns to changes in co-op charges, the effect of an increase in co-op charges, levied as a percentage of gross value, on economic returns was simulated. The results for a 1, 5 and 10% increase in co-op charges are presented in Table B4.21. It can be seen that lobster fishers' economic return is sensitive to increases in co-op charges. For example, a 10% increase in co-op charges leads to an 11% decrease in the economic return of fishers. For increases of 1% and 5% we see a proportional fall in the economic rate of return of lobster fishers. However, due

to the possible problems with the data discussed above, these figures must be interpreted in that light. If the values from the survey are at least proportional to the real values, then the effects simulated should approximately show the real change in lobster fishers economic rate of return when co-op charges are increased. As such, it is apparent that variations in co-op charges can have a significant influence on the financial viability of lobster fishers.

Table B4.21 Sensitivity of lobster fishers' returns to increases in co-op charges.

	<35 shares	35-75 shares	>75 shares	Average for survey
1% increase in co-op charges				
Net profit	**-6095**	**-897**	**3990**	**-1664**
Return to capital	-31%	-6%	6%	-5%
Less opportunity cost of capital	-38%	-13%	-1%	-12%
5% increase in co-op charges				
Net profit	**-6714**	**-2060**	**998**	**-3227**
Return to capital	-34%	-14%	2%	-9%
Less opportunity cost of capital	-41%	-21%	-5%	-16%
10% increase in co-op charges				
Net profit	**-7489**	**-3514**	**-2743**	**-5181**
Return to capital	-38%	-24%	-4%	-15%
Less opportunity cost of capital	-45%	-31%	-11%	-22%

B4.4.1.5 Socially optimal level of effort

The analysis presented above for the net return from lobster fishing does not account for the costs associated with the broader impacts of fishing as a result of removing fish from their natural state. These broader impacts (or externalities) include, for example, the impacts of fishing on the biological and physical environments (which in the case of lobster fishing is expected to be relatively low (see section B2.8)) and costs imposed on other groups whose benefit from using the resource for harvest or utilitarian purposes may be lowered as a result of commercial fishing activities. If these costs are internalised by fishers, and, hence, the externalities minimised, the optimum level of fishing effort may be lower than that described in Tables B4.17 -B4.20.

The scenarios presented in Tables B4.17 -B4.20 consider only the measurable benefits from lobster fishing in the form of market values. However, it is possible that non-market (or non-pecuniary) benefits, such as lifestyle factors, also occur in fisheries (Holland, 2002). As will be demonstrated in Section B5, fishers derive satisfaction from the activity of fishing itself above and beyond the monetary benefits they receive. Where this is the case, it is necessary to account for the non-pecuniary benefits associated with fishing when determining the return to society from commercial harvesting of the resource. However, as lifestyle factors are difficult to measure, it is often not possible to assign them a value. Instead, it is worth noting that the return to society from commercial harvesting of the resource may be higher than presented in Tables B4.17 -B4.20 when social factors are taken into account.

Where social benefits are found to be an important component of the benefits derived from fishing, it may be that paid skippers and crew require a lower level of pay to entice them to work than would otherwise be the case (Holland, 2002). In addition, a lower level of profit than as measured on an economic profit basis alone may be acceptable as the incentive for participation in a fishery. On this basis, comparisons with wages in other sectors of the economy may not be appropriate when considering the profitability of fishing (Holland, 2002).

B4.4.1.6 Concluding remarks

The data presented above prescribes the economic return to capital from harvesting of lobster to be negative, however as the data is only for a single year, it is difficult to use this data to make assertions about the true economic return from lobster fishing. Such assertions would require having data on costs and returns over time.

In a fishery such as lobster, which is managed through a system of individual transferable quotas (ITQs), it would be expected that fishers would be making a positive return on the lobster component of their fishing business if the TACC is set consistent with existing production technology, stock abundance, environmental and market conditions[11].

The fact that the available data shows that fishers were making a negative return on their investment in the fishery in 1999/2000 may be due to several factors, including: the data is not a representative sample (i.e. the data represents only 17% of the population of lobster fishers at the time of the survey); the available data overstates the costs and understates the returns from fishing; there are inefficiencies in other components of the fishing business due to limiting factors from regulation on other types of fishing in which the vessel is engaged; there are inefficiencies in the quota trading system; the age of capital invested in the fishery (i.e. the depreciated value of assets used to calculate capital value is low); and, the age and malleability of labour in the fishery. It may also be that the true benefit that fishers derive from the activity of fishing is greater than is represented by market values. As discussed, the non-market values associated with fishing, such as lifestyle factors, may be significant, and when taken into account, may result in a much higher return to fishers than when measured by economic data alone.

The discussion in Section B4.4.1.4 highlights the need to undertake further work to determine a discount rate that properly reflects the 'risk' associated with investment in fishing, as well as expected returns on entrepreneurial skill. Further work should also be undertaken to determine the most appropriate opportunity cost of capital, i.e. the return that could be made on capital if it was put to the next best alternative use. In the Lobster Fishery, the opportunity cost of capital may be better reflected as the return that could be made on leasing out boat capital.

Despite the apparently low financial viability of fishing businesses holding lobster shares, many fishers have chosen to remain in the industry rather than exit and take up alternative employment. This may be due to the fact that operators are willing to accept a lower level of profit for participation in a fishery due to the substantial lifestyle benefits they derive from fishing. It may also have to do with several other factors including: restrictions on transferability and sale of fishing licenses; difficulty in selling shares; lack of alternative skills or employment opportunities; the prospect of false starts in new employment; the age structure of the Lobster Fishery; and the psychic costs of changing occupation (and possibly place of living). It is also the case that several individuals running a fishing business with lobster shares have a second job, and their income from fishing is less important. For example, in 1999/2000 17% of lobster fishers earned incomes from non-fishing sources (Roy Morgan 2001a).

[11] Reference to any standard fisheries economics text (see, for example, Anderson 1986) will show that, in general, the point at which economic return is maximised (i.e. the difference between the cost and return from harvesting of the resource) lies slightly to the left of the point at which the biological yield is maximised (i.e. the maximum sustainable yield). Hence, in order to maximise the economic return from harvesting of the resource, a more conservative TACC may need to be set than that which maximises the sustainable yield.

B4.4.2 Value of shares

Upon commencement of the *Fisheries Management Act 1994*, the Lobster Fishery was declared under Schedule 1 as a share management fishery. In 1996 provisional shares were first issued to endorsed fishers in proportion to their validated catch history (10234 shares were issued). Initially, fishers were required to transfer their entire lobster business when transferring shares. However, upon commencement of the *Fisheries Management (Lobster Share Management Plan) Regulation 2000*, fishers were given the opportunity to sell lobster shares, separate to other fishing entitlements.

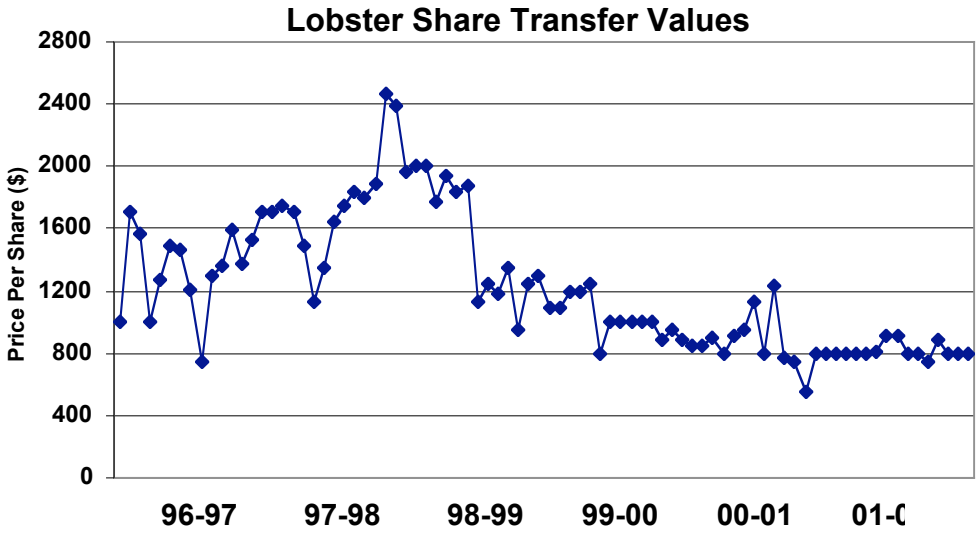


Figure B4.21 Share transfer prices 1995/96 – 2002/03

(Source: NSW Department of Primary Industries fisheries licensing database, 2003)

There has been a decline in the price at which lobster shares are traded since 1998 when the monthly average share price peaked at over $2400 per share. Share prices have stabilised over the past 2-3 years at around $800-900 per share (Figure B4.21). Industry accredit the decline in the value of shares to the implementation of full cost recovery for the management services attributable to lobster shareholders. However, share prices can reflect short-run effects such as interest rate fluctuations, poor overseas markets for interstate product etc. In addition, it may be the case that shares were initially overvalued. Share prices can also reflect factors that are not necessarily associated with a healthy fishery, reflecting over-capacity or over-fishing (ABARE, 2000). In general though, share market values can provide some information about the economic health of the industry.

B4.4.3 Economic multiplier effects

Economic multipliers measure 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. The full extent of the multiplier effects will vary between regions and the level of aggregation used. For lobster fishers, an analysis of their location and size of their business expenditures has been conducted, and 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.

B4.4.3.1 Regional expenses

In the functioning of normal business practice, firms purchase a variety of goods and services from within, and outside, their regional economies. The flow on effects of an industry within a region will depend on the amount of inputs sourced from that region. In order to obtain an understanding of the contribution of commercial fishing and lobster fishing industries, to local economies, fishers were asked, as part of the Roy Morgan Social Survey (2001a), about the location and size of their largest expenses (Table B4.22).

Table B4.22 Expenses over $1000.

	Far North	Mid North	Sydney South	Far South	Total
Ballina	1	-	-	-	1
Batemans Bay	-	-	-	1	1
Brisbane	3	5	3	-	11
Cairns	-	-	-	1	1
Coffs Harbour	5	2	-	1	8
Eden	-	-	2	-	2
Grafton	3	1	-	-	4
Iluka	1	-	-	-	1
Lismore	1	-	-	-	1
Macksville	-	0	-	-	2
Melbourne	-	1	-	-	1
Newcastle	1	4	2	2	9
Port Macquarie	-	1	-	-	1
Sydney	-	8	9	5	23
Taree	-	2	-	1	3
Tweedheads	1	1	-	-	2
Ulladulla	-	1	2	1	4
Wollongong	-	-	1	-	1
Yamba	-	0	-	-	1
Forster/ Tuncurry	-	1	-	1	2
WA/ SA/ Tas	-	-	1	1	2
Total	16	27	20	14	81

(Source: Roy Morgan, 2001a)

From the pattern of expenditures, it can be seen that a high proportion of major expenditures occurred in Sydney. Despite this, fishers in the Far North region did not go to Sydney for major purchases and instead went north to Brisbane. Brisbane was the second most frequent location for large expenditures; however, there were no reported major expenses to occur in Brisbane for fishers in the Far South region.

For each of the regions the locations of expenditures vary greatly. For the Far North and Sydney South regions, only 30% and 50% respectively of expenditures over $1000 occurred outside the region. This is in direct contrast with the other two regions in which fishers had a much greater proportion of their expenditures outside their home region, with 74%, and 86% for the Mid North and Far South regions respectively. A possible reason for such a pattern of expenses is the existence of a large regional centre or economy within the defined regions. In the Far South, it is likely that fishers have to travel outside of their region to get to a regional centre. However, in the Sydney South region, Sydney and Wollongong are large economies allowing them to supply a large proportion of the needs of fishers in the region.

Regional expenditure on inputs within a region also differs between inshore and offshore lobster fishers. Usually, inputs for offshore activities are required to be sourced from larger economies. In the regions outside the Far North, a significantly higher proportion of fishers in the Lobster Fishery are involved in offshore lobster fishing.

In general, where there are increased onshore activities related to a fishery, the greater the flow on effects from the fishery will be. Onshore activities such as handling, marketing and transporting catch may be significantly affected by changes in the demand for output from fishing operations. In the Lobster Fishery, onshore activities are generated via the sale of product and through the purchasing of inputs.

B4.4.3.2 Economic multipliers

In order to formally evaluate the flow on effects of industries, multipliers are used. Multipliers capture the extent of the flow on effects on other sectors of the economy, be it at a national or regional level. Multipliers can be used to capture the effects on output, employment and income within industries, and in other sectors of the economy, caused by increases in the demand for the output of one industry. In this section, estimates of output, income and employment multipliers have been discussed in order to obtain an idea of the true impact that commercial fishing, and in particular lobster fishing, has on regional and national economies. For a more thorough discussion of multipliers, and the techniques used to estimate them, see Appendix B1.2 (Volume 3).

Output produced in an industry has an effect not only in the industry that created the output, but also in various other industries. A change in output in one industry will have an effect on the economy in the form of employment, income and total output. The reason for such links occurs due to the inter-connected nature of individuals within an economy. Employment of an individual will create further demand due to the ability of that individual to spend money on various needs and wants. Further to this, normal business practice uses inputs that are sourced from other industries, thus an expansion in output will mean an expansion in demand of those inputs under certain conditions.

Direct and indirect effects

Direct and indirect effects are used to measure the economic significance of an industry. Direct effects measure the value of output, employment and income in the industry itself. Indirect effects measure the value of output, employment and income in other sectors of the economy created as a result of increased production from an industry. Indirect effects are in the form of 'indirect production effects' and 'indirect consumption effects'. Indirect production effects result from increased demand for goods and services produced in other industries as a result of an increase in output from an industry. As the goods and services are used as inputs, they are termed 'indirect production effects'. Indirect consumption effects result from increased spending of households in response to an increase in output from an industry, which, in turn, creates demand for goods and services within the economy, and, as such, higher employment in other industries. As the goods and services are consumed, they are termed 'indirect consumption effects'.

Output multipliers

Output multipliers show the relationship between the initial increase in output from an industry and the resulting increase in output of all industries caused by a shift in demand. This type of multiplier includes some 'double counting' as the increased output of one industry can be used as an input into other industries. Output multipliers relate to changes in industry outputs due to changes in

final demands, and they measure the sum of direct and indirect requirements from all sectors needed to create the extra unit of output required to satisfy final demand.

Income multipliers

Income multipliers measure the amount of income that is generated in industries, directly and indirectly caused by a change in final demand. They measure the total effect of incomes earned per dollar of output. Income multipliers measure the amount of income generated in both the direct industry, and that induced in other industries by a change in final demand.

Employment multipliers

Employment multipliers measure the employment response caused by a change in final demand directly in the industry and indirectly in supplying industries. They show the creation of employment that occurs due to a change in the final demand in an industry.

Multiplier estimates

Table B4.23 Output multipliers

Output	Initial	Production induced	Consumption induced	Total	Type II ratio
Northern NSW					
Fishing	1	0.193	0.717	1.910	1.910
Clarence					
Fishing	1	0.091	0.787	1.877	1.877
Ulladulla					
Trawl	1	0.237	0.327	1.564	1.564
Non-Trawl	1	0.223	0.341	1.564	1.564
Eden					
Trawl	1	0.218	0.221	1.439	1.439
Non-Trawl	1	0.220	0.198	1.418	1.418
Process+	1	0.426	0.105	1.531	1.531

Source: Tamblyn and Powell (1988); McVerry (1996); and Powell, Jensen and Horwood (1989).

Estimates of output, employment and income multipliers from commercial fishing are presented in Tables B4.23, B4.24 and B4.25 respectively. The estimates of the multipliers are for four separate communities in NSW: Eden and Ulladulla (Powell Jensen and Horwood, 1989); Northern NSW (Tamblyn and Powell, 1988); and, Clarence (McVerry, 1996). The initial column shows the change in output, employment or income. For instance, in Table 4.23, the 'initial' column represents a change in output of $1. Production induced effects are the sum of the direct effects, those that occur within the industry and the indirect effects, those which are caused outside the industry. They represent the total induced production created in a regional economy from the initial change. Consumption induced effects result from the increased spending of household income that results from the initial change in output. The Type II multiplier ratios shown in the tables reflect the relationship between total direct and indirect effects to the direct effect (initial increase).

The output multipliers shown in Table B4.23 show that every $1 of output created in the commercial fishing industry in Northern NSW, induces $0.19 in indirect production in other industries, and $0.72 in indirect consumption. Further, the total effect, both direct and indirect, indicates that the $1 output in the commercial fishing industry leads to a total impact of $1.91. It can be seen that the consumption induced effects in all regions except for Eden are greater than the production induced effects.

There is a vast range of flow-on output effects from commercial fishing across the study areas. The greatest output response occurred in Northern NSW, with a further increase of $0.91 given the $1 of output. All values of output responses were less that the initial change in output of $1 in the fishing industry. The values presented are for regional multipliers, and thus most of the effects are limited by the capacity of the regional economies to supply the inputs of the fishing industry. The low values indicate that the capacity of the fishing industry to source inputs from the regional economies is also low.

Table B4.24 Employment multipliers

Employment	Initial	Production induced	Consumption induced	Total	Type II ratio
Northern NSW					
Fishing	0.038	0.004	0.018	0.060	1.592
Clarence					
Fishing	0.029	0.001	0.014	0.044	1.517
Ulladulla					
Trawl	0.018	0.004	0.006	0.028	1.533
Non-Trawl	0.027	0.003	0.007	0.037	1.362
Eden					
Trawl	0.018	0.002	0.003	0.024	1.304
Non-Trawl	0.015	0.002	0.003	0.020	1.361
Process+	0.003	0.006	0.002	0.011	3.088

Source: Tamblyn and Powell (1988); McVerry (1996); and Powell, Jensen and Horwood (1989). Figures are employment per thousand dollars of output.

Employment multipliers shown in Table B4.24 are for employment per thousand dollars of output. By looking at the Type II ratios, it can be seen that the initial output created in the commercial industry leads to a lesser increase in employment in the regional economy. For the Northern NSW regions, the Type II ratios show that the indirect effects are around 0.6 times the direct effects. This trend is continued for most regions, with the highest ratio in the processing sector of the fishery in the Eden region.

The employment multipliers for each region are relatively low. The cause of this effect may be due to the flow-on effects outside the regional economy. As discussed, fishers rely on non-regional economies for sources of inputs into their fishing businesses. As such, the employment created in the fishing industry due to a change in output may only have a significant flow on effect in economies outside the region in which fishers live.

The income multipliers are presented in Table B4.25. The figures presented show the effect of income earned per dollar of output. For most fisheries in NSW, the income earned per dollar of output has a flow-on effect such that the final result is close to one and a half times its original value. The consumption induced effects are much larger than the production induced effects.

Table B4.25 Income multipliers

Income	Initial	Production induced	Consumption induced	Total	Type II ratio
Northern NSW					
Fishing	0.500	0.056	0.269	0.825	1.650
Clarence					
Fishing	0.590	0.026	0.308	0.924	1.566
Ulladulla					
Trawl	0.300	0.069	0.127	0.496	1.652
Non-Trawl	0.316	0.069	0.132	0.517	1.638
Eden					
Trawl	0.300	0.050	0.080	0.430	1.433
Non-Trawl	0.249	0.064	0.072	0.385	1.548
Process+	0.062	0.104	0.038	0.205	3.296

Source: Tamblyn and Powell (1988); McVerry (1996); and Powell, Jensen and Horwood (1989). Figures are incomes per dollar of output.

Discussion

In contrasting the results shown in the previous sections, one needs to be mindful of the changes in the industry since the time of estimation. The multiplier effects will have been representative of the industry at that time. For example, the results for the Eden and Ulladulla region are influenced by the Orange Roughy catch at the time.

Multipliers assume that the mix of inputs (input ratios) do not change from the time of collection of the data to the estimation of the multiplier effects. As the multipliers estimated in previous studies are based on data from 1980s and 1990s, input usage will have changed since that time. For example, the assumption ignores the possibility of economics of size, and that inputs may be substituted in response to an increase in production.

Changes in the structure of the industry, be it through different fishery management practices, technology change and the GST, will have all had impacts on fishers' use of inputs. The GST has changed relative prices, for instance some goods that attracted a wholesale sales tax, now only attract the GST, and services that did not attract a tax, now do. As relative prices change, it is likely that the ratio of inputs used will also change. This substitution may have also occurred in consumer spending, thus changing the multiplier effect.

The data on the location of expenditures by lobster fishers on major expenses (Table B4.25) adds weight to the estimated results for multipliers from the historical studies. Multipliers for the Far North region (Clarence and Northern NSW) are higher than those for the Far South region in most cases. It was also the case (Table B4.25) that a greater proportion of major expenses over $1000 occurred within the Far North region, as opposed to the Far South region, where the proportion of local expenditure was lower. As much of the multiplier effect is due to the industry's ability to source inputs from the regional economy, it indicates that the ability of the commercial fishers in the Far North region to source inputs from their local region is greater. Further, it also may suggest that the regional economies in the Far North region are more reliant on the commercial fishing industry as they are more specialised to supply the necessary inputs.

B4.4.4 Economic rent

Economic rent is the long run excess of benefits gained from the use of a natural resource over the long run costs of harvesting the resource, where benefits should ideally include both measurable (i.e. revenue from harvesting) and non-measurable (i.e. lifestyle) factors. Economic rent can be divided into three components: differential, scarcity and intra-marginal rent (Muller and Luchsinger, 2003). Differential rent arises because of differences in production sites and scarcity rent arises from excess demand for the good, in this case the fish stock. Because both kinds of rent arise from the characteristics of the natural resource they are collectively called 'resource rent'. Intra-marginal rent, on the other hand, is attributable to a firm's investment in its products, such as training and marketing (including value-adding). Such investments may allow firms' to attain higher prices for their products and lower costs, thereby making them more profitable than other firms. These returns should be left with the company in order to continue to encourage them to make such investments.

As mentioned in Section B4.4.1.4, firms will expect to earn a certain margin above pure accounting profits. This margin, or rate of return, is termed the firm's discount rate and includes intra-marginal rent. Any extra revenues earned above the firm's discount rate are resource rents.

On the basis of the figures presented in Tables B4.17 - B4.20, on the economic return of lobster fishers, it does not appear that the resource was generating an economic rent in 1999/2000. However, as mentioned in Section B4.4.1, the figures used to calculate economic return should be viewed with caution as the data is not representative, and is likely to overstate the costs, and understate the returns from fishing. In addition, the non-pecuniary benefits fishers receive from lifestyle factors associated with fishing are not included in the calculation of economic return. As these non-pecuniary benefits are likely to be considerable, the true return to fishers from commercial harvesting of the resource, and the amount of economic rent in the fishery, may be higher than is reported in Tables B4.17 - B4.20.

It is assumed that fishers would at least be making a normal return on their investment in the resource over the long run if they are choosing to stay in the industry, and/or they are making considerable pecuniary benefits from activities outside fishing that they are using to subsidise their fishing activities.

If people earning negative pecuniary returns stay in the industry then they must be at least obtaining non-pecuniary benefits equal in size to their perceived losses. Further, those fishers earning positive returns could be assumed to be receiving similar non-pecuniary rents equal to the size of the average perceived losses of those fishers with negative returns.

For society as a whole it is desirable that the efficiency with which fishers harvest the resource is at a maximum, and, hence, that the total cost of harvesting the resource is minimised and returns are maximised. This implies that the highest possible net return from harvesting of the resource would be achieved, and, hence, economic rent would be generated from the resource. However, in order for resource rent to be realised in a fishery, discrete property rights over harvesting of the resource need to be defined. This has occurred in the Lobster Fishery through: 1. the issue of category 1 shares entitling fishers to commercial use of the resource in perpetuity subject to the terms and conditions of the share management plan, and 2. the issue of ITQs guaranteeing exclusive access to a certain proportion of the total catch available in the fishery (as determined by the TAC Committee).

In a fishery such as lobster, where property rights are clearly defined, rent should be generated from harvesting of the resource if: the TACC is set consistent with existing production technology,

stock abundance, environmental and market conditions; there are not substantial inefficiencies in other components of the fishing business due to limiting factors from regulation on other types of fishing in which the vessel is engaged; and, the quota trading system is operating efficiently.

In the Lobster Fishery, there is evidence to suggest that in many years the TACC was not caught, suggesting that the TACC may have been set inconsistently with existing production technology, stock abundance, environmental and market conditions. In addition, as around 80 percent of businesses with lobster endorsements also hold endorsements in other fisheries, it may be the case that restrictions on inputs used in these other fisheries are a binding factor on the efficiency with which fishers use inputs to harvest lobster.

The inability of the resource to generate economic rent may also be due to slow structural adjustment in the fishery. Slow adjustment may be due to, for example: the reluctance of smaller, less efficient, fishing businesses to exit the industry due to restrictions on transferability and sale of fishing licences; difficultly in selling shares; lack of alternative skills or employment opportunities; the prospect of false starts in new employment; the age structure of the Lobster Fishery; and the psychic costs of changing occupation (and possibly place of living).

As rent is a long-run concept, it is affected by people's perceptions of future net earnings. For example, uncertainty in the fishery over future management decisions, such as the level at which the community contribution will be set, can affect fishers' perceptions of future net earnings from the resource, and hence of economic rent.

If interpreted correctly, share and quota transfer prices can be a useful indicator of the performance of the industry in generating net value or rent. In a study by Hassall and Associates on the ability of lobster fishers to pay a community contribution, operational accounting data indicated less viability than share and quota transfer prices (Hassall and Associates, 1999). In addition, share transfer data for lobster from NSWF and industry sources indicated a strong market correction with reductions in share prices since 1999-2000, but also more frequent and voluminous share sales in 2001 than in previous years (Figure B4.21). Applying Hassall and Associates' method to 1999-2000 share transfer prices indicated there was some rent in the fishery at share prices of $1,200 (or around $1,060 in today's terms). Similarly quota transfer prices indicated minimal rent in 1999-2000 when prices were $7.50 per kilo (or around $6.65 in today's terms). Share and quota transfer prices have reduced since, hence, it is unlikely that economic rent is currently being generated in the fishery (Figures 4.20 and 4.21).

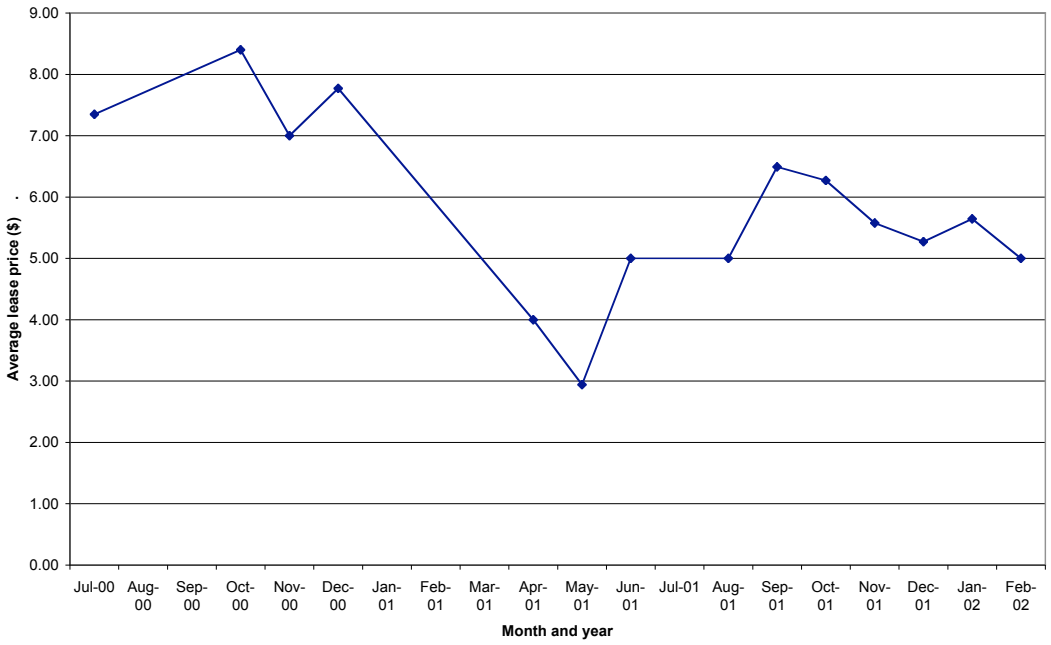


Figure B4.22 The seasonal market price of quota 2000-2001

(Source: NSW Department of Primary Industries Fisheries Licensing database, 2003; Don Moore, Newcastle Marine Brokers, pers. comm.).

B4.4.5 Community contribution

Economic return, as defined in Tables B4.17 -B4.20, is often used as an indicator of the economic rent available in the fishery that can be extracted from the fishery and returned to the community. As fish resources belong to the community, a charge to commercial fishers for use of the resource is a means through which some of the exclusive benefits fishers derive from commercial harvesting can be returned to the community. As such, the price paid under a community contribution would be no different from the price paid for any other input used in catching and delivering fish to market (ABARE, 1990).

A community contribution is based on the premise that if a natural resource is well managed it will be generating a return over the long run that is in excess of normal returns[12]. It is necessary for an open access resource such as a fishery to be managed through government intervention, such as through the creation of property rights and restrictions on total allowable catch, in order to correct for market failure and externalities that may result in overfishing. Market failure results because fishers do not have the incentive to conserve as no one person owns the resource, hence, no one person derives benefits from restraint. Externalities are the costs fishers impose on others that are not taken into account in their activities.

Excess profit, or resource rent, can be extracted from resource users and given to the community in return for privileged access to a community owned resource. However, intra-marginal-rents, i.e. those rents that are attributable to a firm's investment in its products, such as training and marketing (including value-adding) should be left with the company in order to continue to encourage them to make such investments. In order for the resource rent charge not to create perverse incentives,

[12] Where normal returns are the returns that are necessary to keep labour and capital engaged in fishing, and include a return on skills.

the return on invested capital expected by the firm, given the level of risk associated with the exploitation activity and the firms risk preference, needs to be known. If the resource rent charge were to apply to profits earned below this rate of return, firms would under invest in the exploitation activities, reducing the potential economic benefit of the resource. Conversely, if the resource rent charge were to apply to profits earned above the firm's discount rate, firms would over invest in the exploitation activities to stay below the threshold rate, again reducing the potential economic benefit of the resource (Garnaut and Clunies Ross 1979).

As risk preferences are difficult to ascertain, the level of the community contribution should be set so as to balance the requirement to extract the resource rent and the prevention of perverse investment outcomes (Fraser 1993).

Figures presented in Tables B4.17 – B4.20, indicate that economic rent is low, or non-existent in the Lobster Fishery. Hence, on this basis, fishers are likely to encounter difficulties in paying a community contribution under the current circumstances. However, as mentioned in Section B4.4.4, several factors, including possible bias in the data used to calculate economic return introduced through the survey methods, and the non-pecuniary benefits often derived from commercial harvesting of the resource, means that the net return estimates presented in Tables B4.17 and B4.20 may not be a true reflection of the actual rent available in the Lobster Fishery. Although, as share prices are also below a level where it would be reasonable to assume economic rent is being generated from the resource, it is likely that there is currently no rent being realised from commercial harvesting of the lobster resource (Figures B4.21 and B4.22).

An assessment of the economic performance of the Lobster Fishery, made in 1999 by Hassall and Associates found that there was theoretical justification for the implementation of a community contribution to redistribute economic rent from shareholders in the Lobster Fishery to the general community. However, when determining that there was theoretical justification for the introduction of a community contribution, annual net revenue for shareholders was implied using share prices of between $1800-2400. Such prices for shares have not been maintained over recent years.

In response to current concerns about the capacity of lobster fishers to pay a community contribution, the Government has agreed to set the community contribution at $100 per shareholder per year for three years commencing 2004-05 (CPI adjusted to $109 for 2004-05). An economic review of the fishery is to be undertaken during this time, to determine the likely increase in economic return that could be expected to be generated from the fishery over the coming years, as well as the most appropriate base on which to set a community contribution.

In order to estimate economic returns, and hence, resource rent in the Lobster Fishery, a reliable set of cost and earnings data would need to be available and the firms discount rate would need to be known. In addition, this data would need to be available over time, in order to determine how economic returns in the fishery have changed. In addition, the appropriate amount of rent that should be collected by the government on behalf of the community, and that which should be left with industry as a return on skills etc., would need to be determined.

Once the appropriate level of resource rent is determined, a charge base for the community contribution must be determined. Whilst it is administratively simpler to charge a community contribution on the basis of beach prices, there are some problems with levying a charge on this basis in so far as that it does not reflect fluctuations in costs, such as increases in input prices. For this reason, a profit based charge may be preferred (ABARE, 1990)

Imposing and administering a resource rent charge involves costs. These costs should not exceed the expected value of the rent that can be appropriated from the resource otherwise society will be no better off.