Socio-economic Impact Study of Proposed Closures in the Eastern Gemfish Fishery

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INTRODUCTION

The eastern gemfish stock experienced a period of poor recruitment from 1986 to 1989 and its biomass is assessed to have declined significantly as a consequence.

Management strategies have been implemented with the aim of reducing the actual catch of eastern gemfish to the lowest possible level and the Total Allowable Catch (TAC) for eastern gemfish has been set to zero since 1993.

For short periods during the spawning season, eastern gemfish form dense aggregations along a narrow depth band of continental shelf and can be readily targeted by board trawling. However, for most of the spawning season eastern gemfish are dispersed in low densities across a broader area of the shelf.

Industry holds quota for other species of fish that are caught during the same season and area as the spawning gemfish. When fishing for species other than gemfish, trawlers may take an incidental bycatch of gemfish.

The Eastern Gemfish Bycatch Working Group (which has members from management, industry and the scientific community) was established by the South East Trawl Management Advisory Committee (SETMAC) in 1993 to examine strategies for managing the bycatch of eastern gemfish.

Until now the bycatch issue has been managed using trip limits. These reduce the incentive for targeting gemfish by preventing the landing of large targeted catches while allowing small incidental catches to be landed rather than discarded. Trip-limits have been criticised by some members of industry because incidental catches in excess of the trip limit must be discarded; and by conservation groups because they allow gemfish to be caught and sold.

An alternative management strategy to trip limits would be to close the fishery or parts of the fishery, during the main spawning run. While closures would undoubtedly reduce the level of incidental gemfish catch and discarding, they have been criticised because of their potential socio-economic impact on industry, which would also be restricted in catching other quota species.

The Eastern Gemfish Bycatch Working Group recommended that a quantitative study of these issues be completed in order to evaluate the likely impact of closures; both in terms of biological benefit to the stock and socio-economic cost to industry.

SCOPE OF STUDY

The study used SEF1 data and market price data provided by the Australian Fisheries Management Authority (AFMA), to quantify:

- 1. The relative biological benefit of a range of options for closing the fishery during the gemfish run.
- 2. The socio-economic impact of the closure options.

TERMS OF REFERENCE

- 1. Identify and develop practical closure options for the eastern gemfish fishery.
- 2. Assess each option in terms of:

the estimated reduction in the kill of eastern gemfish and the benefits thereof to the future recovery of the stock;

the estimated net value of catch directly foregone of other SEF quota species and key non-quota species.

- 3. Based on the above assessment, determine, as compared to current management arrangements, the direct socio-economic net benefits or costs to groups of fishing operators based in key southern NSW and eastern Victoria ports and to SEF operators as a whole.
- 4. Determine a preferred closure option and evaluate the overall effectiveness of this option against current management arrangements, taking into account:

the quantity of gemfish that may be killed

the direct and indirect socio-economic effects

the management costs

the objectives of the Fisheries Management Act 1991.

CONSULTATION PROCESS

Representatives of AFMA were consulted before and after consultation with industry. The three closure options used in this study were developed in consultation with AFMA. The initial consultation defined terms and scope of the study and the specific closure options that should be considered by the study. The later consultation provided feedback on industry reactions and the initial perspective of the consultants with regard to the issues of the study.

Industry was consulted during a series of port visits in July 1995. The ports visited were: Sydney, Wollongong, Ulladulla, Greenwell Point, Bermagui, Eden and Lakes Entrance. At each port a meeting was organised by the Cooperatives, who invited the trawl fishers and drop-line fishers who work out of that port. At each meeting the three closure options suggested by AFMA were outlined and a series of questions were asked. These meetings were then followed by more detailed discussions with Cooperative managers, individual fishers and other members of the community who were reliant, either directly or indirectly, on the South East Fishery.

Additional, more detailed, quantitative information has been obtained from Cooperative managers and individual fishers.

MAJOR FINDINGS

In the South East Fishery 90% of gemfish reported landed between Lakes Entrance and Barranjoey Point over the months May to September are taken from depths between 250 and 450m.

Gemfish was formerly more than 50% of the annual catch for the SEF in these areas. The reduction of the gemfish TAC to zero has slashed levels of income in the fishery and increased the industry's reliance on other species. Ling is now the most important species being caught in this part of the fishery.

The winter months and depths >200 m are particularly important to the SEF for catching these other species on which they now rely.

Through consultation and analysis, three closure options were identified:

Option 1: June to August closure in depths >200 m - between Lakes Entrance and Barranjoey Point

This option was estimated to result in 60-90% of the annual gemfish catch being avoided. It would result in an approximate 40% loss of income from foregone catches of other species.

In the northern end of the area a June closure usually results in little additional saving of gemfish (1-2% of annual landings in that area), while south of Ulladulla closure during August adds little to the protection of gemfish (in Ulladulla <1-7% of annual landings in that area). However, variability in the timing of the gemfish run means that these extra months of closure would occasionally prevent large gemfish catches.

Option 2: Lakes Entrance to Ulladulla — Closed June and July in depths >200m North of Ulladulla — Closed July and August in depths >200m

This option generally results in a similar level of protection for gemfish as Option 1, with 60-80% of the annual gemfish catch in most areas being avoided. This option would result in an approximate 30% loss of income from foregone catches of other species.

While generally offering a similar level of protection for gemfish as Option 1, this option will occasionally fail because of the variable nature of the gemfish run. Large catches of gemfish have historically occurred north of Ulladulla in June and south of Ulladulla in August. If closures are implemented any significant occurrence of gemfish outside of a closed area is likely to become a high profile event.

Option 3: Rolling Closures

On paper this option provided the best results with 60-80% of the annual gemfish catch in most areas being avoided and an approximate 25% loss of income from foregone catches of other species.

However, the actual impact of this option is difficult to forecast. Its effectiveness in protecting gemfish will depend on a rapid response to some predetermined trigger and industry is extremely sceptical that such an arrangement can be realistically made to work.

Socio-economic Impact of Closure Options

The direct impact of all closure options will be greatest in the north of the SEF, where operators are most dependent on winter catches. In the south there is less seasonal pattern to catches of gemfish and other species. Consequently, closures have less impact in terms of reducing annual gemfish landings and on annual income.

The northern part of the fishery, where reliance on gemfish was greatest, has been most heavily impacted by the reduction of gemfish TACs. It is consequently the area of the fishery in the worst financial situation at this time.

The reduction of the gemfish TAC to zero has halved SEF income in the study area since the late 1980s and the industry and its supporting infrastructure are in an extremely poor financial state. Much of the infrastructure was developed around economies of scale that depended on the tonnage of gemfish. This has made restructuring in the wake of reduced gemfish catches extremely difficult.

Analysis of the financial status of the Cooperatives of Wollongong and Bermagui indicates that cutting the annual income from the SEF by 15% will result in their failure. The survival of the Ulladulla Cooperative would depend on the strength of the tuna season. If gemfish closures were to coincide with a poor tuna season it would, in all likelihood, fail as well. The failure of these facilities would have a major additional impact on the profitability of all existing fishing operations. In the other Cooperatives and fish handling facilities winter closures would result in loss of profitability and employment.

The impact of closures on individual fishing operations is harder to predict because of the variation in personal circumstances. However, many of the findings concerning the Cooperatives can be applied to individual operators. A further loss of income of 15% will drive some operators into insolvency.

Summary Table & Figures

See Tables 3, 4 &5 and Figures 5, 6 &7.

Key Statements from Consultation

Industry opposition to any form of closures during the three winter months (June, July and August) was vehement. Right across the fishery there was unanimous agreement that implementation of closures was tantamount to shutting the fishery down entirely. Most of the fishers were not interested in hearing what the closure options were, and were not prepared to discuss them.

The view frequently advanced was that if the state of the gemfish stocks was poor enough to warrant winter closures the industry should be closed entirely and compensated accordingly.

Industry consistently stated the importance of the three winter months, June, July and August, a period that can produce up to 50% of annual incomes.

The impact of closures for the wider community will be particularly severe south of Ulladulla because in that area fishing is one of the few sources of income through the winter, which is the off-peak season for tourism.

CONCLUSIONS

All the closure options investigated have severe socio-economic repercussions for the SEF industry in NSW and eastern Victoria. Given the recent history of this section of the SEF fishery, and the loss of gemfish as its main source of income, any successfully implemented closure option will cause some Cooperatives and operators to fail financially.

For this reason, industry is extremely threatened by the proposal of closures. Managers should expect a backlash if they proceed with any of the closure options. This will severely undermine the constructive relationship developed in recent years between industry and managers, and have a deleterious effect on the management of the SEF, which in the long run may outweigh any short term gains in terms of avoided gemfish catch.

Given that monitoring of gemfish landings in 1995 continues to show evidence of increased recruitment following the poor year classes of 1985 through 1989, and that this improvement in recruitment has occurred despite a continuing low level of accidental catching, there is no reason to believe that the current low level of accidental catching will threaten the continued recovery of the eastern gemfish stock and no justification for the socio-economic impact that will accompany closures.

The gemfish run is extremely variable between years. This will make effective implementation and enforcement of anything other than a complete winter closure (June - August) extremely difficult and costly. Managers should count on Murphy's Law applying: gemfish will occur unexpectedly outside closed times and areas. In the event of closures being implemented the atmosphere surrounding any mismatch between closures and gemfish occurrences will be irrational and emotionally charged. If closures are implemented, managers will need to think carefully about how such a situation will be handled.

With a zero TAC on gemfish preventing targeted fishing the control of the gemfish bycatch currently relies heavily on the goodwill of industry in avoiding areas where gemfish may be expected. This goodwill should not be relied upon if closures are implemented.

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SECTION ONE: INTRODUCTION

In Australia the eastern gemfish stock experienced a period of poor recruitment from 1985 to 1989 and its biomass is assessed to have declined significantly as a consequence.

Management strategies have been implemented with the aim of reducing the actual catch of eastern gemfish to the lowest possible level and the Total Allowable Catch (TAC) for eastern gemfish has been set to zero since 1993.

For short periods during the spawning season, eastern gemfish form dense spawning aggregations along a narrow depth band of continental shelf and can be readily targeted by board trawling. During the remainder of their spawning season, however, eastern gemfish are dispersed at low densities across a broader area of the shelf.

Industry holds quota for other species of fish that are primarily caught during the same season and area as the spawning gemfish. When fishing for species other than gemfish, trawlers may take an incidental bycatch of gemfish.

The Eastern Gemfish Bycatch Working Group (which has members from management, industry and the scientific community) was established by the South East Trawl Management Advisory Committee (SETMAC) in 1993 to examine strategies for managing the bycatch of eastern gemfish.

Until now the bycatch issue has been managed using trip limits. These reduce the incentive for targeting gemfish by preventing the landing of large targeted catches while allowing small incidental catches to be landed rather than discarded. Trip limits have been criticised by some members of industry because incidental catches in excess of the trip limit are still being discarded; and by conservation groups because they allow gemfish to be caught and sold.

An alternative management strategy to trip limits would be to close the fishery or parts of the fishery, during the main spawning run. On the surface closures appear certain to reduce the levels of incidental gemfish catch and discarding, but they have been criticised because of their potential socio-economic impact on industry. One impact would be a restriction in the fisher's ability to catch other quota species.

The Eastern Gemfish Bycatch Working Group recommended that a quantitative study of these issues be completed in order to evaluate the likely impact of closures; both in terms of biological benefit to the stock and socio-economic cost to industry.

SCOPE OF STUDY

The study used SEF1 data and market price data provided by the Australian Fisheries Management Authority (AFMA), to quantify:

- 1. The relative biological benefit of a range of options for closing the fishery during the gemfishrun.
- 2. The socio-economic impact of the closure options.

DESCRIPTION OF THE SOUTH EAST FISHERY

General Description

The eastern gemfish (*Rexea solandri*) is just one of the species fished by the multi-species South East Fishery (SEF). The SEF extends down the eastern seaboard of Australia from Barranjoey Point, New South Wales, and to the west, almost as far as Kangaroo Island, South Australia. Its fishers use a range of techniques; principally demersal board trawling, Danish seining and baited hooks. At the present time the major gear sector in the SEF is board trawling.

The north-eastern sector of the SEF between Barranjoey Point and Flinders Island (Eastern Sections A & B), can be considered a distinctive bio-geographical area within the broader fishery. It is also the area in which the gemfish run occurs and is the subject area of this study. The species fished in this area can be somewhat arbitrarily subdivided into shallow water (<200m) and deep water (>200m) species. The shallow waters are fished for inshore and continental shelf species such as flathead and morwong. The deeper water (>200m), at the edge of the continental shelf and down the shelf slope are fished for species such as gemfish, ling, mirror dory, spotted warehou and blue warehou.

The productivity of this area is enhanced by the Sub-tropical Convergence, or Tasman Front, which is formed by the mixing of warm, nutrient poor waters of the shallow Eastern Australia Current, which flows from the north, and the cold, relatively nutrient rich waters of the deeper Sub-Antarctic Intermediate Water Mass.

The convergence oscillates north and south with the seasons. In summer and spring the area of enrichment reaches its southern limit in the latitudes of Tasmania; the winter/autumn, or northern, limit is around the latitudes of southern NSW.

In the SEF the northward movement of the Sub-tropical Convergence up the NSW coast in winter is associated with a seasonal enrichment of the continental shelf. Many species of marine life take advantage of this phenomena to spawn and feed. Catches of a wide range of species increase and reach the northern limit of their range at this time of year.

Gemfish

The eastern Australian gemfish is one of the species to take advantage of the seasonal enrichment in this part of the SEF. It is a highly mobile, carnivorous fish living its adult life in depths of 400-500m. Gemfish annually form large aggregations which move northward, feeding and breeding, along the shelf break in synchrony with the sub-tropical convergence.

During the summer months relatively small numbers of juvenile eastern gemfish are caught in a wide range of depths along most of Australia's south-eastern coast — between Newcastle, NSW, and the southern shelf off south-eastern Tasmania. More than 90% of gemfish caught, however, are reported landed during May - September, having been taken from depths of between 200m and 450m (Figure 1). The main fishing areas are north of Flinders Island (40°S).

The gemfish season is preceded each year by gradually increasing catch rates of subadult fish over the southern part of the winter fishery (Figures 2& 3). The winter catch is primarily sexually mature fish that, through the season, are sporadically participating in spawning behaviour. The fishermen call this the 'winter run' or 'main run'. It begins in the south (Lakes Entrance - May/June) and moves northwards (Sydney - July/August). In some years a later run of maturing sub-adults may provide smaller but significant













catches in September. This is called the 'back run', because it begins in the north and builds as it moves southward.

Historically, at Bermagui and Ulladulla the main winter catches have occurred relatively consistently in June and July. Annual variability in timing of the season is greatest at the northern and southern margins, with significant catches sometimes continuing into September off Sydney, Eden and Lakes Entrance.

The SEF has evolved rapidly during the last 20 years, as fishing techniques have been developed and management regulations introduced. Prior to the 1970s the SEF had mainly fished for shallow water species over the continental shelf. In the early 1970s participants in the demersal trawl fishery learnt how to target the winter aggregations of gemfish on the shelf break. This led to a rapid escalation of gemfish landings and the development of a fishery for a wide range of shelf break and slope species. In the late 1980s the discovery of orange roughy in deep water along the shelf slope lead to a further expansion of fishing activity in the deeper waters of the SEF.

Monitoring of the size composition of gemfish catches in the late 1980s indicated that the stock was experiencing a period of poor recruitment which, together with the impact of fishing, was causing a decline in stock abundance.

In 1988 a competitive TAC was introduced in the eastern gemfish fishery to limit landings and the season was closed when landings exceeded 3 000t. In 1989 Individual Transferable Quotas (ITQ) were introduced for eastern gemfish and in 1991 and 1992 for all other 15 SEF quota species. At that time gemfish and orange roughy comprised the major landings from the broader SEF fishery; gemfish from Eastern Sectors A & B and orange roughy principally from other sectors.

Since the introduction of ITQs, catches of gemfish and orange roughy have been substantially reduced. As the contents of this report demonstrate, the importance of these two species is now greatly diminished. This has caused major restructuring within the SEF industry and changed targeting practices. This changing nature of the fishery forms the background of this analysis. Consequently, it is difficult to describe the nature of the industry and 'typical' landings patterns in order to predict the future impact of possible changes to management.

Continued monitoring of gemfish landings up to and including the 1995 season indicate that, following the years 1986 through 1989, recruitment has improved despite a continuing low level of accidental catching.

 1978 Annual Catch 5 200t 1987 Annual Catch 4 200t 1988 TAC of 3 000t introduced; reported landing, 3 500t. 1989 ITQs introduced for gemfish. TAC of 3 000t; reported landing, 2 300t. 1990 TAC of 1 750t; reported landing 1 200t. 1991 TAC of 500t; reported landing 560t. 	1970	Annual Catch 200t
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	1991	TAC of 500t; reported landing 560t.
1992 TAC of 200t; reported landing 570t. ITQs introduced for 15 other quota species.	1992	TAC of 200t; reported landing 570t. ITQs introduced for 15 other quota species.
1993 TAC = 0; 200kg Trip Limit; 36t Research Quota; reported landing 270t.	1993	TAC = 0; 200kg Trip Limit; 36t Research Quota; reported landing 270t.
1994 TAC = 0; 200kg Trip Limit	1994	TAC = 0; 200kg Trip Limit

Table 1: Chronology of the Gemfish fishery (Tilzey, 1994)

SECTION TWO: METHODS

The methodology used in this study can be divided into two categories. Firstly, the study assessed the relative biological benefit of a range of options for closing the fishery during the gemfish run. Secondly, the socio-economic impact of closures was assessed.

Representatives of AFMA were consulted before and after consultation with industry. The three closure options used in this study were developed in consultation with AFMA. The initial consultation defined the terms and scope of the study, including the specific closure options to be considered. The later consultation provided feedback on industry reactions and the initial perspective of the consultants with regard to the issues of the study.

The relative biological benefit was estimated in terms of the likely gemfish catch that would have been avoided under a range of closure scenarios in four previous years. This was determined by quantifying historical spatial and temporal profiles of gemfish landings during those seasons and applying the closure scenarios to estimate, in percentage terms, the level of the annual catch that would have been prevented.

The socio-economic impact of differing closure scenarios was estimated in absolute (dollars of income foregone by the industry) and relative terms (percentage of annual income foregone).

The socio-economic impact of the differing closure scenarios was estimated by first quantifying the spatial and temporal profile of landings of other species during the selected gemfish season. These profiles, together with data on current market prices (gathered by ABARE), were then used to estimate the direct cost to industry in foregone catch under each closure scenario. This direct cost can be used to assess the indirect cost of alternative management strategies through the loss of the multiplier effect, and the reduction of throughput, on existing levels of fish processing infrastructure.

CONSULTATION PROCESS

Industry was consulted during a series of port visits in July 1995. The ports visited were: Sydney, Wollongong, Ulladulla, Greenwell Point, Bermagui, Eden and Lakes Entrance. At each port a meeting was organised by the Cooperatives, who invited the trawl fishers and drop-line fishers who work out of that port. At each meeting the three closure options suggested by AFMA were outlined and a series of questions were asked. These meetings were then followed by more detailed discussions with Cooperative managers, individual fishers and other members of the community who were reliant, either directly or indirectly, on the South East Fishery.

Additional, more detailed, quantitative information has been obtained from Cooperative managers and individual fishers.

The following list of questions were asked at each meeting:

1. What are your views on the state of the South East Fishery and the proposed closure option? 2. Specific catching issues. a) What is the importance of the months of June, July and August to the fishery in terms of catch and cash flow? b) What is the importance of inshore areas (up to 200m) versus the offshore areas (greater than 200m)? c) List the species associated with gemfish (quota species and non-quota species). d) If there were strip closures, would you travel to other ports? 3. Questions regarding marketing. a) Where are the fish sold? b) Describe any price fluctuations. c) Impressions of demand and supply (if one area is shut will a price increase compensate?) 4. Questions regarding infrastructure. a) What is the size of this Cooperative and what other groups besides trawl fishers use its facilities? b) Identify the source of spending i.e. local, within the cooperative and outside. A list of questions was presented to the Cooperative managers:

1. What is the annual throughput?

2. What percentage of this comes from the continental shelf in the months of June, July and August?

3. What is the percentage and importance on non-quota species in the months of June, July and August?

4. What spending is local and what is outside?

a) ice b) fuel c) equipment d) maintenance e) slipping f) payments to non-company boats?

ECONOMIC ANALYSIS

The following analysis is based on historical catch data supplied by AFMA and market price data supplied by ABARE. These data apply to the period 1986 to 1994 and cover the 16 SEF quota species as shown in the appendices of this report.

Data interpretation

In conducting this analysis, the consultants were obliged to make a number of assumptions, the most significant of which are outlined in this section. In addition, the consultants were made aware of a number of factors which, although they elude firm quantification, are worth noting as part of the interpretive process. These factors, outlined below, were largely brought to our attention during the port visits conducted as the first stage of this project.

Price data

The price data used in the economic analysis was gathered from prices published by ABARE in the 'Australian Fisheries' magazine for the 16 SEF species for both the Sydney and Melbourne markets. These were average monthly prices for each species

An additional price data set was supplied electronically by ABARE for this analysis. This contained a breakdown of all species sold in both markets, by product form (headed, gutted, etc.), by month, by sale price (per kg), for the financial years 1991/92, 1992/93 and 1993/4. An incomplete set for 1994/95 was also provided.

Preliminary work with this data set revealed a number of formatting inconsistencies and data omissions, such as market indicators and processing codes. As a result, this data set would have required a significant amount of formatting and adjustment before it could be used in the analysis. The time constraints placed on this project precluded such work.

In any event, any final data set from such preparatory work would have been presented as an average monthly price for each species. Given that the alternative data set originated from the same source, it was felt that it would provide sufficient accuracy to represent both the value of the recorded catch and, of equal significance, the relative proportion of the winter catch value with respect to the annual catch value.

The price data used relates to the 1994 calendar year. In collating this data, values for two months of missing data (February and October) were calculated by taking a weighted average of the prices and quantities for each species from the adjacent months. The weighted average was used to correct for short term inconsistencies, such as an increase in supply, depressing prices, or vice versa.

A full list of prices by species, market and month is shown in Appendix A of this report.

Veracity of price data

The data used in this analysis was average market prices for the Sydney and Melbourne Fish Markets. While this will provide an analysis consistent with much of the previous work conducted within the fishery, there are some factors for consideration which emerged principally from the port visits.

Fishers in practically every port indicated that trawl activities in the SEF are becoming increasingly sophisticated. This applies to both species targeting and marketing. The fishers indicated a broad shift away from the traditional high volume approach to operating a profitable trawler in the fishery. In the regulatory induced absence of "big ticket" catches, such as gemfish and orange roughy, the fishers now tend to "play the market". They do this by specifically targeting or avoiding species, depending upon short term market prices, short term supply and regulatory impositions in place at the time. As a result, many of these fishers believe that average market prices will understate the true value of their individual catches.

The allocation of either Sydney or Melbourne prices to the various ports was based on interviews with Cooperative managers. In some cases this delineation was clear (i.e. Sydney/Wollongong) while in others the consultants found it necessary to rely on the experience of the Cooperative managers and their historical records.

Another factor considered was the sale of high volume species to processors, particularly in the period preceding TACs and other regulatory mechanisms. While the volumes handled by the processors was significant in these times, interviews with past and present processors indicated that the price paid by them paralleled the prevailing market prices. This was supported by the fishers themselves, who stated that they alternated between the central market and the processor to avoid an over-supply to either, a situation that would devalue prices. Accordingly, the price data supplied by ABARE has been deemed indicative for both points of sale.

Catch data

The catch data used in this analysis was supplied by the Australian Fisheries Management Authority (AFMA) with the cooperation of the Bureau of Resource Sciences (BRS). This data consisted of individual trawl shots from Eastern Sectors A & B for sixteen of the commercial species that are subject to management within the SEF.

These are:

Blue Eye Trevalla	Mirror Dory
Blue Grenadier	Ocean Perch
Blue Warehou	Orange Roughy
Flathead (Tiger)	Redfish
Gemfish	Royal Red Prawn
Jackass Morwong	School Whiting
John Dory	Silver Trevally
Ling	Spotted Warehou

The data covered the years 1986 to 1994. Information contained in the data set supplied included:

Target (i.e. Was the catch a result of a targeted shot?) Method (i.e. trawl, line) Year Month Day Hour Latitude Longitude Shot number Zone Depth (50 metre increments) Species code Catch Weight Effort Catch per unit effort (CPUE) This data was supplied in full to allow the research team full latitude for an interpretive analysis. The first stage of this analysis was to identify a specific series of parameters which reflected a number of factors, including (in relative order of importance):

- The key patterns of the historical eastern gemfish catch.
- Closure boundaries that would maximise the avoided kill for eastern gemfish.
- The key biological and physical factors that determined historical trawl grounds.
- Latitudinal closure boundaries that reflected fishing effort by port of origin and point of catch landing.
- Other spatial closure boundaries deemed enforceable by fishery managers should closures be pursued.

An initial screening of the data for two years chosen at random (1986 and 1988) revealed that in excess of 90% of eastern gemfish catches were recorded in water depths of 200 to 450 metres. In addition, this catch occurs in the winter months of June, July and August as a defined peak over a short time. A second identifiable catch peak, corresponding with the so called "return run" of gemfish, was also often present. This peak does not uniformly occur during the winter months and was considerably smaller than the main catch peak.

As a result of this screening process, and after consultation with the fishery managers (including enforcement personnel), the first set of analysis parameters were identified. These were that the analysis of closure options would focus on an area ranging from 33° 35' S to 40°S, in waters >200m, for the months June, July and August.

Veracity of catch data

The catch data used for this project are the SEF1 logbook entries, supplied by the fishers. The consultants have no option other than to accept the veracity of this data however, a number of points should be noted.

The geographical information system (GIS) Map Info, which formed the basis of the mapping process utilised during this study, revealed that a number of recorded shots for SEF species may have been erroneously recorded — small number of shots actually appeared inland during the GIS mapping process. Also worthy of note were a number of shots that appeared to be in shallow water not usually associated with the mid to deep water species.

Some sources also indicated that many fishers view their role in the SEF logbook scheme with increasing suspicion. That is, there is growing scepticism among fishers that the logbooks are being used as pseudo policing instruments — and not merely as objective, scientific records of catch histories. It was not considered appropriate by the consultants to offer an opinion on the accuracy of these suspicions during the interview process or in the compilation of this report. However, it should be noted that the potential exists for a discrepancy between actual and recorded catches, especially in more recent years and specifically with respect to bycatch records of eastern gemfish.

Not withstanding all of the above, neither of these points are likely to significantly affect the analysis of the economic impact of the closure option for this report. This is due to a number of factors, including the large size of the original database in comparison to the small number of erroneous spatial records, and to the reliance this study has placed on trend data rather than absolute values.

It should be noted, however, that this analysis excludes catches of SEF quota species made in depths <200m (mainly redfish, morwong and flathead). This exclusion of data partly reflects the focus of this study on the shelf fishery, but was principally determined by the difficulty of estimating catches from the shallower area. Statistics are

gathered for these areas by both Commonwealth and State authorities and some degree of double reporting and misreporting is known to contaminate these data. Some of this known misreporting, whereby deep water species are reported as being caught inshore within State jurisdiction, will in fact counteract overstatement of the impact of closures.

It should also be noted that this analysis does not consider the catch of non-quota species. An exhaustive analysis of all species (more than 100) caught in the SEF was beyond the scope of this time limited study.

The exclusion of these data will cause this study to overstate the impact of all closure options to some extent. The level for potential overstatement will be determined by the level of income the fishery derives from shallow water quota and non-quota species, and their seasonal catch profile.

Estimates of the contribution of shallow water quota species to overall income levels ranged from 5-10% in the north of the study area to 15-30% in the south. Non-quota species have been historically a relatively minor part of the catch, although their importance is growing rapidly (nearly 20% of total SEF catch in 1994). Appendix H contains an analysis of data provided by operators for individual boats and by Cooperatives the analysis shows that the seasonal trends described by this study is apparent if total landings, including shallow water quota species and non-quota species, are used.

Consequently the exclusions of these data is not considered likely to substantially alter the veracity of this study's findings. The major impact that excluding these data is likely to have on this study is to cause the level of foregone income to be under-estimated, perhaps by as much as 25-35%. However, estimates of seasonal trends in catch and the relative importance of the seasons are unlikely to be affected.

Analysis years

Having determined all the necessary filtering parameters for the analysis, the next stage was to apply the processes to historical data. The years 1986, 1987, 1990 and 1994 were chosen as a sample set for this analysis. The choice of these years was made in an attempt to capture a series of trends.

The first of these is the variability between years in the consistency and timing of eastern gemfish catches. This variability and its significance was highlighted by the fishers during the port meetings. In choosing four sample years across 9 years of data, and in having two adjacent years, the analysis is designed to test the anecdotal evidence supplied by the fishers.

The second key reason for the choice of sample years was to examine a number of perceived changes within the fishery as a result of management options, both past and present. Each of the four years chosen represents a different stage of the evolution of management of the fishery, ranging from a basically unregulated industry (1986) to the present quota and catch limit situation (1994).

This is designed to allow the analysis to include consideration of a number of factors raised by the fishers. These include:

- The diminished financial worth of the fishery (to the fishers), which has resulted from existing regulatory impositions.
- The change in fishing effort since gemfish restrictions were imposed and tightened.
- The resulting perceived inadequacies and financial impositions of a quota system that was allocated on a catch history slanted towards high gemfish effort, and which was subsequently applied within a regulatory regime designed to preclude gemfish catches.

All of these factors were specifically highlighted by the fishers as important to the integrity of an economic analysis of closure options.

Closure options

Through consultation with AFMA a set of three hypothetical closure options were developed, upon which a retrospective analysis would be based. These are:

<u>Option 1</u> A full closure of Eastern Zone A and Eastern Zone B during June, July and August.

<u>Option 2</u> Separated closures designed to reflect the known northerly shift of gemfish catches through winter. A southern portion of the fishery would close in early winter and a northern section would do so in late winter. The actual agreed closure boundaries for this option are outlined below.

<u>Option 3</u> A "rolling closure" in which individual ports or latitude bands would be closed as recorded gemfish bycatch landings increased beyond a predetermined "trigger" threshold. As with Option 2, the methodology for this option is outlined below.

Closure boundaries

This analysis has been performed for Eastern Zones A&B of the SEF between its northern boundary, 33° 35' S, and a southern boundary arbitrarily defined for this study as 40°S (Figure 4).

This southern boundary has been chosen in the interests of unambiguous policing:

- 1. The winter (May-September) run of gemfish begins north of 40°S.
- 2. A southern boundary of 40°S is unambiguously to the north of St Helen's Hill, an important orange roughy fishing ground previously prone to misreporting of fishing activity. This was considered sufficient reason for choosing a more northerly definition of the southern boundary.

The fishery was further subdivided north-south into 5 areas on which to base the analysis of the 3 closure options. An analysis was conducted on recorded shots of all quota species to define these boundaries. This mapped shots by location rather than catch weight. The resulting location maps identified clearly and consistently discernible breaks in the pattern of trawl shots. These, in combination with port locations, were used to identify boundaries for five areas for closure options 2 and 3.

These areas have been named after principal ports of landing in each area:

- Sydney 33° 35' 35°S
- Ulladulla 35° 36°S
- Bermagui 36° 36° 54' S
- Eden 36° 54' 38° 30' S, > 149° E
- Lakes Entrance 38° 30' 40°S : 148° 19' E 149°E

The ports of Sydney and Wollongong were grouped as the one because their trawl grounds appear contiguous.

Option 1 - Full winter closure, all ports

Having established the broad parameters of the analysis, the data sets for all species were then filtered into shots by year and season, by catch method (trawl), by latitudinal band and by depth band (>200). This data set is used as the basis for the examination of Option 1, a full winter closure of all areas.



Option 2 - Southern closure during early winter, Northern closure for late winter

From this point, the preliminary findings were examined to determine a north-south delineation upon which the Option 2 analysis could be based. The separation arrived at involved closing the Ulladulla, Bermagui, Eden and Lakes Entrance areas for June and July, and the Sydney area for July and August. The main criteria for this selection was to devise an option that would best serve the original intention of the proposed closure options — avoiding gemfish landings. An additional consideration was a perceived equity issue between ports. That is, Option 2 closes all areas for a uniform period of two months in winter.

Port visits made during the initial investigation for this report revealed a level of perceived bias in previous management approaches. Some groups of fishers felt they had been "singled out" or discriminated against by prevailing management approaches; and this subsequently created a backdrop of antagonism towards both managers and other ports. Without commenting on the validity of these perceptions, this report points out that each of the proposed closure options will rely on a degree of cooperation from the fishers. To this end it is felt that an equity consideration, which can be included without compromising the integrity of the closure option, may be of legitimate benefit to the managers.

Option 3 - Rolling closures

While definite closure "triggers" were not stated by management, or codified in this report, the analysis contained below was conducted to capture the essence of this option. That is, to minimise gemfish landings while imposing the minimum disruption to the fishing effort directed towards other species.

The broad methodology for the third closure option was agreed to in preliminary discussions with the fishery managers. This was to be a series of so called "surgical" closures of defined areas dependent on landings of Gemfish bycatch. Under Option 3, bycatch landings would be monitored on a routine basis. Once landings exceeded a predetermined "trigger" of a set weight and frequency in a set time period, the grounds where they were caught would be closed to allow the gemfish aggregations to pass.

In order to maintain consistency between the three options discussed in this report, the defined port boundaries for Options 1 and 2 were used in the Option 3 analysis.

The timing and duration of the closures in Option 3 were determined from a retrospective analysis of gemfish catches by time, weight and location, with consideration being given to rises in the average catch weight per shot for these catches (Table 2). For the purpose of this analysis the trigger was defined for 1986, 1987 and 1990 as half monthly landings exceeding 10 tonnes, or catch rates exceeding 500 kg per shot. Trip limits were used during 1994 capping recorded catch rates and landings consequently reduced half monthly triggers of 2 tonnes and 150kg/shot were used for 1994.

	Early June	Late June	Early July	Late July	Early August	Late August
1986						
Sydney						
Ulladulla						******************************
Bermagui						
Eden						
Lakes Entrance						
1987						
Sydney						
Bermagui						
Eden						
Lakes Entrance		8 8				<u></u>
1990						
Sydney						
Ulladulla						
Bermagui						
Eden						
Lakes Entrance						
1994						
Sydney						
Ulladulla						
Bermagui						
Eden						
Lakes Entrance						

Table 2: Schematic representation of Closure Option 3 (Triggered rolling closures).

Shaded area indicates period of closure.

PRESENTATION OF RESULTS

The results of the final analysis are presented on a port by port basis for the years chosen. The results are also separated to show specific results as they relate to gemfish and non-gemfish catches.

The findings for gemfish have been largely interpreted for avoided gemfish catch. In the analysis the amount of gemfish that would not have been caught retrospectively under the closure options has been termed "% gemfish kill avoided" — with a higher % indicating lower amounts of gemfish caught and, therefore, the greater biological benefit. In the discussion the term "biological benefit" is used more widely than "gemfish kill avoided", with greater biological benefit referring to a greater quantity of gemfish

remaining uncaught. The findings for other species together with price data are interpreted for the effective revenue forgone by the fishers and ports. This is the direct economic impact of the closure options on the industry.

Contrasting levels of biological benefit and effective revenue forgone allows the relative merits of each option to be assessed. In order to facilitate this comparison, the original and filtered catch data sets have been manipulated to remove two remaining key anomalies.

The first of these is the impact of applying 1994 gemfish prices to historical catch information. The decline in the gemfish catch since 1986 has seen a significant increase of their average price. What was once a high volume, lower price market has shifted towards a low volume market characterised by increasing prices. The application of recent (high) gemfish prices to the large volume catches of earlier years will overstate both the relative value of gemfish and the average annual income of the fishery in those years. Consequently, unless explicitly noted otherwise, estimates of income foregone for each year are based on 1994 prices and the recorded catch profile for each year, excluding gemfish landings.

A second perceived anomaly in the analysis was the significant recordings of orange roughy in some years and areas. This species is not of major importance to the area being studied — partly because vessels larger than those typical of the study area are primarily involved in orange roughy fishing and partly because the study area is to the north of the major concentrations of orange roughy in Australia. However, in the north of the study area orange roughy dominated landings in late 1990, when an aggregation was discovered off Sydney and initially fished. Occasional large landings are also periodically reported off Lakes Entrance. Neither of these events are considered typical of the study area, but the large size of these catches and their corresponding worth tended to distort the annual income figures for the fishery and thus had the potential to affect the proportional analysis conducted on the winter months. For these reasons unless noted otherwise orange roughy data was also excluded from the analysis results.

SECTION THREE: FINDINGS

RESULTS OF CONSULTATION

This section contains a summary of the port visits held in July 1995. A more detailed account of these meetings can be found in Appendix I.

Views on the State of the South East Fishery

Industry has the general opinion that the state of the gemfish is not as bad as the scientific assessment indicates.

Minority opinions range from an unbridled optimism and complete lack of acceptance that the stock has declined through to a severe pessimism about stock status. But the broadly accepted view is that the stock had declined and is now rebuilding. This opinion is based on the continuing catches of extremely large gemfish and what is perceived to be unprecedented abundances of sub-adult gemfish being observed across the fishing grounds.

Views on Current Management of the South East Fishery

The following four points were raised in every meeting:

- It is impossible to manage a multi-species fishery with ITQs.
- Fishing techniques are continually changing in response to management.
- Continual change in management strategy leads to a lack of security and certainty.
- Trip limits were condemned for forcing the dumping of unexpected catches.

The issue of dumping and high grading was roundly canvassed and condemned. Fishers uniformly question why they are not allowed to bring unintended catches ashore to be surrendered. They are deeply disturbed by the wastage forced by current legislation.

Most fishers felt that industry would use a low TAC to judicially manage incidental bycatches of gemfish, thus avoiding dumping. Current high prices of gemfish favoured managing supply to the market rather than flooding the market with large landings. This view was strongest in the south, where fishermen support a return to low but sensible TACs. It was considered that a sensible TAC level should recognise the actual amount of gemfish being caught each year and not just reported landings.

In the north fishermen favour larger trip limits or end of week closures as management strategies, rather than a return to low allocated TACs. They believe that spelling the trawl grounds is beneficial to catches.

Views on the proposed closure options

Industry opposition to any form of closures during the three winter months (June, July and August) was vehement. Right across the fishery there was unanimous agreement that implementation of closures was tantamount to the fishery being shut down entirely. Most of the fishers were not interested in hearing what the closure options were, and were not prepared to discuss them.

In the northern ports (Sydney, Wollongong and Ulladulla) there was strong consensus that if the situation is serious enough to warrant closures then fishers should be paid out of the fishery. They believe they should be compensated for the closures, as happens overseas. In one port the fishers stressed this as the only closure option, and no other options could or would be discussed. In Eden the fishers questioned the equity of having area closures. They say the length of the gemfish season increases further north. The season is only 2-3 weeks in Lakes Entrance and up to 3 months in Sydney.

Some fishers believe that if areas are closed they will never be opened to fishing again.

In Nowra the wider impacts of closures on the local community were discussed with the Industrial Development Manager from the City of Shoalhaven (this shire includes Greenwell Point and Ulladulla), where tourism is an in important industry, worth \$304 million in 1993. The Development Manager expressed concern at any closures in the fishery. Tourism is a seasonal industry, with little activity in the winter months. As the winter months are the most important to the trawl fishery, a closure in the fishery at this time would have a big impact on the local community.

Having a fishing boat harbour in a town is seen as a tourist attraction in its own right, one that provides an important but difficult to quantify ambience. Tourists expect to be able to buy fresh fish, direct from the boats.

Unemployment is high in the City of Shoalhaven: 25% in October 1994 (45% of which are long-term unemployed). In Ulladulla unemployment exceeds 40%.

Unemployment rates are greater for people over 40. There would be no alternative employment in the region for fishers if the industry was forced to shut down as a result of closures.

The fishers often asked how the closures would be policed, saying that the existing situation (having State waters) isn't being properly policed now. They did not believe lines (north/south or inshore/offshore) could be policed.

The fishers agreed that a "trigger mechanism" to initiate closures would not work. They said fish would be dumped to forestall closures being activated.

Importance of the winter months

All the fishers agreed that June, July and August are their most important months, providing 50% of their income. The winter months are good for ling, now an extremely important species, and most of the other shelf species. During winter there is not much fish inshore, the inshore grounds are summer grounds.

A Wollongong fisher said, "It is not so much the gemfish that are important in these three months, we can't catch them anyway, it is the other species."

Drop-line fishers from Kiama said 75-85% of their annual income comes during these three months.

What is the importance of inshore and offshore areas?

Industry uniformly stated that the shelf is responsible for most of the SEF production.

With the exception of Lakes Entrance the fishers were unanimous that if the shelf were closed during winter, then inshore grounds should also be closed. Any redirection of effort from the shelf into inshore areas during winter would destroy these grounds, which are limited in extent and mainly fished in summer.

In Ulladulla the range of opinions on the importance of the shelf was largely dependent upon boat size — some saying 90%, others 50% or less. One fisher said "If you close from 100 fathoms you may as well close from the shore. Fishing inshore would create a war in the industry as well as widespread ecological damage. This would create more pressure on AFMA from the green groups."

A Wollongong fisher: "In one week the inshore areas would be destroyed, if the shelf was closed."

In Wollongong the shelf provides approximately 70% of income for trawlers. It was higher (75%) before quotas, when gemfish provided approximately 50% of income. Some fishermen hold 90 to 100% of their quota on shelf species. In some cases, there is not enough inshore quota to even cover costs.

The Kiama drop-liners said 100% of their activity is on the shelf, and the same months are important as for the trawl fishery.

A Sydney fisher: "If you can't fish the shelf then the inshore grounds will be destroyed, just like if you close the inshore areas you will destroy the shelf. There would be not enough product inshore to survive. It would be cheaper just to leave the boats tied to the wharf."

In Sydney some boats fish on the shelf 99% of the time. One fisherman said 90% of his fishing was on the shelf, but 100% during June, July and August.

The Industry Development Manager from the City of Shoalhaven expressed concern that trawlers fishing the inshore areas would impact upon recreational fishing, which is presently a major attraction to tourists.

Off Lakes Entrance the inshore areas are more extensive and support a specialised Danish seine fleet. Members of the Danish Seine fleet were less dismissive of the importance of inshore areas. However they noted that the most productive Danish Seine groundsduring winter are in depths >200. Around Lakes Entrance there is also a push by a local land conservation group to close areas of the coast to the three mile limit as a marine reserve. Additional closures would put more pressure on any inshore areas left open.

Travel between ports

In Ulladulla they said 100% of fishermen would travel to other ports "to survive".

Wollongong and Sydney fishers said they couldn't afford to travel to other ports, partly because they do not hold enough quota for more southern species.

In Eden the fishers said effort may increase south of 40°S for the larger boats. But this may not happen due to such factors as bad weather during winter, lack of fish on the east coast of Tasmania during winter, low prices and small market for fish in Hobart and high fuel costs.

At Lakes Entrance the fishers said that south of 40°S is good in January, February and March but after that you wouldn't cover your costs if you travelled.

CATCH TRENDS BY AREA

The results used in the following section on catch trends for each area have been graphed in Appendix B.

Sydney

From the four years analysed (1986, 1987, 1990, 1994) it can be seen (Appendix B: 1) that off Sydney the bulk of annual catches from depths >200m (36-90%) have historically been made from June to September. Historically, 28-48% of the non-gemfish catch has been landed during the period June to August.

By weight, the main species caught on the shelf edge (>200 m) have been gemfish, royal red prawn, redfish, mirror dory, ling, flathead, and ocean perch (Appendix B: 2a-d). Orange roughy were important to declared landings in 1990, when an aggregation was found in deep water off Sydney and fished down.

In 1986 and 1987 gemfish comprised 46% and 75% respectively of annual landings from >200m. The move to zero TACs for gemfish has meant an overall reduction in gemfish landings of 95-98% (Appendix B: 3).

Since these reductions royal red prawn has become particularly important to the area, accounting for 52% of 1994 income (Appendix B: 4). Most of the remainder of the income from his area was derived from redfish (10%), ling (10%), mirror dory (9%), ocean perch (8%) and gemfish (7%).

<u>Gemfish</u>

In the Sydney area gemfish are principally caught in July (Appendix B: 3). But in some years significant catches also occur in June, August and September. The monthly profile of gemfish catches is relatively variable for Sydney compared to Ulladulla.

Royal red prawn

In the Sydney area royal red prawn have been mainly caught from March-June (Appendix B: 5a). For the four indicative years 4-33% of royal red prawn catches were landed during the June-August period.

Redfish

May to September are the main catching months for redfish. During the four indicative years 39-73% of redfish landings from >200m occurred during the months June to August (Appendix B: 5b).

Ling

Since the reduction of gemfish landings the importance in the catch of ling has been growing (Appendix B: 2a-d). Catches of ling are predominantly made during winter, May-August (Appendix B: 5c). June to August comprise 43-73% of landings during the indicative years.

Mirror Dory

Virtually (Appendix B: 5d) all the catch is taken in July - September. In 1986, 1987 and 1990, 65-76% of mirror dory landings were made during the period June to August. Landings were greatly reduced in 1994 and concentrated in October, probably because vessels were avoiding accidental catches of gemfish. Consequently, in 1994 only 29% of the mirror dory was caught during June-August.
Ocean Perch

In the Sydney area catches of ocean perch are made in all months in >200m (Appendix B: 5e). However catches appear higher in the second half of the year. Over the indicative years 27-36% of ocean perch catches were made in June-August.

Ulladulla

The Ulladulla area has a similar catching profile to Sydney (Appendix C: 1a &b), May to September being the period in which the bulk of landings from >200m are made (57-90% including gemfish; 56-82% excluding gemfish). The main species caught are gemfish, redfish, flathead, ling, mirror dory, ocean perch, and royal red prawn (Appendix C: 2a-d). Over the indicative years 30-65% of the non-gemfish catch was taken during June - August.

As with Sydney, gemfish was formerly the most important shelf edge species in Ulladulla, providing 62% and 63% of annual landings in 1986 and 1987 respectively (Appendix C: 2a-d). Since 1986-87 landings of gemfish have declined from 700 - 900t per annum (Appendix C: 3) down to around 15t (a 98% decline).

By 1994 ling was the most valuable species (32%), with mirror dory (16%), ocean perch (15%), redfish (13%) and royal red prawn (9%) most of the remainder (Appendix C: 4).

<u>Gemfish</u>

Principally caught during June and July, some smaller catches from the September 'backrun' (Appendix C: 3). Catching profile is relatively stable over the years.

Ling

In the Ulladulla area the best months for catching ling are generally the months of May to July (Appendix C: 5a). The months June-August account for 28-61% of the ling catches in the four indicative years.

Mirror Dory

Virtually (Appendix C: 5b) all the catch is taken June - September. In October 1994 significant catches were recorded in October but this is not a normal trend. The months June-August accounted for 57-68% of the mirror dory catches in 1986, 1987 and 1990 but only 33% in 1994.

Ocean Perch

Some catches of ocean perch were recorded in all months (Appendix C: 5c). The months June-August account for 22-33% of the ocean perch catches in the four indicative years.

Redfish

June to September are the main catching months for redfish (Appendix C: 5d). The months June-August account for 31-89% of the redfish catches in the four indicative years.

Royal red prawn

Mainly caught over summer and autumn, December - May (Appendix C: 5e). The months June-August only account for 3-17% of the royal red prawn catches in the four indicative years.

Bermagui

For the Bermagui area the main period of catches is May to September, comprising 58-89% of total landings (Appendix D: 1a). In the indicative years used by this study 56-78% of non-gemfish landings were made during these months. The winter months June to August provided 31-56% of the non-gemfish landings (Appendix D: 1b). The main species caught in the Bermagui area have been gemfish, ling, mirror dory, ocean perch and redfish. Significant catches of spotted warehou and blue grenadier are also made in some years (Appendix D: 2a-d).

In 1986 and 1987 gemfish were 53% and 66% of landings respectively. Since 1986-87 landings of gemfish have declined from around 550t per annum down to approximately 14t in 1994, a decline of approximately 98% (Appendix D: 3).

In 1994 ling was the most valuable component (49%) of the catch. Ocean perch (17%), mirror dory (11%), gemfish (10%) and redfish (7%) were the other most important species (Appendix D: 4).

<u>Gemfish</u>

Off Bermagui gemfish are principally caught in June, with lower catches in July from the tail of the main gemfish run and, in some years, further smaller catches from the September 'back-run' (Appendix D: 3). The catching profile is relatively stable over the years.

Ling

Ling is principally caught from May to August. Of the ling catch 35-60% was landed during June to August (Appendix D: 5a).

Ocean Perch

No noticeable pattern to catches, 13-24% landed during June to August (Appendix D: 5b).

Mirror Dory

Mirror dory is principally taken June - September (Appendix D: 5c). In the years 1986, 1987 and 1990, when gemfish were being fished, 52-53% of the mirror dory catch was landed during June - August. Only 19% of the mirror dory catch was landed during this period in 1994, presumably reflecting changed targeting to avoid gemfish.

Redfish

In the Bermagui area June to September are the main catching months for redfish. In the indicative years, 42-80% of the redfish landed from this area were caught in June to July (Appendix D: 5d).

Eden

For the Eden area the main catch period is June to September, in the indicative years accounting for 47-84% of total landings and 47-61% of non-gemfish landings (Appendix E: 1a & b). The months June to August provided 44-52% of the non-gemfish landings in those years.

The main shelf species caught in the Eden area have historically been gemfish, ling, blue grenadier, spotted warehou, mirror dory, ocean perch and redfish (Appendix E: 2a-d).

In 1986 and 1987 gemfish were 55% and 67% of landings respectively. Since 1986-87 landings of gemfish have declined from 800-1200 per annum down to approximately 36t in 1994, a decline of approximately 96% (Appendix E: 3).

In 1994 ling was the most valuable component (31%) of the catch, followed by spotted warehou (21%), blue grenadier (10%), gemfish (10%), ocean perch (7%), mirror dory (4%), and redfish (5%) (Appendix E: 4).

<u>Gemfish</u>

In the Eden area gemfish are principally caught in June, with some lesser catches in July from the tail of the main run. In some years there are further smaller catches from the

September 'back-run' (Appendix E: 5d). The catching profile is relatively stable over the years.

Ling

Ling is principally caught in May and June (Appendix E: 5a). During the four indicative years 33-39% of the ling catch was landed between June to August.

Spotted Warehou

Spotted warehou are principally caught in July and August in the Eden area with 43-97% of landings during the indicative years occurring during June to August (Appendix E: 5b).

Blue Grenadier

In the Eden area June and July are normally the peak months of blue grenadier landings, although in 1990 significant landings were also made during September to November. During the four indicative years 30-75% of landings occurred during June to August (Appendix E: 5c).

Ocean Perch

Little noticeable pattern but catches mainly May to August, 14-21% landed during June to August (Appendix E: 5d).

Redfish

In the Eden area June to September are the main catching months for redfish (Appendix E: e). In the indicative years 1986, 1987 and 1990, 94%, 92% and 95% respectively of the annual redfish catch was taken during the period June to August. However, in 1994 the redfish catch was more evenly distributed over the months July - November and only 28% of the annual landings were made between June and August.

Mirror Dory

Mirror dory is principally taken June - September (Appendix E: f). In the indicative years 43-61% of the mirror dory catch was landed during June - August.

Lakes Entrance

The data for Lakes Entrance are less clear than for the other ports because of this port's involvement in the orange roughy fishery. In the indicative years there is a clear winter peak in total catches which is primarily attributable to orange roughy landings and, to a lesser extent, gemfish landings. These two species should clearly be excluded from this analysis as TACs for both these species have been greatly reduced.

However, an examination of catch trends of species taken in >200m, other than orange roughy and gemfish, shows that in most indicative years landings of other species into Lakes Entrance declined during winter. This undoubtedly reflects allocation of fishing effort away from these species onto orange roughy and gemfish.

Over the indicative years there is little apparent trend in monthly landings of species other than orange roughy and gemfish (Appendix F: 1a-d). The months June to August provided 26-30% of these landings in those years.

The main shelf species caught in the Lakes Entrance area have been orange roughy, blue grenadier, gemfish, ling, spotted warehou and blue warehou (Appendix F: a-d).

Historically, gemfish has not been as important to Lakes Entrance as it has to the ports further north. In 1986 and 1987 gemfish were 14% and 4% of landings respectively (Appendix F: 3).

Excluding orange roughy from the analysis in 1994, blue grenadier (39%) was the most valuable component of the catch, followed by ling (22%), morwong (11%), spotted warehou (6%), gemfish (3%), ocean perch (5%), blue warehou (5%), and mirror dory (4%). (Appendix F: 4)

Orange Roughy

Orange roughy is the major species declared as being caught in the Lakes Entrance area (Appendix F: 2a-d). Catches from this area have been mainly reported between May and August, the season during which orange roughy spawn (Appendix F: 1e). As there is no known spawning site in this area there must be some question over the veracity of these reports.

<u>Gemfish</u>

In the Lakes Entrance area the gemfish run is extremely variable between years. Significant catches can be taken as early as June and as late as October (Appendix F: 3).

Blue Grenadier

This species has been predominantly landed at Lakes Entrance between October and May (Appendix F: 5a). During the four indicative years only 5-14% of landings occurred during June and August.

Ling

Ling are principally caught in August and January, probably as a bycatch of the summer fishery for blue grenadier (Appendix F: 5b). During the four indicative years 17-30% of the ling catch was landed between June and August.

Morwong

Little pattern through the year. Slightly higher landings during summer. During the four indicative years 7-26% of the morwong catch was landed between June and August (Appendix F: 5c).

Spotted Warehou

In the Lakes Entrance area spotted warehou have been principally caught in late winter and early spring, July and September, with 45-93% of landings during the indicative years occurring during June to August (Appendix F: 5d).

Ocean Perch

Little noticeable pattern through the year, 6-58% landed during June to August (Appendix F: 5e).

Blue Warehou

Principally caught May to October. In 1986 and 1987 only 22% and 7% respectively were landed during June to August (Appendix F: 5f). However, in 1990 and 1994 72% and 65% of the catches were made during this winter period.

Mirror Dory

Little noticeable pattern through the year, some larger catches in winter and also in summer, probably as a bycatch of the summer blue grenadier fishery (Appendix F: 5g). In the indicative years 0-22% of the mirror dory catch was landed during June to August.

CLOSURE OPTIONS

Tables 3 to 5 show the results of the three closure options. The % income foregone figures in this table were calculated using 1994 price data and catch data for all SEF quota species excluding gemfish and orange roughy.

Option 1 was most effective in conserving gemfish stocks (greatest biological benefit) when applied to catch data from Sydney and Ulladulla over the four years (>84% of gemfish kill avoided). There was more variability in the amount preserved each year further south, with Bermagui ranging from 63-98% of the gemfish catch avoided and 47-86% in Eden. In Lakes Entrance the estimated reduction in gemfish catch was lower in all four years, ranging from 15-61%, reflecting the fact that at that port some level of gemfish catching may occur over a broad part of the year.

In Sydney the % income foregone ranged under Option 1 ranged from 43% in 1986 to 20% in 1994. For Ulladulla, Bermagui and Eden the average % of income foregone in the four years was 40% for this closure option. For Sydney, Ulladulla and Bermagui the lowest % income foregone occurred in 1994, when fishers of their own accord were avoiding fishing areas that could yield gemfish bycatches. For Option 1 the % of income foregone was less variable between the ports than the % reduction in gemfish catch.

For Option 2 the average % of income foregone under Option 2 was similar in Sydney, Ulladulla, Bermagui and Eden (24-33%) and lowest in Lakes Entrance (9%). The highest % gemfish kill avoided was 90% in Ulladulla and the lowest was 36% in Lakes Entrance. The Sydney values were comparatively lower on average than for Option 1, because of a lower % gemfish kill avoided (62%) in 1994.

The biological benefit (avoided kill) under Option 2 was highly variable in Sydney (59-100%), Bermagui (41-96%), Eden (33-80%) and Lakes Entrance (15-58%).

Generally the average % of income foregone was around 10% lower for all ports under Option 2 than under Option 1 while the level of biological benefit was similar, although more variable.

The % gemfish kill avoided under Option 3 was generally around 10% lower than under Options 1 and 2 for every port except Sydney. In Sydney the % gemfish kill avoided was 88% for Option 3 and 76% for Option 2. In Ulladulla and Bermagui the average % gemfish kill avoided was approximately 69%, compared with 56% in Eden and only 15% at Lakes Entrance. Under Option 3 there were no closures in 1990 at Lakes Entrance.

Avoided kill was highly variable in Ulladulla (39-96%), Bermagui (40-97%) and Eden (12-83%).

The % income foregone under Option 3 did not greatly differ on average from Option 2.

		1986	1987	1990	1994	Average
Sydney	% Income forgone	43	41	32	20	34
	% Kill avoided	90	87	100	100	94
Ulladulla	% Income forgone	38	45	59	29	42
	% Kill avoided	96	95	94	84	92
Bermagui	% Income forgone	38	46	52	28	41
	% Kill avoided	95	98	80	63	84
Eden	% Income forgone	41	44	37	37	40
	% Kill avoided	86	92	47	52	69
Lakes Entrance	% Income forgone	21	19	17	18	19
	% Kill avoided	49	61	15	26	38

Table 3: Estimated impact of Closure Option 1 on four years (excluding gemfish and orangeroughy).

Table 4: Estimated impact of Closure Option 2 on four years (excluding gemfish and orangeroughy).

		1986	1987	1990	1994	Average
Sydney	% Income forgone	28	32	23	13	24
	% Kill avoided	59	85	100	62	76
Ulladulla	% Income forgone	25	37	39	24	31
	% Kill avoided	96	95	94	77	90
Bermagui	% Income forgone	26	31	37	21	29
	% Kill avoided	91	96	79	41	77
Eden	% Income forgone	32	34	33	32	33
	% Kill avoided	80	90	33	48	63
Lakes Entrance	% Income forgone	8	7	7	14	9
	% Kill avoided	47	58	15	24	36

Table 5: Estimated impact of Closure Option 3 on four years (excluding gemfish and orangeroughy).

		1986	1987	1990	1994	Average
Sydney	% Income forgone	25	37	19	20	25
	% Kill avoided	72	86	95	100	88
Ulladulla	% Income forgone	25	37	19	12	23
	% Kill avoided	96	95	47	39	69
Bermagui	% Income forgone	32	38	19	19	27
-	% Kill avoided	93	97	40	44	68
Eden	% Income forgone	36	31	9	32	27
	% Kill avoided	83	81	12	48	56
Lakes Entrance	% Income forgone	6	3	0	2	3
	% Kill avoided	23	29	0	10	15

CLOSURE OPTIONS

The purpose of this section is to provide a deeper analysis of the findings, as they relate to the application of management options. While the three options all have the potential to provide varying degrees of biological benefit in terms of reduced gemfish catch, a number of logistic considerations should be noted.

See Figures 5, 6 & 7 for a visual comparison of closure options on a port by port basis.

In addition to the comments provided in the previous section on closure impacts, the authors received several letters about closures and their impacts. These were from the Sydney Fish Market, Towns Haulage Group from Eden and the Lakes Entrance Fishermen's Co-operative. These letters support the general comments made by the fishers and have been included in this report as Appendix G.

Option 1

The full closure of the SEF for winter provides the most protection for the gemfish stocks (38-94% of gemfish landings avoided) and would be the easiest to enforce. This option yielded the greatest biological benefit in all ports, in all years, with the exception of Sydney in 1994. The analysis of Option 3 showed that the fishery off Sydney would have remained closed all winter in 1994 and, as a result, the impacts of Options 1 and 3 are identical for Sydney.

However, given the secondary objective of identifying a closure option that provides maximum protection to gemfish stocks while causing the least economic disruption, Option 1 could be interpreted as being too heavy handed (19-42% of annual income foregone) in most ports in most years. The following comparisons between Option 1 and 2 demonstrate this point.

Option 2

Option 2 involved closing all areas except the Sydney area for June, all areas for July and the Sydney area in August.

Compared with Option 1, Option 2 reduces the cost of closures to industry (9-33% of non-gemfish annual income foregone) without, in most cases, seriously compromising the biological objective of closures (36-90% of gemfish landings avoided). However, the seasonal variation in the timing and location of gemfish aggregations inevitably leads to mismatches between the closure and periods of gemfish catching. This variability between seasons applies both to the timing between years and the duration of the season in each year.

For example, for Sydney in 1987 and 1990 the closure of June only reduced the gemfish catch in that area by 2% and <1% respectively but reduced annual income (excluding gemfish and orange roughy) by 9% in both years. In contrast, it should be noted that a June closing in Sydney for 1986 and 1994 would have reduced the gemfish catch in the area by 31% and 38% respectively, reducing annual income by 15% and 7% respectively.

The results for Ulladulla also reinforce the point that in many years a closure of three months is too heavy handed. The closure of the additional month of August only reduces the gemfish catch of this area by <1% in 1986, 1987, and 1990 and 7% in 1994, reducing annual non-gemfish income by 13%, 8%, 20% and 5% respectively.



Figure 5: Impact of the three closure options for the Sydney and Ulladulla Areas.



Figure 6: Impact of the three closure options for the Bermagui and Eden Areas.





In Bermagui, closures in August would have provided little additional protection for gemfish in any of the years except 1994 costing the industry 12%, 14%, 22% and 7% of annual non-gemfish income in each respective year. But in 1994, the closure of August would have reduced the gemfish catch of that region by 22%.

For Eden the biggest biological gain in any year that a three month closure had over a two month closure was a 14% reduction in the gemfish catch of 1990. This gain would have been achieved at the cost of a 3% reduction in income from other species. However in 1986, 1987 and 1994 the extra month's closure only reduced the annual gemfish catch in the Eden by 6%, 2% and 4% respectively, costing the industry 9%, 10% and 5% of annual non-gemfish income respectively.

At Lakes Entrance the extra month's closure also offered minimal additional protection for the gemfish stocks. The marginal biological benefit for August was 3%, 3%, ,1% and 2% for the years analysed. These marginal benefits would have resulted in a loss of 13%, 12%, 10% and 4% of annual non-gemfish and orange roughy income respectively.

In summary, while Option 1 gave the greatest biological benefit in most years and areas, the third month of closure only achieved a marginal reduction in gemfish catches and did so at a relatively high cost in terms of lost catches of other species. However the seasonal variability of the gemfish season means that significant landings can occur over a three month period off most ports. This seasonal variability provided the impetus for the formulation of the third option, a rolling closure that would be activated by a prearranged trigger mechanism.

Option 3

Option 3 involves the half month closures in areas where gemfish catches are deemed to exceed some prearranged trigger. As outlined before, the theoretical trigger used for this model was half monthly gemfish landings in an area of greater than 10,000 kg, or half monthly catch per shot levels of greater than 500 kg/shot for the years 1986, 1987 and 1990, and 2.0 tonnes and 150kg/shot for 1994.

As Table 6 shows, Option 3 resulted in lower impacts on industry and smaller reductions in the gemfish catch from each area than Option 1, the full winter closure.

		Average % of Income Forgone	Average % Reduction in Gemfish Catch
Sydney	Option 1	34	94
	Option 3	25	88
Ulladulla	Option 1	42	92
	Option 3	23	69
Bermagui	Option 1	41	84
	Option 3	27	68
Eden	Option 1	40	69
	Option 3	27	56
Lakes Entrance	Option 1	19	38
	Option 3	3	16

Table 6: Average Income Forgone and Gemfish Catch reduction: Option 1 cf. Option 3.

A variation of this data is contained in Table 7, which represents the results from the Option 3 analysis as a percentage of the Option 1 outcomes.

	Average % of Option 1 IncomeForgone	Average % of Option 1 Gemfish Catch Reduction
Sydney	74	94
Ulladulla	55	75
Bermagui	66	81
Eden	69	81
Lakes Entrance	16	41

 Table 7: Option 3 analysis results as a percentage of Option 1 results

This table shows that Option 3 consistently captured more of Option 1's Gemfish Catch Reduction than of its' Income Forgone. Theoretically Option 3 gives a high level of biological benefit without incurring the full detrimental effects of the complete closure option. Results for the Sydney area were the closest of all ports to the full winter closure option, but it should be noted that for Sydney in 1994 the options were identical. Bermagui and Eden returned similar results with Option 3 delivering good biological benefits with substantially lower loss of income. The results from Ulladulla are less encouraging while those from the Lakes Entrance area are less than 50% of the Option 1 findings.

It should be pointed out that the complete winter closure (Option 1) also returned poor results for Lakes Entrance. The average avoided kill under Option 1 for this area was only 37.8% of the annual catch. This is because gemfish can be caught in low quantities over a large part of the year in the southern part of its range. As such, the use of Option 3 in Lakes Entrance only represents a deterioration from what was already a marginal result, lowering the effective avoided kill to 15.5% of annual gemfish landings.

Logistically, however, this option is the most difficult to implement. A consistent comment from all ports was that this option would not be viable. The general consensus among fishers was that the trigger, once known, could and would be avoided by the dumping of gemfish bycatch. It should be stressed that this response was uniformly presented by the fishers as necessary for their economic survival and not as a deliberate attempt to work against fishery management. As will be discussed in the following section, most of the fishers do not believe that they could absorb the economic impact of any closure. As such, avoiding the trigger mechanism was felt to be an economic imperative.

This option may, therefore, prove to be unworkable, despite its biological and/or socioeconomic benefits.

Issues relating to all options

A number of issues were raised by the fishers during the port visits. Some of these have been incorporated here as they highlight perspectives that are not immediately obvious from the statistical analysis, but which could be legitimately included in the decision making process. Matters that are not directly relevant to the comparative merits of the options are included elsewhere in the report, either in the ensuing socio-economic analysis, or in the findings section of the report.

Travel

During the meetings, the fishers at each port were asked whether they would travel to areas within the fishery if their own home port were closed. Reactions were mixed; some fishers agreed that they would travel "to survive", others said that they would not. Some suggested that their quota holdings would not allow them to travel.

The reality is that this is a mobile fleet capable of moving between ports, which, historically, they have done to track the gemfish aggregations. Whether or not the fleet travels to avoid the impact of closures may not be predictable, and in any event will probably be determined by the events of any particular year. It should be noted that there is a coincidence between the gemfish run and enhanced catches of other species. Thus, if the closures successfully coincide with the occurrence of the gemfish aggregations there maybe little inducement for vessels to move to avoid closures because the opportunity to catch fish in other areas may be limited. However, fisheries managers should be certain that if a mismatch occurs between the area being closed and the aggregation of gemfish and other species, the fishers will travel to avoid the closures.

The implication of this is that any mismatch between closures and gemfish occurrences will almost inevitably be a high profile event. Vessels are likely to converge on the area that remains open and high levels of accidental gemfish catches are likely to follow. Fisheries managers should consider with care what management strategies are to be put in place where and when closures did not apply, because it seems possible that in the event of a mismatch between closures and gemfish aggregations the impact of closures could be to aggravate the bycatch problem with gemfish.

Closure by depth band

The fishers uniformly indicated reservations towards the approach of enacting closures based on specific depths.

Their first reservation was based on the practicality of enforcing what will effectively be a "line on the water". Enforcement personnel consulted during this project felt confident that they could enforce a closure, given a clear set of boundaries upon which to base their efforts. However, the fishers uniformly expressed, in one form or another, their belief that this confidence was misplaced.

The second, and in our opinion most significant, issue arising from closing the shelf by depth banding was the potential for large scale environmental degradation of the inshore areas. All fishers, particularly those in the northern waters, agreed that the shift of fishing effort into shallow waters, especially by large vessels purpose-built for shelf fishing, would result in considerable damage to the inshore trawl grounds.

Given the mechanics of present trawl activities, and the capacity of the deep water boats, the possibility of such consequences are not unrealistic. At all times fishers stressed that these consequences would be as a result of economic necessity rather than as an act of bloody-mindedness on their part. The depth of concern over this issue was significant. This is reflected by the counter intuitive view put by many fishers that any closure enacted on the grounds of biological protection should be applied across all depths.

FINANCIAL ANALYSIS

The following section is a port-by-port analysis of the likely consequences of the three proposed closure options for the SEF. This section draws upon the statistical financial findings of previous sections, financial information provided by Cooperatives and local businesses in the towns visited, and financial and anecdotal evidence provided by a range of fishers.

Some of this data has been provided with associated confidentiality clauses. Where full and frank disclosures cannot be made, the information will be presented in terms of the proportional significance of the winter months and so on.

This analysis begins with an interpretive introduction, which introduces a number of qualitative points that should be borne in mind when considering the quantitative results.

Reduced income

Most fishers were quick to point out that the impacts of any closures on individual operators would not simply be proportional to estimated losses of income, a sentiment also echoed by the Cooperative managers. Revenue from the fishery has already been greatly reduced by the setting of gemfish TAC's to zero. Consequently many commercial fishing operations are already reduced to extremely small profit margins.

A further complicating factor is that both on and off shore infrastructure entail a significant expenditure on fixed costs throughout the year — a diminution of fishing effort does not bring a corresponding reduction in annual expenses. The loss of income from lower levels of effort therefore results in a disproportionately high loss of profit.

With these two factors in mind, both Cooperative managers and individual fishers pointed out that theorising on the effects of a reduction in income of more than approximately 15% of the current annual total was largely academic. A contraction of income of this magnitude would in fact force these operations out of business.

In the absence of a uniform price data set for all the years of the analysis, quantification of this contraction in revenue is difficult. However, there is sufficient anecdotal and circumstantial evidence to give a high degree of credibility to such claims.

For example, as outlined previously in the report, Sydney has seen an overall reduction in gemfish landings of 95-98% through the period 1986 to 1994. Catches of mirror dory, a species closely associated with gemfish, have also declined in Sydney through this period because targeting practices have been forced to change to avoid catching gemfish.

A similar situation exists in Ulladulla and Bermagui with respect to both of these species. Eden has absorbed a 96% reduction in gemfish landings and Lakes Entrance's landings have also declined, albeit to a lesser extent. Given the historical importance of the gemfish catch, it could be safely assumed that industry's claims of tenuous profitability are not without basis.

An analysis of the sensitivity of the profitability of some fishing Cooperatives also gives credibility to the arguments put forward by industry. In Wollongong, for example, a reduction by 10% of both fishing income and variable costs resulted in a 64% reduction in Cooperative profit in 1993 and 69% in 1994. Given that the post-tax profit margins for the Cooperative in these years were 8.1% and 10% respectively, a reduction in fishing income of approximately 15% could theoretically cause the close of this Cooperative.

The manager of the Wollongong fishing Cooperative indicated that low margins such as these have become typical. This situation is seen as the end result of the regulatory mechanisms placed upon the fishery.

A similar analysis was conducted using information from the Bermagui Cooperative. Margins in Bermagui were better than Wollongong, with pre-tax profits of 19% and 20.5% in 1993 and 1994. An extrapolation of the effect of decreasing gross fishing income revealed that a drop of 10% of income would have caused a reduction of 39% and 38% of profitability in 1993 and 1994 respectively.

It should, however, be noted that 1994 was considered an abnormally good year for tuna. With this in mind, the Cooperative manager at Bermagui considered that the real situation for the Cooperative is in fact more severe than the figures may show. In short, the manager had no doubts that winter closures would cause the Cooperative to close.

The situation at Ulladulla, Eden and Lakes Entrance tended to be less severe.

In Ulladulla, a significant proportion of the annual profit is now being derived from tuna sales on the export market. As a result, management felt that a winter closure, while being detrimental, may not necessarily cause the closure of the Cooperative. The final impact of a closure would largely be dependent upon the success or failure of the highly variable tuna season.

The lessened influence of closures in Eden and Lakes Entrance is largely a function of the increasing diversity of the fishery to the south. In Lakes Entrance, the winter landings of all species landings are roughly proportional to the length of the season. The three months of winter (25% of the year) have been responsible for 23% to 31% of the annual landings through the Cooperative. The 16 SEF species account for some 68% of this winter catch.

Despite a diminished threat to long term commercial viability in these two ports, the managers were still adamant that winter closures would produce disproportionately high impacts on profitability. The operation of all Cooperatives in the SEF is geared to high volume operation As mentioned above, this results in a high proportion of fixed costs which will not diminish with lower tonnages of catch.

Fishers from Eden and Lakes Entrance have limited ability to make up lost catches as weather conditions deteriorate in late winter and Autumn, and November, December and January are poor months for catching. Therefore, any loss of fishing opportunity through winter is an absolute loss that, for the most part, cannot be supplemented by increased effort in periods of non closure.

One final significant factor involving the year to year operation of the Cooperatives is the absence of retained profits. The Cooperative, by the nature of its operation, is designed to handle the catch on behalf of its members. Basically, all profits are returned to members and the Cooperative carries little wealth from one year to the next. The Cooperative is therefore atypical of many other commercial businesses, which can budget for a contingency fund to counteract the short term effects of bad years.

Individual boats

Many of the individual operators within the fishery are in the same situation as their respective Cooperatives. The boats in Sydney, Wollongong, Ulladulla and Bermagui, with their reliance on SEF species, have had their profit margins drastically reduced since 1986 and 1987. As is the case with the Cooperatives, the southern boats, with greater opportunities for diversification have, in some cases, been less affected in this time.

Despite the ostensibly high turnovers of the individual boats, fishers were quick to point out that trawl fishing is a high cost operation, a significant proportion of which is either fixed, or must be expended before fishing commences. These costs are sunk and could not therefore be recovered should the trawl grounds be closed. This leads directly to the high probability of severe financial impacts should the grounds be closed for the winter.

LIKELY CLOSURE EFFECTS

The following section brings together the quantitative findings from the analyses and the existing financial positions of industry on a port-by-port basis. Against the backdrop of the four year average figures already presented, specific estimates for 1994 are now provided. These 1994 figures make the analysis current and provide the best basis for predicting specific impacts of the closure options.

The percent of annual income foregone figures estimated for 1994 are presented below. These are based on declarations of all SEF quota species (including gemfish and orange roughy) caught in each area (>200m) during 1994 and were calculated using average 1994 price data. As such, this set of figures provides the best real time assessment of the impact of closures, and provide the best basis for predicting immediate effects if closures were to be introduced in 1996.

These estimates of income that would have been foregone in 1994 are contrasted with estimates of the gemfish landings that would have been avoided. The previously presented four year averages are presented for comparison along with the specific estimates for 1994.

After identifying the likely socio-economic effects of the three closure options for each port, the section will then project these to include social factors for consideration. Where port specific, these will be presented in the individual ports. A further set of socioeconomic factors, which are applicable to all ports, will then be discussed at the end of this section.

Sydney area

The analysis for the Sydney area across the four years studied revealed the average avoided gemfish kill would have been—

Option 1: 94% Option 2: 76% Option 3: 88%

During 1994 it is estimated that each option would have prevented the following gemfish landings, cited in terms of the actual landed weight and percentage of 1994 landings in the Sydney area —

Option 1: 16 657kg (99%) Option 2: 10 317kg (62%) Option 3: 16 657kg (99%)

The income forgone in 1994 under the three closure options would have been —

Option 1: 27% Option 2: 18% Option 3: 27%

It should be noted that these percentages only apply to income from SEF quota species declared caught by the trawl sector in depths >200m.

With the evidence of already diminished profit margins, a heavy reliance upon the closure areas and the closure times, there is little doubt that all of the three closure options would impact severely on individual operators in the ports of Sydney and Wollongong.

In Sydney, the lack of profitability of the area was evidenced by the fact that one fisher had already found it necessary to sell his house to subsidise his fishing operations. The view of the fishers in general was that the loss of 10% of annual income was the

maximum amount which could be absorbed by individual operators before a loss of profitability.

It can be concluded, therefore, that all operators in Sydney would have incurred a net financial loss from any of the closure options. For many, if not most, this one year loss could not have been carried over to the following year and the size of the Sydney fleet would be reduced. There is anecdotal evidence that this reduction in fleet size may be permanent. One fisher has been attempting to sell his vessel for a number of years without success. According to his statements, the last price offered to him would have barely covered a recent major overhaul and motor replacement needed to continue fishing.

The fleet operating from Sydney does not have a formal Cooperative structure. The fleet's close physical proximity to the Sydney Fish Market allows the fishers to sell directly to the market without a great deal of on-shore infrastructure. A local processor, dependent on the Royal Red Prawn catch from Sydney, employs 8 to 10 permanent staff and up to 5 casuals. The loss of processing stock from Sydney may have a flow on effect to this operation.

As could be expected, the relative size of the Sydney fishing industry compared to greater Sydney economy will mean that no significant flow on effects will be felt outside the industry itself.

However it should be noted that the bulk of product handled by the Sydney Fish Market is SEF product and that representatives of the markets believe that winter closures in the SEF threaten the Market's viability. These representatives claimed that if continuity of supply is broken during winter, market share will be lost permanently to product sourced from New Zealand that would not be handled by the markets.

The situation for operators based in Wollongong is basically identical to those in Sydney. As such, the general conclusion is that no Wollongong boats could operate profitably under closures. Similarly, a proportion of these operators would be unable to carry the financial loss into the following year and would withdraw from the industry. Staffing levels for individual vessels are the same in Wollongong as in Sydney. There are 4 trawl boats based in Wollongong.

As previously highlighted, figures from the Wollongong Cooperative indicate that a 10% variation in annual income resulted in an profit variation of approximately 70%. It can be concluded that losses of approximately 20% as evidenced in the analysis results would, therefore, cause the Wollongong Cooperative to loose profitability. Discussions with the Cooperative management indicate that there is little or no likelihood that the Cooperative could absorb this loss and would close permanently.

This would result in the direct loss of 2 permanent jobs and approximately 5 casuals with additional job losses in allied fields such as transport and so on. Additional effects of the closure of the Cooperative include the loss of handling and icing facilities for other sectors of the industry and the loss of general infrastructure services for these sectors.

The loss of boats from Wollongong would result in a direct reduction in spending in the Wollongong area. However, given the magnitude of the local economy, the effects of this would be minimal. Flow on effects from the loss of part of the fleet and/or the closure of the cooperative include reduced spending on transport, fuel and provisions for the vessels.

Ulladulla

Results for Ulladulla cross the four years studied revealed the average avoided gemfish kill would have been—

Option 1: 92% Option 2: 90% Option 3: 69%

In 1994 the gemfish landings that would have been avoided for these options are —

Option 1: 13 153kg (84%) Option 2: 12 023kg (77%) Option 3: 10 434kg (67%)

In the Ulladulla area in 1994, the income forgone (including gemfish and orange roughy) under the three closure options would have been —

Option 1: 31% Option 2: 26% Option 3: 13%

Most operators in Ulladulla indicated financial conditions for this portion of the fishery were similar to those in Sydney and Wollongong. It is difficult to envisage boats in Ulladulla operating at a profit under Options 1 or 2, based on 1994 data. The fleet may be able to maintain a reduced profit under Option 3, but this is difficult to ascertain without detailed catch records and financial statements for each boat. Once again, there is a high likelihood that a number of these operators would not be able to carry these losses through to the following year, given the low financial base from which they are operating.

There are 9 trawlers operating from Ulladulla, each with a skipper and 3 to 4 crew.

The Ulladulla Cooperative would be affected by the closures, possibly even closed. Its overall viability would depend on an interplay between the option enacted, the seasonal variations of the stock movement and the profitability of the tuna season. Cooperative managers indicated that a complete winter closure, along with a bad tuna year could cause the closure of the Cooperative. Similarly, a closure of the shelf for more than one season would drastically increase the likelihood of the Cooperative closing.

This is a function of both the element of fixed costs in the Cooperative expenditure and the level of its capitalisation. Ulladulla Cooperative invested heavily in the gemfish industry and is specifically geared towards a high volume throughput. Its facilities are presently significantly under-utilised, although the expenditure and capital costs associated with the initial investment remain. The Cooperative infrastructure can actually act as a marginal drain on profits in good years and amplify losses in bad years.

Loss of the trawl fishery in Ulladulla would result in the loss of a number of casual positions from the Cooperative. Should the Cooperative close, three permanent administration staff and three permanent floor staff would loose their jobs. In addition, up to 7 regular casuals and an unknown number of other casuals would loose their positions.

The balance of the Ulladulla fleet would also loose their icing and handling facilities, slipway services, bulk discounts passed on by the Cooperative on the purchase of gear and a range of other ancillary benefits.

The Ulladulla Cooperative is also a major supplier of ice, with customers including other Cooperatives, vegetable growers, the tourist and retail sectors. Any closure of the Cooperative would therefore have wider ramifications in the local economy. Other economic losers from a closure of the Cooperative would include local transport companies, engineering firms and the retail sector.

Bermagui

Analysis shows that, over all years, the average avoided gemfish kill in Bermagui was -

Option 1: 84% Option 2: 77% Option 3: 68%

The 1994 avoided gemfish catch for these options would have been —

Option 1: 8 838kg (63%) Option 2: 5 708kg (41%) Option 3: 6 108kg (44%)

In Bermagui the 1994 loss of income (including gemfish and orange roughy) would have been —

Option 1: 31% Option 2: 23% Option 3: 21%

The situation with respect to both fishers and the Cooperative is more precarious in Bermagui than Ulladulla. Most of the fishers believed that they could not carry the losses associated with any closure of the shelf over winter. With boat crews similar to other ports, enacting a winter closure in Bermagui would lead to a direct loss of jobs of some 4 to 5 people per vessel from 3 to 4 vessels.

The Cooperative management also believed that any closure option would result in the Cooperative closing. The sensitivity analysis carried out on the Cooperative income adds support to this claim, with the average variation in income from any closure option being sufficient to push the Cooperative into financial loss.

This would result in the loss of 5 staff jobs from the Cooperative along with the jobs of two truck drivers. As was the case with other Cooperatives, closure of the Bermagui operation would result in the loss of infrastructure for other segments of the fishing industry.

The loss of revenue for the local community is more significant in Bermagui due to its relatively small size. While Bermagui derives a substantial proportion from tourism, this is extremely seasonal, occurring over the summer months. Income from the winter fishery is, therefore, disproportionately significant as it provides an income levelling effect for the town. This was evidenced during the port visit to Bermagui by a harbour-side restaurant bearing the sign: "This restaurant closed for June, July and August".

Eden

The impact of possible closures becomes less clearly defined as one moves south through the fishery. As outlined throughout the report, this is a function of a range of factors including the diversity of local fishing areas and the seasonal movements of fish stocks through the entire SEF. In Eden, the effectiveness of proposed closures in terms of avoided gemfish catch is lessened while the relative proportion of income forgone remainshigh.

Across four years, the average avoided gemfish kill (excluding gemfish and orange roughy) in Eden was —

Option 1: 69% Option 2: 63% Option 3: 56% The 1994 gemfish landings avoided for these options would have been —

Option 1: 18 743kg (52%) Option 2: 17 445kg (48%) Option 3: 17 445kg (48%)

For Eden the 1994 it is estimated that the loss of income (including gemfish and orange roughy) would have been —

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Option 1: 40%
Option 2: 35%
Option 3: 35%
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The fishers in Eden stressed the overall importance of the winter months to the trawl sector. Many claimed that June and July represented up to half of their annual profit for the year, with non winter months barely breaking even.

Some modelling based on Cooperative data and individual boat records for all species tends to support these claims with the winter peak associated with the SEF quota species caught in >200m carrying over to the non SEF species (see Appendix H). Financial records for some individual boats also indicate the slim profit margins as outlined for other ports.

While it may be thought that some potential must exist for fishers to recoup winter losses throughout the remainder of the year, the fishers indicated that increases in effort over the years 1986 to 1994 had reached a point at which many boats were more or less operating at capacity.

As with all ports, the fish handling facilities in Eden are designed for high volumes of throughput and cannot function efficiently at reduced volumes. While the managers of these facilities did not feel they would be forced out of business in the short term, the point was repeatedly made that even in the more diversified southern ports, all deep water fishing operations were already at relatively low levels of profitability.

Lakes Entrance

The importance of closures with respect to avoiding gemfish catches was at its lowest in Lakes Entrance.

Across the four analysis years the average avoided kill (not including gemfish and orange roughy) at Lakes Entrance was —

Option 1: 38% Option 2: 36% Option 3: 15%

The 1994 gemfish kill avoided for these options would have been —

Option 1: 2 217kg (26%) Option 2: 1 988kg (24%) Option 3: 834kg (10%)

At Lakes Entrance the 1994 loss of income (including orange roughy and gemfish) would have been —

Option 1: 58% Option 2: 13% Option 3: 3% At Lakes Entrance the 1994 loss of income (not including orange roughy) would have been —

Option 1: 19% Option 2: 14% Option 3: 5%

As with fishers from Eden in Lakes Entrance it was claimed that vessels were operating at full capacity targeting small catches of species that were formally relatively unimportant and that they would be unable to recoup losses sustained by closing winter months.

The Cooperative management indicated that a full winter closure off Lakes Entrance may be sufficient to cause the shut down of their operations over winter. This would jeopardise the situation of some 33 permanent staff and 60 casuals who rely on the Cooperative for employment. The Lakes Entrance Cooperative also operates a retail fish outlet, is a major importer of fishing gear, and is responsible for bulk fuel sales in the area. There are some 73 vessels operating from Lakes Entrance with a crew compliment of between 2 and 5. An additional 63 Melbourne based scallop boats also operate out of Lakes Entrance during winter.

As would occur elsewhere, infrastructure services for other industry segments would be lost if the Cooperative closed for any period. A closure would also mean that financial input into the local economy would be diminished and the ongoing viability of some individual boats would be threatened.

GENERAL DISCUSSION

In all ports examined, the proportional contribution of the fishing industry into the local economy is small. In Sydney and Wollongong, the fishing industry is swamped by large, multi-sector economies. Tourism is the big economic concern in Ulladulla, Bermagui, and Lakes Entrance. It also plays a significant role in Eden, along with the wood-chip processing and export site.

However, the importance of fishing income is amplified in areas with a traditional reliance on the seasonal cash flows of tourism. As mentioned in the Bermagui analysis, the winter cash flow from the fishing sector provides a degree of all year stability to these economies.

Diversity within a local economy provides an element of resilience should other sectors suffer from a down turn. This point was stressed by the Shoalhaven local government representatives, who pointed out that the usually lucrative tourism recently suffered a bad year, due to unseasonable summer rainfall. This down turn was immediately reflected by job losses and a number of business closures. Thus while tourism is relatively reliable, it is not immune to periodic years of poor performance. The Shoalhaven council has recognised the links between diversity and resilience and has listed fishing as one of the 6 key sectors which are to be encouraged in the region.

Some other significant economic sectors in the southern ports are also worth commenting on. The wood-chipping operations in Eden are presently the target of a sustained environmental campaign. While the likelihood of closure is still minimal, it cannot be ruled out. Removal of this economic input into the Eden economy would increase the significance of the fishing sector, particularly with reference to the issue of summerwinter cash flows.

Powell, Jensen and Horwood (1989) found that income multipliers for the trawl sectors of a number of ports were between 1.35 and 1.65. These figures should be treated with some caution as the methodology used included the figures from the Danish seine fleets

in some ports. However, given the evidence that the bulk of winter trawl income is generated from the shelf, they should be reasonably accurate. As could be expected, the majority share of the effect of the multiplier comes from fishing sector employees. As a result, the majority of any economic impacts arising from higher unemployment in the industry will be felt locally sooner rather than later.

Another significant point relating to the economic nature of the infrastructure of the fishery is the temporal relationship between fishing effort and on-shore infrastructure. Evidence from other regional or sub-regional fisheries shows the long term disruptions that can result from short term regulatory reductions in catch effort. When the TACs for orange roughy were reduced there were some suggestions that the price could be expected to escalate. In fact, the TAC reductions have had the impact of closing down a significant portion of the on-shore processing capacity of the fishery and forced markets to find alternatives. The evidence shows that these impacts have seriously eroded the marketability of orange roughy and the net worth of the fishery.

It is conceivable that, given the tight margins of many of the fish handling facilities, a short term closure in the SEF would result in a long term loss of infrastructure. This, in itself, has the potential to rebound onto the fishers, threatening their viability with increased handling costs and so on. It is almost impossible to predict the likelihood of such events, but the potential for this chain of events should not be dismissed lightly.

There are also serious social implications arising from the proposed closure options. The most obvious is the disruption closures will cause to the fishers themselves and their immediate families. The actual or perceived loss of one's livelihood will generate tensions both within the industry and between industry and management. The depth of feeling generated by closures within the fishing community cannot be ignored. A consistent theme in the response of fishers was that "we would lose everything". As could have been anticipated, this sentiment fuels a considerable amount of anxiety and anger among fishers.

While occasional "off the cuff" remarks were made by the fishers, they are presently managing to retain the focus of this emotion on logical and rational arguments on the relative merits or scientific bases of the closure options. Given their misgivings on the necessity of closures for the protection of gemfish stocks, there is a potential for the focus of this emotion to shift more towards the scientific community in general and fishery managers in particular.

In many cases, this "threat to family" theme extends deeper than is immediately apparent. The fishing communities and allied business links have evolved over time, often over several generations. A result of this is the actual boat represents the starting point of a web of inter-connected family businesses, all of which are to some extent dependent on the success of the fishing performance. It is not unusual for various members of a family or small group of families to own retail outlets for the catch, transport services for the conveyance of the catch to market and so on.

In good times, such an arrangement works to the mutual benefit of family members. However, an event such as a closure reveals the "inverted pyramid" nature of these vertical linkages. The livelihood of a series of families are more or less dependent upon the success or otherwise of a single venture. In formulating policies such as closure options, managers should be aware of the depth and breadth of these inter-connected, extended family arrangements that are present in many communities. This intertwining of personal and economic relationships should be expected to generate a fierce and deep seated emotional response when the economic basis of these relationships is threatened.

Another significant factor is the prospect for re-employment for industry personnel in general, and fishers in particular. There are varying levels of unemployment in the communities which comprise the SEF. In general terms, this is higher in the smaller

towns. The pragmatic reality of the present labour force is that a middle-aged fisher with no alternative skills base may be virtually unemployable should his fishing operation become unviable and thus by definition unsaleable. The potential for reemployment in the fishing industry will be small as any contraction caused by closures will affect the whole fishery. As is the case with the interconnected web, single skilling and broad experience with all facets of the fishing industry is an asset in good times but a liability in times of contraction.

SUMMARY

Any closure option that results in a significant loss of income, threatens the livelihood of individual or cooperative businesses and/or the lifestyle of industry participants will inevitably lead to social upheaval. The successful use of closure options, as is the case with regulatory mechanisms in general, is largely a process of gaining sufficient efficiency without seriously eroding equity.

Based on the available catch and price data, financial figures supplied by industry, and anecdotal and circumstantial evidence, this analysis has found that all of the three closure options examined have the potential to cause a considerable contraction within the fishing industry of the SEF.

There is a high probability that enacting any of the three options will lead to some individual fishers in all ports being unable to continue operations. These effects will be more pronounced in the northern ports of Sydney, Wollongong, Ulladulla and Bermagui. The effects on fishers in Eden are also likely to be substantial, but less severe than the northern ports. The diversity of the fishery at Lakes Entrance offers that port more protection from the effects of the proposed closures.

The on-shore infrastructure will also be seriously affected by the closure of the shelf over the winter months. The Wollongong and Bermagui Cooperatives are likely to cease operations should the closures be enacted. The Cooperative in Ulladulla is operating at marginal levels of profitability, surviving largely on income from the tuna catch. This Cooperative could survive a limited period of closure that coincided with a profitable tuna season, but the likelihood of Ulladulla surviving repeated winter closures is small. While the Cooperatives and other fish handling facilities in Eden and Lakes Entrance do not face as imminent a threat to their long term operation, there is evidence that they may be forced to close for at least a part of the year, impacting the provision of services to other sectors of the fishing industry and local economy in general.

There is also the possibility that the loss of at least part of this infrastructure will be permanent, which will lead to a further deterioration of profitability in a fishery that has already become financially marginal in many areas. These backward linkages may have the potential to drive a wide range of operators out of the fishery over time.

All of these factors will contribute to unemployment among a cohort of the population, many of whom may have little prospect for re-employment. This may lead to considerable social upheaval in the coastal communities, which may spread laterally through networks of family companies that have evolved through vertical linkages with individual boats or small groups of boats.

The combination of diminished incomes from the fleet and a loss of disposable income from those made redundant by the curtailing of fishing effort will result in a direct contraction in the economies of the coastal communities.

While the fishing industry is not a major component of the local economy of any port on the south coast, it does provide significant benefits to these economies. In some cases the winter fishing income smooths out otherwise lumpy income streams from tourism, which occur in summer. In all cases the fishing industry adds to the diversity of the economy, enhancing its resilience in times of economic down turn in other sectors.

There is an element of scepticism among the fishing community with regard to the biological need for closures to protect the gemfish stocks. This may be fuelled in part by the financial self interest of the fishers. Given the potential severity of the economic and social disruption caused by winter closures, however, managers must be absolutely convinced of this biological need before closures are resorted to.

SECTION FIVE: REFERENCES

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Jan-94	Melbourne wholesale markets		Sydney Fish Markets	
SEF Species	Q (kg)	Av. price	Q (kg)	Av. price
Blue eye trevella	5490	5.1	0	0
Blue Grenadier	74580	3.64	919	3.48
Blue warehou	42750	4.17	325	3.15
Flathead	75870	2.21	85860	2.71
Gemfish	10770	3.21	14832	4.68
Jackass morwong	27750	1.59	47511	2.97
John dory	2250	3.32	19829	6.61
Ling	28470	4.49	11847	4.81
Mirror dory	4380	1.73	3746	3.14
Ocean Perch	2160	1.86	14590	3.88
Orange roughy	50040	4.21	2181	5.57
Redfish	15990	1.16	77903	1.52
Royal red prawn	0	0	30094	3.33
School whiting	45330	1.23	0	0
Silver trevally	15750	1.7	42664	1.41
Spotted warehou	61200	1.76	26764	1.88
Arrow squid	10680	1.93	0	0

Feb-94	Melbourne wholesale markets		Sydney Fish	Markets
SEF Species	Q (kg)	Av. price	Q (kg)	Av. price
Blue eye trevella		5.58		7.68
Blue Grenadier		3.29		2.57
Blue warehou		3.60		3.18
Flathead		2.15		2.82
Gemfish		3.83		4.90
Jackass morwong		1.66		2.67
John dory		2.72		5.40
Ling		4.36		4.65
Mirror dory		1.77		2.50
Ocean Perch		1.89		3.79
Orange roughy		4.19		5.57
Redfish		1.08		1.51
Royal red prawn		#DIV/0!		3.30
School whiting		2.35		#DIV/0!
Silver trevally		1.50		1.59
Spotted warehou		2.11		2.03
Arrow squid		1.30		3.57

Mar-94	Melbourne wholesale markets		Sydney Fish Markets		
SEF Species	Q (kg)	Av. price	Q (kg)	Av. price	
Blue eye trevella	10950	5.82	15939	7.68	
Blue Grenadier	150870	3.11	6466	2.44	
Blue warehou	77460	3.28	136	3.26	
Flathead	76800	2.09	. 78377	2.94	
Gemfish	11010	4.43	8701	5.28	
Jackass morwong	16290	1.79	84661	2.5	
John dory	5910	2.49	30129	4.61	
Ling	41250	4.27	20871	4.56	
Mirror dory	5370	1.8	9402	2.24	
Ocean Perch	4140	1.91	15422	3.71	
Orange roughy	64230	4.18	0	0	
Redfish	21540	1.02	111137	1.5	
Royal red prawn	0	0	52471	3.28	
School whiting	54300	3.28	0	0	
Silver trevally	27690	1.38	46868	1.76	
Spotted warehou	86280	2.36	25551	2.18	
Arrow squid	55380	1.18	70	3.57	

Apr-94	Melbourne who	lesale markets	Sydney Fish Markets		
SEF Species	Q (kg)	Av. price	Q (kg)	Av. price	
Blue eye trevella	10230	5.51	16281	6.89	
Blue Grenadier	129990	2.87	960	2.31	
Blue warehou	84450	2.78	2455	2.11	
Flathead	63870	2.09	70700	2.93	
Gemfish	7650	4.43	7202	5.4	
Jackass morwong	21780	1.66	48187	2.72	
John dory	3570	2.26	18536	5.2	
Ling	30060	4.15	19560	4.79	
Mirror dory	1920	2.15	5761	2.54	
Ocean Perch	2370	3.85	11153	4.04	
Orange roughy	82290	4.39	0	0	
Redfish	14880	1.27	74938	1.8	
Royal red prawn	0	0	17484	0.73	
School whiting	25770	1.73	0	0	
Silver trevally	32160	1.41	33383	1.79	
Spotted warehou	65970	1.91	14223	2.53	
Arrow squid	20850	1.38	88	3.02	

May-94	Melbourne wholesa	le markets	Sydney Fish Markets		
SEF Species	Q (kg)	Av. price	Q (kg)	Av. price	
Blue eye trevella	6660	5.21	20445	6.18	
Blue Grenadier	76350	2.3	1761	2.86	
Blue warehou	134610	2.12	6295	2.12	
Flathead	28080	2.23	55583	2.73	
Gemfish	4590	4.49	10711	4.19	
Jackass morwong	9390	1.82	43992	2.12	
John dory	870	3.62	25485	6.36	
Ling	56790	3.43	68304	3.2	
Mirror dory	690	1.56	8802	2.24	
Ocean Perch	450	1.78	26684	2.89	
Orange roughy	26040	4.27	1448	4.1	
Redfish	34770	1.21	133305	1.19	
Royal red prawn	0	0	41492	2.9	
School whiting	49860	1.25	24759	1.54	
Silver trevally	41700	1.2	47054	1.29	
Spotted warehou	71820	1.51	22743	1.54	
Arrow squid	22770	1.41	0	0	

Jul-94	Melbourne who	lesale markets	Sydney Fish Markets		
SEF Species	Q (kg)	Av. price	Q (kg)	Av. price	
Blue eye trevella	16020	6.27	25472	6.79	
Blue Grenadier	108600	2.15	4493	2.44	
Blue warehou	85980	1.61	9167	1.23	
Flathead	55290	1.95	85763	1.96	
Gemfish	2100	4.14	41028	3.36	
Jackass morwong	4140	1.68	20396	3.39	
John dory	1380	4.2	45689	3.7	
Ling	45360	3.65	36744	3.77	
Mirror dory	600	1.85	37049	1.87	
Ocean Perch	1350	1.35	23200	3.03	
Orange roughy	81810	3.65	6265	3.29	
Redfish	44070	1.42	156168	1.06	
Royal red prawn	0	0	32308	3.05	
School whiting	15360	1.91	16974	2.17	
Silver trevally	5100	2.62	24157	1.98	
Spotted warehou	200850	0.95	67304	1.12	
Arrow squid	32160	1.34	0	0	

Jun-94	Melbourne wholesa	Sydney Fish Markets		
SEF Species	Q (kg)	Av. price	Q (kg)	Av. price
Blue eye trevella	9930	6.38	17452	6.54
Blue Grenadier	115260	2.75	6471	2.23
Blue warehou	142140	1.78	5576	1.82
Flathead	34470	2.36	66912	1.97
Gemfish	2610	4.8	23160	3.86
Jackass morwong	6840	1.8	33905	2.3
John dory	1920	4.42	37865	3.91
Ling	63750	3.36	60920	3.17
Mirror dory	2610	2.05	29334	2.21
Ocean Perch	960	2.13	14403	3.46
Orange roughy	103920	3.83	3168	3.74
Redfish	34620	1.39	144563	1.01
Royal red prawn	0	0	14484	3.32
School whiting	39540	1.2	23085	1.61
Silver trevally	27180	0.92	39446	1.11
Spotted warehou	90000	1.17	31155	1.39
Arrow squid	34110	1.28	0	0

Aug-94	Melbourne who	lesale markets	Sydney Fish Markets	
SEF Species	Q (kg)	Av. price	Q (kg)	Av. price
Blue eye trevella	18060	5.71	20636	6.75
Blue Grenadier	141450	1.78	610	2.88
Blue warehou	113400	1.64	3716	1.28
Flathead	52260	2.27	75424	2.75
Gemfish	4560	4.28	18485	4.66
Jackass morwong	690	2.27	35327	3.02
John dory	630	4.91	42105	4.46
Ling	37590	4.51	21066	4.13
Mirror dory	1020	1.94	10200	2.57
Ocean Perch	810	1.75	20442	3.09
Orange roughy	149760	3.32	10814	3.8
Redfish	32910	1.56	134000	1.23
Royal red prawn	0	0	11900	4.43
School whiting	16680	2.26	24815	2.14
Silver trevally	3960	2.68	22889	2.52
Spotted warehou	204060	0.98	97755	1.06
Arrow squid	20670	1.62	0	0

Sep-94	Melbourne wholesa	Melbourne wholesale markets		Markets
SEF Species	Q (kg)	Av. price	Q (kg)	Av. price
Blue eye trevella	7320	5.13	17677	6.63
Blue Grenadier	20520	4.5	50	2.91
Blue warehou	101250	1.57	16807	2.41
Flathead	28320	2.22	58706	2.89
Gemfish	13830	4.49	9755	4.32
Jackass morwong	7380	2.07	58025	2.78
John dory	330	5.88	29658	6.81
Ling	29490	4.39	18305	4.18
Mirror dory	660	2.48	7773	2.45
Ocean Perch	630	1.85	13816	3.55
Orange roughy	33300	3.46	9357	3.25
Redfish	29190	1.13	132618	1.23
Royal red prawn	0	0	16847	3.93
School whiting	21180	2.36	21294	2.11
Silver trevally	20310	2.47	62868	1.45
Spotted warehou	202080	1.22	44259	1.12
Arrow squid	14520	1.89	0	0

Nov-94	Melbourne who	lesale markets	Sydney Fish Markets	
SEF Species	Q (kg)	Av. price	Q (kg)	Av. price
Blue eye trevella	15270	4.88	16837	6.26
Blue Grenadier	36600	4.78	663	3.49
Blue warehou	64350	2.91	921	2.91
Flathead	61350	2.04	57214	2.8
Gemfish	4680	4.45	11062	4.73
Jackass morwong	23040	1.61	50373	2.76
John dory	990	4.38	29997	5.57
Ling	47940	3.95	36039	4.14
Mirror dory	570	2.08	26407	2.94
Ocean Perch	3090	1.65	38221	3.07
Orange roughy	62520	3.99	3342	2.77
Redfish	33510	1.17	137799	1.23
Royal red prawn	0	0	27335	4.02
School whiting	48090	1.77	18087	2.2
Silver trevally	13950	1.73	17931	2.27
Spotted warehou	9090	1.71	0	0
Arrow squid	0	0	0	0

Oct-94	Melbourne wholesa	Melbourne wholesale markets		Sydney Fish Markets	
SEF Species	Q (kg)	Av. price	Q (kg)	Av. price	
Blue eye trevella		4.96		6.45	
Blue Grenadier		4.68		3.45	
Blue warehou		2.09		2.44	
Flathead		2.10		2.85	
Gemfish		4.48		4.54	
Jackass morwong		1.72		2.77	
John dory		4.76		6.19	
Ling		4.12		4.15	
Mirror dory		2.29		2.83	
Ocean Perch		1.68		3.20	
Orange roughy		3.81		3.12	
Redfish		1.15		1.23	
Royal red prawn		1.00		3.99	
School whiting		1.95		2.15	
Silver trevally		2.17		1.63	
Spotted warehou		1.24		1.12	
Arrow squid		1.89		#DIV/0!	

Dec-94	Melbourne who	lesale markets	Sydney Fish Markets	
SEF Species	Q (kg)	Av. price	Q (kg)	Av. price
Blue eye trevella	17880	4.89	20173	5.52
Blue Grenadier	57690	3.58	2542	2.82
Blue warehou	90540	2.39	1265	1.79
Flathead	72120	1.64	97910	1.76
Gemfish	6570	4.86	6383	5.32
Jackass morwong	15210	1.38	46174	2.47
John dory	60	4.52	17140	8.11
Ling	42990	3.89	29190	3.92
Mirror dory	5550	1.62	28482	2.44
Ocean Perch	1380	1.45	29352	2.84
Orange roughy	34710	4.31	7685	3.98
Redfish	5430	1.61	99225	1.31
Royal red prawn	0	0	16145	4.24
School whiting	36690	1.24	24514	1.62
Silver trevally	10080	2.21	44854	1.46
Spotted warehou	63780	1.55	24461	1.75
Arrow squid	6810	1.4	0	0

Jan-95	Melbourne wholesale markets		Sydney Fish Markets	
SEF Species	Q (kg) Av. price Q (kg)		Av. price	
Blue eye trevella	10800	6.38	11772	7.14
Blue Grenadier	125790	2.61	5844	1.75
Blue warehou	301860	4.18	96	3.26
Flathead	157261	2.11	98017	1.98
Gemfish	37117	4.77	8159	5.59
Jackass morwong	28260	1.8	61556	2.4
John dory	390	5.41	16867	7.03
Ling	187355	4.32	18952	4.26
Mirror dory	7230	1.66	12642	3.29
Ocean Perch	2250	2.02	14393	3.49
Orange roughy	39990	3.71	652	2.39
Redfish	3360	2.13	62827	1.87
Royal red prawn	0	0	24872	4.34
School whiting	50400	1.29	20962	1.98
Silver trevally	13590	2.16	50017	1.55
Spotted warehou	60750	2.78	6493	2.95
Arrow squid	13050	1.79	0	0

9 MONTH WEIGHTED	Melbourne who	Melbourne wholesale markets		larkets
SEF Species	Q (kg)	Av. price	Q (kg)	Av. price
Blue eye trevella		5.69		8.00
Blue Grenadier		3.75		3.09
Blue warehou		3.29		2.99
Flathead		2.20		2.95
Gemfish		4.64		5.65
Jackass morwong		1.79		2.96
John dory		3.05		7.13
Ling		5.04		5.92
Mirror dory		1.86		2.86
Ocean Perch		2.19		3.96
Orange roughy		4.48		3.91
Redfish		1.51		1.64
Royal red prawn		0.00		4.05
School whiting		2.25		2.54
Silver trevally		2.14		1.85
Spotted warehou		1.86		1.99
Arrow squid		1.70		3.26

Feb-95	Melbourne wholesa	Melbourne wholesale markets		Markets
SEF Species	Q (kg)	Av. price	Q (kg)	Av. price
Blue eye trevella	11430	5.52	15867	6.2
Blue Grenadier	127080	2.14	6800	2.11
Blue warehou	25320	3.06	33	3.22
Flathead	105390	1.61	128237	1.68
Gemfish	15870	4.08	23422	4.45
Jackass morwong	30960	1.42	62270	2.13
John dory	600	3.47	11480	6.43
Ling	51840	3.91	21346	4.25
Mirror dory	8160	1.8	12796	2.88
Ocean Perch	4950	3.56	15086	3.8
Orange roughy	38370	3.74	2514	4.44
Redfish	1770	1.08	37897	2.14
Royal red prawn	0	0	16831	4.3
School whiting	48120	1.29	17252	1.85
Silver trevally	15840	1.71	43130	1.33
Spotted warehou	57420	2.31	10202	2.04
Arrow squid	46320	1.28	0	0

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1a - Total Landings 1,400,000 1,200,000 - 1986 1,000,000 800,000 1987 600,000 1990 400,000 1994 200,000 0 🖄 X MARCH JAN JUNE JULY SEPT DEC APRIL ΜАΥ AUGUST OCT FEB VOV















APPENDIX B: ULLADULLA AREA CATCH TRENDS










APPENDIX D: BERMAGUI AREA CATCH TRENDS





APPENDIX D: BERMAGUI AREA CATCH TRENDS









APPENDIX D: BERMAGUI AREA CATCH TRENDS

























APPENDIX G: LETTERS RECEIVED CONCERNING CLOSURES





1 September, 1995

Mr Geoff Diver Biospherics Pty. Ltd PO Box 209 LEEDERVILLE WA 6903

Fax No: (09) 242 3563

Dear Sir,

CLOSURE OPTIONS FOR SEF TRAWL

Reference is made to your facsimile of 25 August, 1995 regarding the socio-economic assessment of closure options for the South East Trawl Fishery which you are undertaking.

As discussed in our telephone conversation today, Sydney Fish Market Pty. Ltd is concerned at the proposals to implement closures for the South East Trawl Fisheries. Such closures would have a significant impact on the business operations of not only the Sydney Fish Market but also the professional fishermen in question; local co-operatives; the 600 fish merchants who purchase their supplies at the market and, ultimately, seafood consumers.

We are currently extracting the statistical information which you have sought and will forward it to you in the near future.

Yours faithfully,

BRYAN SKEPPER FINANCE AND ADMIN. MANAGER

ydney Fish Market

ty Limited

CN 064 254 306

orner Pyrmont

ridge Road &

ank Street

lackwattle Bay

O Box 247

mont NSW 2009

EL: (02) 660 1611

X: (02) 552 1661







Head Office: 13-15 Railway Ave., Bunyip, 3815. Phone: (056) 29 5203 Fax: (056) 29 5808

A C N 005 605 103

EDEN DEPOT - Ben Boyd Drive, Eden, NSW, 2551 Phone (064)961256 Fax (064)961886

July 27 1995

Mr J Prince Biospherics Pty Ltd P O Box 209 LEEDERVILLE W A 6903

Dear Sir re Trawl Fish Industry

We are writing to place on record the vital importance to Towns Haulage of the NSW South East Trawl Fishery.

The Eden depot of this company carries the trawl fish catch of the Eden fleet to the Sydney and Melbourne fish markets. In addition we also carry Bermagui trawl fish to the Melbourne markets and, periodically, Ulladulla trawl fish to both Sydney and Melbourne markets.

In the last financial year to 30/06/95 cartage earnings directly attributable to this fish freight amounted to \$ 838,000.

We also carry a substantial volume of freight connected with the support of the trawl industry such as fishing equipment, maintenance materials, engine oils and so on to name just a few.

Further, this steady volume of fish freight from Eden to the capitals enables us to bring consumables such as groceries and hardware back to the Eden/Bega area on an economical basis, thus fostering the local economy and business community generally.

In the event of the periodic whole or partial closure of the trawl fishery this company would lose not only the direct freight earnings but would also suffer substantially from a flow - on effect overall.

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1/....

Biospherics Pty Ltd (cont.)

July 27 1995

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We estimate that such an occurrence would mean that some 12 employees of a total of 35 currently employed at our Eden and Bega depots would be at risk of losing employment and the company would be involved in downsizing its whole operation.

Clearly the trawl fish industry is of major concern to us and any changes would be expected to have a corresponding effect on this company.

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We would be pleased to amplify the above at any time should you so require.

Yours faithfully Towns Haulage (NSW) Pty Ltd

Noel Mitchell - Manager



LAKES ENTRANCE FISHERMEN'S CO-OPERATIVE SOCIETY LIMITED

22nd August, 1995

Dr Jereny Prince, Fax NO. 09 242 3563

Dear Jereny,

I now enclose the information that you sought relevant to the importance of the June, July and August production to this Co-operative and to the fishermen generally. Generally speaking these months have been responsible, at worst, for a for our annual production, and at best, 343. The specific figures as to kilograms landed are as follows:-

1986	June,	July,	August		1,189,430
1987	June,	July,	August		1,963,292
1988	June,	July,	August		1,780,943
1989	June,	July,	August		2,430,019
1990	June,	July,	August	••••	2,084,486
1991	June,	July,	August		1,811,178
1992	June,	July,	August		1,499,404
1993	June,	July,	August		1,620,885
1994	June,	July,	August	• • • • • • • •	1,170,176

The total kilograms of landings in the various years are as follows:-

Tr fret.	1985	_	TITO	1986		4 566 612
U LLY				100	*********	1,000,012
July	1986	-	June	1987		6,332,984
July	1987	-	June	1988	•••••	6,868,849
July	1988	-	June	1989		7,335,808
July	1989	-	June	1990	•••••	7,505,276
July	1990	-	June	1991		8,948,763
July	1991	-	June	1992		6,667,316
July	1992	_	June	1993		6,078,322 2
July	1993	-	June	1994		5,429,7273
July	1994	-	June	1995		4,308,7495

All the above figures are for "off the shelf" landings.

688 of this production is made up of the 16 SEF species.

A closure of the fishery during these three months would have a very detrimental affect on the Co-operative itself since we employ approximately 22 normanent staff and 60 metals) All of the activities at the Co-op depend fundamentally upon the throughout of fish so that we would see our the allow activities at the co-operative inter.

An economic study of the value of the Co-operative to Lakes Entrance and to the Victorian Community which was carried out some years ago, put a figure willion on the annual enterprise. This figure was considered conservative by the Dean of Economics at the Australian National University. Apart from our Export catch, which is normally 20% of our landings right through the year, 80% of our landings go to the Melbourne Market and 20% to Sydney. Our so that the Winter months are of vital importance to production overall and to the regular supply of fresh fish to the two markets.

- -

There are an average of the state of this Port and the total from Melbourne normally working out of this Port during these months. They average three crew members each.

It will be apparent from the way our inclusion of the introduction of quotas in the South East Fishery. There is a tendency for Fisheries Managers, Scientists etc to declare that the South East Fishery is of very small value and therefore of no importance. The point should be made that this South Hard Constant, as distinct from the Abalone, Northern Prawn and Western Rock Lobster industry. Although the wharf price for scale fish is relatively low, to replace it would be extremely expensive for the nation as a whole.

It should also be pointed out that our **blice of**, Leftrade Ltd, which is some the second state of the sec

Yours faithfully,

T.G. Davies, Geperal Manager.

APPENDIX H: CASE STUDIES OF INDIVIDUAL BOAT AND COOPERATIVE INFORMATION

This Appendix contains an analysis of individual boat figures and Cooperative figures which were used to validate the results from the SEF1 data and some assumptions made in this study (see Page 12).

Analysis of seasonal trends in the throughput of the Fishermen's Cooperatives and some individual boats show that the seasonal trends described by this study are still apparent if total landings are considered including shallow water quota species and non-quota species.

Case study 1a shows total monthly landings (including all quota and all non-quota species) for an individual boat for the years 1986 to 1994. The graph confirms the importance of the winter months as described in the report. The figure for Case study 2 displays the same data for two boats from another port. Again for most years the landings during the winter months are higher than for the rest of the year. This same trend is evident in statistics (Case study 3) from an individual Cooperative showing monthly volume handled.

Non-quota species have been historically a relatively minor part of the catch, although their importance is growing rapidly. Case study 1b shows the monthly percentage of quota species for the same boat as in Case study 1a. Over the nine years shown in this figure the percentage of landings comprised by quota species ranged from 20% to 100%, most of the time the percentage was between 60-90%. From the figure it seems the percentage of quota species may be somewhat higher during the winter months although there has been no attempt to substantiate this.





APPENDIX I: RESULTS OF CONSULTATION

1. What are your views on the state of the South East Fishery and the proposed closure option?

State of fishery

In Ulladulla the fishers say there are a lot of small gemfish in the catch this year, and that they are catching all size classes.

Many fishers said that the water has been particularly cold this year.

In Wollongong many of the fishers are concerned with the research that current decisions are being made on. The fishermen questioned this level of research. "Some fishermen have 50 years experience of fishing the shelf but their knowledge is ignored. During the last 7 years of management no one has seen a NSW fisheries boat in the water."

"Why doesn't AFMA come here to see how we fish. The best researchers are here (the fishermen) but they are not even used. AFMA needs to employ someone who can talk to the fishermen and come down to the ports and go out on the boats."

A Sydney fisher: "There are a lot of gemfish there but no one is catching them because everyone is avoiding them. If these people from Canberra come down and go out on our boats we can show them plenty of gemfish."

Many of the fishermen questioned the value of assessing gemfish stocks by catch and effort data. This is because they are not targeting gemfish and if they catch over the trip limit the fish aren't being declared. Also, high grading is occurring. Some fishers say the only way measuring of length can be accurate is if it is done on board the vessels.

The issue of the gemfish fishery of New Zealand was continually being raised by the fishermen. "If the eastern gemfish are genetically the same as the New Zealand ones, why aren't they managing them? They have no quota in NZ and they keep hammering their stocks and then we buy their fish". "If the school shark, lobster and tuna move between the countries, why not gemfish?"

<u>Closures</u>

Industry opposition to any form of closures during these three months was vehement. Right across the fishery there was unanimous agreement that if any closures were to occur then the fishery would close down entirely. Most of the fishers were not interested in hearing what the closure options were, and were not prepared to discuss them.

In the northern ports (Sydney, Wollongong and Ulladulla) there was strong consensus that if there are any gemfish closures the fishers should be paid out. They believed they should be compensated for the closures, as happens overseas. In one port the fishers stressed this as the only closure option, and no other options could or would be discussed.

All fishers were agreed that the use of a "trigger mechanism" to initiate closures would not work. The fishers said they would rather dump fish than activate closures.

The fishers often asked how the closures would be policed, saying that the existing situation (having State waters) isn't being properly policed now.

In Eden the fishers questioned the equity of having area closures. They say the length of the gemfish season increases further north. The season is only 2-3 weeks in Lakes Entrance but up to 3 months in Sydney.

Some fishers believe that if areas are closed they will never be opened to fishing again.

In Nowra the wider impacts of closures on the local community were discussed with the Industrial Development Manager from the City of Shoalhaven. This shire includes Greenwell Point and Ulladulla. In the City of Shoalhaven tourism is an in important industry, with a gross worth of \$304 million in 1993. The Development Manager expressed concern at any closures in the fishery. Tourism is a seasonal industry, with little activity in the winter months. As the winter months are the most important to the trawl fishery, a closure in the fishery at this time would have a big impact on the local community.

The value of having a fishing boat harbour in a town is seen as an attraction for tourism. This "ambience" is important but cannot be quantified. The tourists also desire the ability to buy fresh fish, direct from boats. These are all impacts of closures that cannot be quantified.

Unemployment is high in the City of Shoalhaven: 24.7% in October, 1994 (45% of which are long-term unemployed). In Ulladulla there is an excess of 40% unemployment. Unemployment rates are greater for people over 40 and there would be no alternative employment in the region for fishers if closures forced the industry to shutdown.

Current management

The fishers hold a range of points of view about whether a TAC on eastern gemfish should be introduced.

In Wollongong there was talk of some targeting, especially towards the end of the season or when price and availability presented themselves. The Cooperative manager felt that targeting would occur.

A Wollongong fisher: "We are used to getting \$4/kg for gemfish now, we wouldn't flood the market."

In Wollongong there was a view that the system is set up for the people down south. They felt that even with a TAC, not much quota would get North.

A Wollongong fisher: "The most damaging thing to the fishery is current management which results in high grading and dumping.... We would rather bring the fish in and give them away than have to throw them out if we catch too much."

In Ulladulla the fishers believed a small quota was necessary and the current system of trip limits isn't working. They say a 1 000t quota would probably result in only 600t landed. There would be no dumping of the gemfish if this happened as no one is currently targeting. "If you had a small quota you would try and stretch it out, not catch it all straight away. No one targets gemfish now, this wont change if we had a small TAC."

In Sydney the fishers felt a bigger trip limit would be better than a bigger bycatch because even with a small TAC some people would target, and ruin it for the rest.

At Greenwell Point the fishers believed they could manage a small TAC.

In Lakes Entrance the fishers agreed that the current trip limits have caused more damage than a small TAC because of targeting. They would prefer a small TAC to trip limits. They say a small TAC of 200t would mean the same number of fish would be caught as with a reasonable TAC of 1 000t as no high grading and dumping would occur. They believe a bigger trip limit would be more realistic in the south than in the north.

Most of the fishers believe trip limits should cover trips of more than one day.

There was some discussion with the problem of industry representation on the MAC.

In Sydney the fishermen don't fish on Fridays and Saturdays. They do this to give the sea a spell. They think if you leave the fish a couple of days then you catch more fish. And then with the factor of bad weather, they sometimes don't fish for days. The fishermen suggested closures for 2-3 days/week for a few months. With the weather this would average more days of no fishing. Could have different days closed in different ports so prices would be better. They could survive this option.

The Sydney fishermen stressed how fishing patterns and effort has changed since the gemfish closures. "We now use different nets. We now go for prawns and you get a bit of dory, ling and perch. We use a prawn net on the shelf which is smaller and lower. Also we now fish at 230-240 fathoms to avoid gemfish."

Many of the fishers made the point that fishing techniques, gear and fishing patterns have changed greatly since the gemfish closures.

"You can't manage a multi-species fishery on a single species policy."

"If you try and save one species then the others will be targeted...It wrecks the balance...You need a blend of fish."

One fisher said that as long as the research logbooks are used for policing they won't be accurate.

Other comments

A view that was expressed to us continually was the fishers' frustration with the process of management. The trawl fishers consider there have been too many changes in the way the fishery is managed, and they are the ones bearing the cost of this. It was often said that the fishers have no security or continuity in the industry that is their livelihood. Even the banks won't lend them money any more because the bank managers don't see stability in an industry where the "rules" change so often and so quickly.

Comments by Sydney fishermen:

"I have been fishing for 40 years and with the gemfish closures I've already lost my house, I've lost everything. If they close the shelf we can't survive anymore. I am a fisherman, what else can I do? Where can I go?"

The fishermen explained how they are already on the edge. They aren't making any money as it is. They say they can't get the dole because they have a business but they cant make any money from that. They can't even sell their boats — no one wants to buy them.

Royal red prawn are now the main source of income (60-75%), the rest is fin fish.

They are only surviving now because they can fish north of Barranjoey.

Comments by Wollongong fishers;-

"This study is seven years too late."

"How many goes do they want at managing something that is easy to manage."

"First there was the unit system, then quota and now closures. These are all systems which have been brought in by AFMA which have failed."

"We don't trust AFMA and consultants. This is the end of a seven year process. What you see here is the survivors."

"This situation is coming to a boiling point. The only good thing that has happened is that no one has been hurt."

"The Government's management benefits very few people. Do they have something against the fishermen in NSW?"

"There are many questions and many answers but the most important answer is that if they close the shelf they will close the fishery and the Cooperative. What will the fisheries scientists do then? They will have no job."

"Why is the Government paying Jeremy Prince to come around and ask questions he already knows the answers to?"

"The Government can afford to spend \$6 million to pay for more inspections but they can't afford to subsidise the fishermen, or to do research."

"We feel frustrated because there are hundreds of meetings, lots of paper sent to us, but nothing ever changes."

Comments by Greenwell Point fishermen:

The Nowra Cooperative has already closed, the fishers say this was largely due to gemfish management. Since the Cooperative closed the fishers say their expenses are greater.

Comments by Lakes Entrance fishermen:

"The more the fishermen say, the more you tell the truth, the worse things get."

"If they want closures their aim must be to get rid of the fishermen."

An uncertainty as to what will happen next was expressed. "Every year something new happens." The fishers are concerned about the insecurity of the current setup and don't believe the basic problems are being tackled and make such comments as, "We are kicking over more fish than we are bringing in."

"Everywhere you turn the trawl fishers are being done, we have twice the levies of meshers and 10-20 times the levies of the drop-liners who are uncontrolled. We are a pretty vulnerable group."

The fishers say the profit margin is a lot less now and that much more effort is required to get the same catch.

"In the early days you could get a 100t shot and then you would tie the boat up for four days. Now you only ever tie up for 12 hours. Everything is different now."

The fishermen consider that the fish come some years and not others. This has always been the case, even before fishing. They say "it's nature". "Before quotas we caught the fish that were having a good year, the other species were left alone as they were not worth catching."

2. Specific catching

a) What is the importance of the months of June, July and August to the fishery in terms of catch and cash flow?

All the fishers agreed that June, July, August are the most important months. Even though it is only three months they say it is 50% of their income.

A Wollongong fisher: "It is not so much the gemfish that are important in these three months, we can't catch them anyway, it is the other species."

In Wollongong the fishers said that pre quota gemfish were 50-70% of cash flow. For fishers who fished only the shelf gemfish was 100% of income pre quota.

There are 7 drop-liners from Kiama who turnover \$500,000 annually. The drop-liners said 75-85% of their annual income comes during these three months.

In Lakes Entrance the fishers reckon the winter months are good for ling and that there are not much fish inshore. They also say that after August the weather declines, and that the summer months aren't good for fishing.

b) What is the importance of inshore areas (up to 200m) versus the offshore areas (greater than 200m)?

With the exception of Lakes Entrance (**check**), the fishers were unanimous that if they can't fish the shelf the inshore grounds will be destroyed. One fisher said "It can't stand pressure like the shelf. Nets will be trawling over the reefs."

In Ulladulla there was a range of opinions on the importance of the shelf, some saying 90%, some 50% or less. "If you close from 100 fathoms you may as well close from the shore. Fishing inshore would create a war in the industry as well as widespread ecological damage. This would create more pressure on AFMA from the green groups."

A Wollongong fisher: "In one week the inshore areas would be destroyed if the shelf was closed."

In Wollongong the shelf provides approximately 70% of income for trawlers. It was higher (75%) before quotas, with gemfish providing approximately 50% of income Some fishermen hold 90 to 100% of their quota on shelf species. There is not enoughinshore quota to pay or even to cover costs in some cases.

The Kiama drop-liners said 100% of their activity is on the shelf, and the same months are important as for the trawl fishery.

A Sydney fisher: "If you can't fish the shelf then the inshore grounds will be destroyed, just like if you close the inshore areas you will destroy the shelf. There would be not enough product inshore to survive. It would be cheaper just to leave the boats tied to the wharf."

In Sydney some boats fish on the shelf 99% of the time. One fisherman said 90% of his fishing was on the shelf, but 100% during June, July and August.

In Greenwell Point the Industry Development Manager from the City of Shoalhaven expressed concern that if the trawlers were fishing the inshore areas then the recreational fishers would be impacted. Recreational fishing is a major attraction to tourists.

In Lakes Entrance the inshore areas are important to the Danish seine fleet.

In Lakes Entrance there is a push by a local land conservation group to close areas of the coast to the three mile limit as marine reserves. Additional closures would put more pressure on the inshore areas.

c) List the species associated with gemfish (quota species and non-quota species)

In Ulladulla they cited ling, mirror dory, blue grenadier, morwong, flathead, redfish, snotties and squid. There was discussion on the relative importance of non-quota species. Some said this was up to 50%. Some said you can't survive on one without the other. The non-quota species were ribbon fish, rough-skin shark, angel, spikies, black shark, squid, oreo dory, king dory, shuttlenose, black dory. In winter there are not many non-quota species on the shelf.

In Wollongong silver dory, oreo dory, liverfish and ribbonfish were cited as important non-quota species.

The drop-liners from Kiama said they would like to target the ribbonfish as the prices are increasing, but they can't because they feed with the gemfish.
In Sydney, balmain bugs were cited as important non-quota species.

In Greenwell Point gummy sharks and green-eye sharks were cited as important nonquota species.

In Lakes Entrance non-quota species included ocean perch, spotted trevally (from Gabo Island south) as well as sharks and morwong.

d) If there were strip closures you travel to other ports?

In Ulladulla they said 100% of fishermen would travel to other ports "to survive".

In Wollongong, Sydney the fishers said they wouldn't travel to other ports as they couldn't afford it and because they don't hold enough quota.

In Eden the fishers said effort would increase south of 40°S for the larger boats. However, this may not happen due to any combination of the following factors: bad weather during winter, lack of fish on the east coast of Tasmania, low prices and small market in Hobart, high fuel costs.

In Lakes Entrance the fishers said that south of 40°S is good in January, February and March but after that you wouldn't cover your costs if you travelled.

3. Questions regarding marketing

a) Where are the fish sold?

The Ulladulla, Wollongong and Sydney fishers all said their fish goes to Sydney.

The Sydney trawlers supply 7-8% of the total product though the Sydney fish Markets. Royal red prawn have a set price (export market).

In Eden: 60% to Sydney, 40% to Melbourne.

Lakes Entrance fish are sold to the Melbourne market.

b) Describe any price fluctuations

Since the drop in gemfish TAC the prices have been pretty good except when there is a glut on the market.

Prices fluctuates a bit, but there is no difference in winter.

Fishers admit to manipulating prices by diversifying catch between processors and market to maintain market price.

In Melbourne the prices are low in the beginning of the year and increase from Easter.

c) Impressions of demand and supply (if one area is shut will a price increase compensate)

If there were closures there wouldn't be a price rise.

4. Questions regarding infrastructure

Port	Trawlers (crew*)	Drop-liners	Cooperative staff - permanent, casual
Wollongong	4 (4)	7 (2-3)	2,5
Ulladulla	8-9(2-3)	3-4(2-3)	10
Sydney	8(4-5)		none
Bermagui	4(3)	10 (2-3)	
Greenwell Point	3(3)	4-5(2)	none
Eden (3 cooperative)	17-20(3-4)	4-8(2-3)	5(17)
Lakes Entrance	7	1-5(3)	

a) What is the size of this co-operative and what other groups besides trawl fishers use its facilities?

*-includes skipper

In Lakes Entrance there are 16 Danish seiners, each boat with three crew.

In Ulladulla the Cooperative throughput is approximately 70% trawl but it would close if the trawl fishery did. The Cooperative only runs on a 10% profit margin so would close if there was even a 10% reduction in throughput.

In Wollongong the Cooperative is marginal now and would definitely close if the shelf was closed for those three months. The Cooperative is 75% trawl. All other fishermen around Wollongong — trap and line, purse seine, bait fishing, tuna fishing, estuarine fishermen — use the Cooperative.

The fish shops would be affected.

Wollongong Fisheries (a processing plant) used to employ 120 people during the gemfish fishery, now just a few.

b) Identify the source of spending, i.e. local, in the Cooperative and outside

The Cooperatives in Wollongong, Ulladulla and Eden are all dependent on the trawl fishery. The view in these ports was unanimous : "Take out the trawl and you take out the Co-op. Take out the Co-op and you take out the infrastructure for the drop-liners and the remaining boats (icing facilities, bulk fuel, transport and haulage)."

It was continually pointed out to us that all the fishers are family operators, you don't take away individuals from the fishery, it affects whole families. One fisher from Greenwell Point said, "If I tie up my boat it affects five families."

The fishermen say it will have a domino effect on all sectors of the local community, "Right down to the local hamburger joint."