

**ASSESSMENT OF
WESTERN ROCK LOBSTER
STRATEGIC MANAGEMENT OPTIONS
(4 volumes)**

**A SOCIAL ASSESSMENT OF
COASTAL COMMUNITIES HOSTING THE
WESTERN ROCK LOBSTER FISHING FLEET
Volume 3**

By Veronica Huddleston, Institute for Regional Development

A REPORT PREPARED FOR
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**Fisheries Research and
Development Corporation**

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WESTERN ROCK LOBSTER FISHING FLEET**

December 2005

**Veronica Huddleston
Research Fellow
Institute for Regional Development
The University of Western Australia
35 Stirling Highway, Crawley, WA 6009
<http://www.ird.uwa.edu.au>**

EXECUTIVE SUMMARY

Analysis of the socio-economic trends and patterns in 17 communities that host the Western Rock Lobster (WRL) fishing fleet show the inter-relatedness of the economic, social, environmental and cultural facets of communities and regions. Most of the communities experienced substantial population growth between 1991 and 2001. Although still dependent on fishing, the communities now have a broader outlook. The median age increased because of aging *in situ*, and the attraction of retirees from inland communities and larger centres. Some communities exhibit a large seasonal population change that affects business activities. Except for Yanchep, Jurien Bay, Geraldton and Fremantle, the communities exhibit low to moderately-diversified economies. The smaller fishing communities have unemployment rates almost double the national average and high levels of part-time employment.

Some communities are better able to handle change (i.e., they are more resilient) and others less so. More resilient communities are Two Rocks, Yanchep, Busselton, Ledge Point, Mandurah, Lancelin and Fremantle. Less resilient communities are Geraldton, Cervantes, Bunbury, Augusta, Green Head and Jurien Bay.

The decline in the proportion of rock lobster fishers in these communities is accompanied by a change in the mindset of younger fishers who are often becoming less concerned with community activities. But they spend most of their income in their community of residence and contribute to the financial well-being of their communities.

The fishers' perceptions of the problems and issues confronting them and the WRL fishery, and their views about these communities, are put forward in this paper in the fishers' own words. The fishers' perceptions on the impacts of fishery management at the economic, social, environmental and institutional levels are also recorded.

A key recommendation is the adoption of a workable arrangement for an intensive and open consultation process between those involved in the fishery and the rest of the community. Such a consultation process is necessary to ensure that the changes introduced in the WRL fishery will result not only in a sustainable fishery but also in viable and contented communities.

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1.0 INTRODUCTION

In October 2004, the Institute for Regional Development received a grant from the Fisheries Research and Development Corporation for a project entitled *A Scenario Analysis of the Social Impact of the Western Rock Lobster Industry Management Options on Fleet Hosting Communities*. This three-year project will address the social dimensions of management arrangements governing the Western Rock Lobster¹ (WRL) fishery. Support from both Western Australian fishers and industry representatives for this project underscores the increasing recognition of the need for a comprehensive social impact analysis of management practices in the WRL fishery. Such analysis will inform managers and industry on the likely social consequences of changes to the existing management rules and practices (particularly a change from input to output controls) to the communities hosting the WRL fleet (see Figure 1).

The research project has three key objectives:

1. To assist in the formulation of policies and strategies concerning the management arrangements in the WRL fishery;
2. To establish a database of social indicators that will contribute to the assessment of alternative management options; and
3. To participate in the formulation of a predictive sustainability model, integrating the social aspects into fisheries management, along with economic and environmental parameters.

This report is on work-in-progress and is based on the research and data collection undertaken in the first two phases of the project. These two phases focused on the audit of available secondary data and collection of primary data that were used in preparing the profiles of the 17 communities included in the study. A further analysis of the interview transcripts on the views of other stakeholders will be undertaken. A telephone survey focusing on measuring social capital and cohesion in the 17 communities has also been undertaken and is currently being analysed. Additional consultations focused on specific issues, and a more detailed analysis of the impacts of the alternative management arrangements will be undertaken in specific communities as the project advances to the next stage.

Report Outline

Chapter 1 - Introduction

Chapter 2 - Research Methodology and Data used in the Analysis

Chapter 3 - The Socio-Economic Environment of Rural Australia

Chapter 4 - An International Perspective on Fishery Management Arrangements

Chapter 5 - Profile of Communities hosting the Western Rock Lobster Fleet

Chapter 6 – Initial Research Findings and Trends

Chapter 7 - Conclusion

¹ Colloquially known as crayfish, the Western Rock Lobster fishery is an important component of commercial fishing and a significant contributor to the Western Australian economy. The total catch for the 2002/2003 season was valued at \$278 million, exported mostly to Japan, Taiwan, Hong Kong/China, and the United States and Europe.

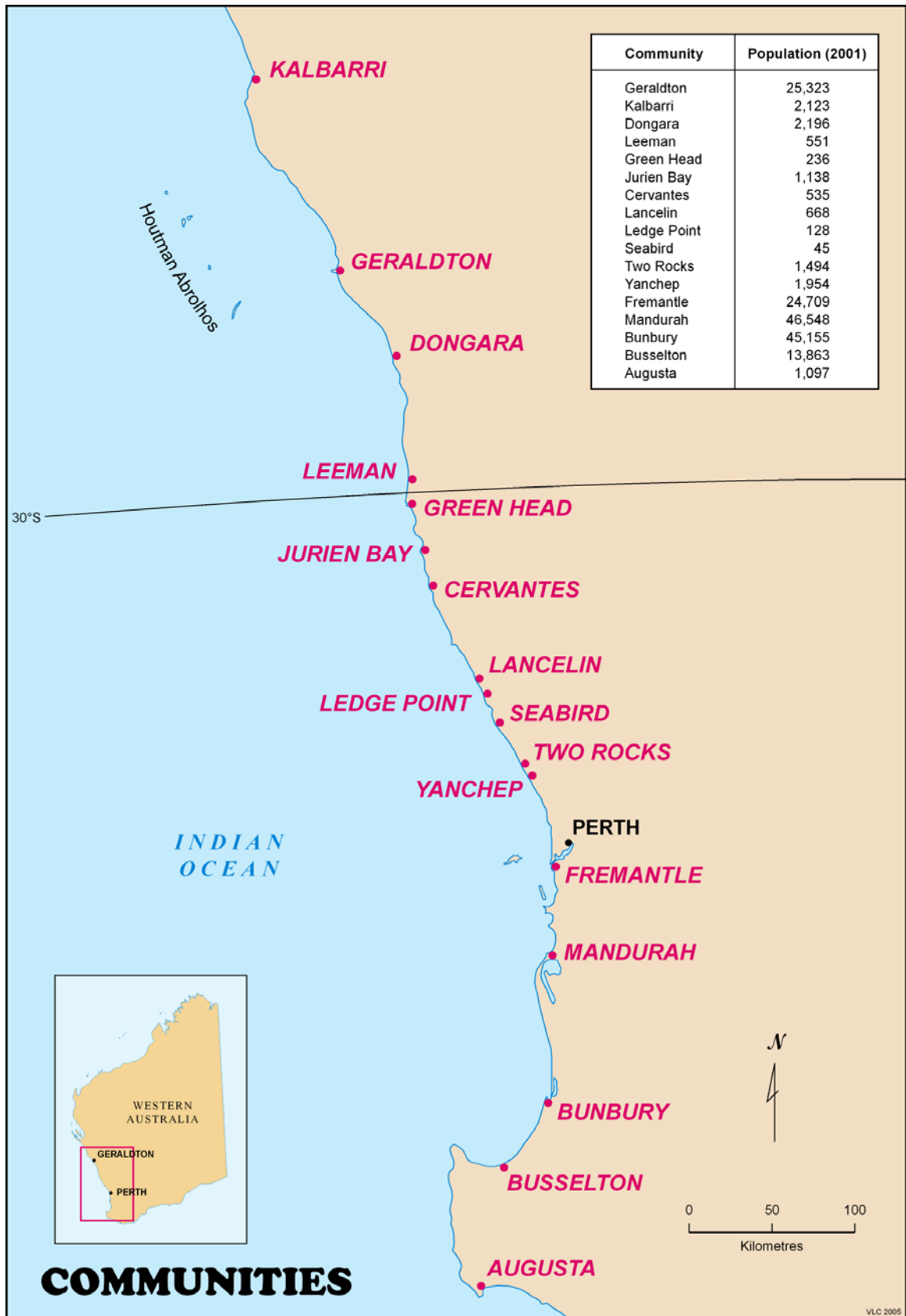


Figure 1: Locations of the 17 Communities

2.0 RESEARCH METHODOLOGY

The core process in sustainability consists of finding a strategic vision of the future which is the desired outcome for a majority of the community based on common good principles and setting out practical steps that integrate economic, social and environmental outcomes relevant to that vision and which can be taken through every element of development (Government of Western Australia, 2002, p. 55).

In undertaking the research, an extensive literature review of government, academic, institutional and internet sources was completed. The review included the analysis of relevant studies to develop the contextual and methodological frameworks that will link changes in fishery management arrangements with the socio-economic adjustments experienced by coastal communities. It also included a review of the literature relating to other fisheries in Australia and overseas that have experienced changes in management arrangements and practices in order to provide comparative context. Available documents containing community histories, issues and dynamics were also reviewed.

Primary data² in the form of the results of a postal survey of WRL license holders, undertaken by the author in the second quarter of 2004, were also analysed and included in the project database. These postal survey results were complemented by semi-structured interviews conducted in most of the 17 communities. The individual and group interviews (most of which were taped after permission was granted by the interviewees) were transcribed and are, at present, being analysed by the author.

Community profiles for each of the 17 communities included in this study were prepared. In compiling these profiles, existing or secondary sources of data collected by organisations such as the Australian Bureau of Statistics were used. Secondary sources include data from the 1991, 1996 and 2001 Censuses conducted by the Australian Bureau of Statistics (ABS)³ on demographics, employment, labour force characteristics, and income.

Other secondary data used in the community profiles include data compiled by regional development commissions and local governments. Historical perspectives of how the towns were created and the current settlement patterns vis-à-vis growth of rock lobster fishing were also incorporated.

² Current project activities aimed at primary data collection include telephone survey focusing on measuring the social capital and the social cohesion in the 17 communities as well as additional consultations in the form of focus group discussions with business and community groups.

³ It must be noted that most of the census data produced by the ABS is based on place of enumeration which counts people where they are on census night. The data thus excludes those who normally live in the area but were away on census night. The ABS also produces data based on the place of usual residence. These are important to note since the WRL fishery is a seasonal one (November 15 to June 30) and rock lobster fishers may be away to work elsewhere or be on holidays at the time of the census data collection.

3.0 THE SOCIO-ECONOMIC ENVIRONMENT OF RURAL AUSTRALIA

Historically, rural Australia was a place whose role was seen as the exploitation and transformation of natural resources – whether they were farming or grazing lands, forests, fisheries or mineral deposits. The economic and social role of rural towns reflected that purpose, in that they were essentially service centres for these primary industries. Today, however, the relationship between the economic condition of primary industries and the economic and social condition of rural communities is often much less strong and direct, and factors originating elsewhere in the economy are relatively more important in determining the circumstances of rural communities (Stayner, 2005, p.122).

In recent years, an increasing number of studies have been conducted on the social and economic conditions in rural Australia (e.g. Black et al, 2000; Pritchard and McManus, 2000; Gray and Lawrence, 2001; and Cocklin and Alston, 2003). Usually, rural Australia is described as an area where the economic and social systems are connected with, if not wholly dependent upon primary industries. However, it is clear that much of the research on rural communities has focused on broad-acre agricultural regions, rather than on localities linked to other primary industries, such as fishing. Indeed, Zann (1995), in discussing the summary of the State of the Marine Environment Report, indicated that the social and cultural values associated with the coast and sea, are not widely documented in Australia. In fact, they are not adequately considered in management plans and environmental impact studies in Australia.

Growing and changing communities are an important part of marine resource management equation as highlighted by the findings of a recent Tasmanian research (Frusher *et al*, 2003). The research concluded that fishers and boats, and their regional distribution are essential components of that state's socioeconomic and cultural profile. This research has also stressed that communal social and economic sustainability is as important as the biological sustainability of the resource. There is inter-relatedness and interdependence among the economic, social, environmental, and cultural facets of communities and regions. When one aspect is put under pressure, or when it dysfunctions, it is inevitable that the sustainability of the whole community can be threatened (McKenzie, 2002). While rural restructuring is forcing change among farming people (Gray and Lawrence, 2001), there is evidence that rural communities need not be passive recipients of negative economic, social or political pressures (Tonts, 2000).

A recent study of two rural communities in Victoria that have a history of dependence on primary industries – farming and fishing - is a case in point (Bourke, 2005). These two towns have seasonal economies dependent on international markets, with fewer people employed due to technological advancements, and where environmental concerns have altered the rates of extraction. These two towns were also located on the coast and had also experienced change associated with tourism. Yet, these towns continued to endure and embrace change.

There is now a considerable body of research on the capacity of rural communities to adapt to economic, social and environmental change (e.g. Cocklin and Alston, 2003; Sorensen and Epps, 1996; and Tonts, 1996). These studies point out that major adjustment in industrial policy or macro-economic conditions do not necessarily lead to local economic, social and demographic decline. In many cases, rural communities have been able to flourish by embracing new industries and innovations, including downstream processing activities, tourism and recreational opportunities, or by attracting urban based businesses to high amenity coastal and other environments. However, it is also clear that communities that lack the leadership and resources to pursue such initiatives can struggle in the face of wider changes.

One of the major factors driving change in Australia's rural communities has been the reorganisation of the regulatory and policy contexts within which key primary industries operate. In industries such as agriculture, this has included a gradual deregulation of the sector, trade liberalisation, and a reduction in direct and indirect governmental support. While the fisheries sector has not experienced reform on the same scale as agriculture, there are significant changes to the management of the industry on the horizon. These changes will have a bearing on coastal communities inasmuch as the commercial fishing sector and the expansion of the fishing industry from the late 1940s onward provided the impetus for the establishment of services and the bulk of employment in these coastal communities (Crombie, 2001).

Of course, the rock lobster industry is not confined to smaller coastal communities. It also forms a significant component of the economies and social structures of larger centres, such as Fremantle and Geraldton. Indeed, in these larger centres fishing is associated with a range of downstream processing industries, as well as allied transport, packing, maintenance and supply firms. Larger urban economies are less dependent on a single industry, such as fishing, and are more resilient in the face of management changes, but individual enterprises, families and organisations will be affected, and it is important that these impacts are not masked by the more complex and diverse nature of urban settings.

4.0 AN INTERNATIONAL PERSPECTIVE ON FISHERY MANAGEMENT ARRANGEMENTS

...Scrutiny of the record of fisheries management reveals no alternative scheme that is free of significant problems (Copes, 1986, p. 288).

In 1997, the Organisation for Economic Cooperation and Development (OECD) undertook a review of more than 100 fisheries in 24 member countries to determine which fishery management measures are effective in conserving marine fisheries and producing significant economic and social benefits (OECD, 1997). The management measures examined were: Output controls (total allowable catch, individual quotas, and vessel catch limits); Input Controls (limited licenses, individual effort quotas, and other gear and vessel restrictions); and Technical measures (size and sex selectivity and time and area closures). The study also looked into the conditions where such

specific management measures are effective. A summary of the findings reported that the empirical evidence clearly shows that the total allowable catch management results in a race-to-fish, with all its attendant effects (Sutinen, 1999). It also reported that individual quotas are an effective means of controlling exploitation, of mitigating the race to fish and most of its negative impacts, of generating resource rent and increased profits, and of reducing the number of participants in a fishery. Also, it is clear that time and area closures have not been effective in assuring resource conservation, although conservation of the fish stocks might well have been poorer without them.

A number of studies have been undertaken on the individual quota as a device in fisheries management. Some studies indicated that individual quota should be considered with caution, as it is not a suitable management device under many common conditions (Parzival, 1986). Others pointed out that Individual Transferable Quotas⁴ (ITQ) should not be viewed as a panacea, but simply as another fisheries management option (Boyd and Dewees, 1992). The literature points to the economic benefits of ITQ⁵ but does little to the concern for social equity and balanced regional development (Symes and Crean, 1995). In New Zealand, ITQ in fisheries management is viewed in some quarters as ‘part of a particular political and social agenda’ that has led to the exclusion of small-scale and independent fishermen from fisheries that have fallen increasingly under the control of large, profit-seeking corporations’ (Duncan, 1995). The distributional effects of ITQs, in terms of income distribution between owner and crew, and the vulnerability of fisheries communities short of quota, has also been central to the debate in Icelandic fisheries that have been managed by ITQs for a decade (Eythorsson, 2000). Table 1 summarises a number of important issues on the economic, social and ecological implications of ITQ (McCay, 1995).

Several countries have experimented and implemented ITQs in their fisheries and their experiences had been widely documented (see Appendices 1A and 1B for the details). It is worth pointing out, however, that the ITQ system in New Zealand does not stand entirely on its own but operates in tandem with other administrative and management controls⁶ designed to meet those management objectives that ITQs do not address (Boyd and Dewees, 1992). The system, when put in place, was supported and promoted by key fishing industry players right from the start and enjoyed wide support from fishers, industry managers and politicians (Annala, 1996).

The history of ITQs also shows the effects of trial-and-error learning and adaptation. It is thus important that ITQs be embedded in governance systems that include both the state and communities and to link market forces with the social and ecological dimensions required for ecosystem-based management (McCay, 2004).

⁴ ITQs involve the allocation of a share of the total allowable catch (TAC) to individual operators. The ITQs can be a fixed quantity or a percentage of a variable TAC and can be allocated for specified time periods or allocated in perpetuity.

⁵ The benefits include increased operating efficiency, rationalisation of fleet structure, improved asset management and reduced monitoring costs for central government, although some doubts exist about the costs of monitoring ITQs.

⁶ Some regulations required to reduce undesirable biological effects of fishing are still in place. These include mesh size restrictions, minimum fish sizes, some closed areas to protect juvenile fish and nursery areas, and closed seasons to protect spawning fish.

ECONOMIC	Are costs reduced if the fleet size and structure are optimal?
	Is waste, brought about by the competitive race to fish, reduced?
	Are there other economic gains, such as improvements in fish quality and hence marketing position?
	Is there greater ease in obtaining loans for capital improvements because of having a new source of collateral?
SOCIAL	Among the social implications of ITQs in fisheries are job losses, changing social relationships of production, changing social structures within communities, and increased concentration of rights, power and wealth within the industry.
	ITQs have potentially profound consequences for fishery-dependent families and communities which are likely to vary according to the design of the ITQ regime, the prevailing kinship, inheritance and taxation systems and other factors.
	Other potential social problems include the loss of professional expertise and knowledge and of a traditional culture of fishing in families and communities where ITQs lead to large-scale sell-outs.
ECOLOGICAL	ITQs do not do away with, and may directly or indirectly increase, incentives for potentially wasteful and destructive fishing practices, such as discarding by-catches and high-grading targeted species.
	Underreporting of catches as well as honest mistakes can be serious problems for stock assessment programs.

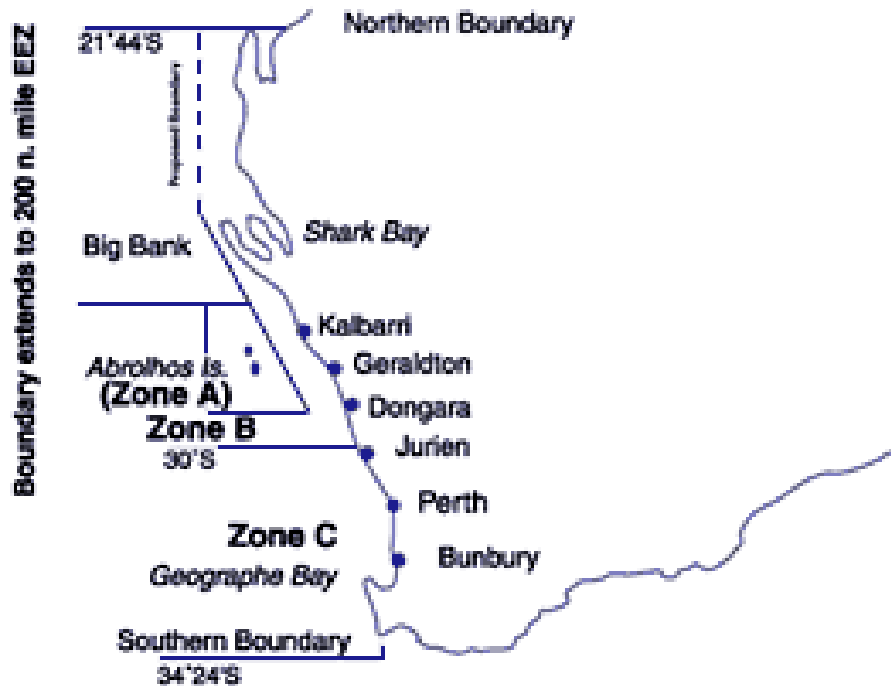
5.0 PROFILE OF COMMUNITIES HOSTING THE WESTERN ROCK LOBSTER FLEET

The 17 communities included in this study lie in the three major zones in the WRL fishery (see Figure 2). These zones are:

1. South of latitude 30°S or south of Green Head (C Zone);
2. North of latitude 30°S or north of Green Head (B Zone); and
3. Within this northern area, a third offshore zone (A Zone) around the Abrolhos Islands (Department of Fisheries, 2005: 14).

In presenting the profile of the 17 communities included in the study, comparisons are made based on:

1. Population and demographic characteristics;
2. Economic diversity and labour force/income characteristics;
3. Trends in catch and boat numbers/employment by WRL fishing zones; and
4. Measures of resilience.



Source: <http://www.fish.wa.gov.au/docs/Rock Lobster>

Figure 2: Western Rock Lobster Fishing Zones

5.1 Comparison based on Population and Demographic Characteristics

Population age distributions have a range of socio-economic consequences, because people's behaviours, abilities and entitlements all vary with age (Lee, 1994, cited in Lee, 2002, p. 4).

Based on the total population in the 17 communities in 2001, the socio-economic trends and patterns of development are presented in three groups (see Table 2):

1. Communities with population levels between 10,000 to 47,000;
2. Communities with population levels between 1,000 to 2,200; and
3. Communities less than 1,000 residents - Leeman, Green Head, Cervantes, Lancelin, Ledge Point and Seabird.

Table 2 shows that all 17 communities experienced substantial population growth between 1991 and 2001, with the aggregate population increasing from 113,895 in 1991 to 167,633 in 2001, a rise of 47.2 per cent. The greatest rate of population growth for 1991-2001 was experienced by the bigger communities, led by Mandurah, Bunbury and Busselton. Of the communities in Group 2, the highest growth rates were experienced by Jurien Bay (98.6 per cent), Kalbarri (37.9 per cent) and Augusta (36.3 per cent). While the overall level of population in Group 3 communities

exhibited an increase, a number of communities actually experienced declining levels of population over the ten-year period, e.g. Ledge Point and Leeman (-30.4 per cent and -3.3 per cent, respectively).

Table 2: Population Levels and Growth by Community, 1991-2001

Total Resident Population	1991	1996	2001	% Change 1991-1996	% Change 1996-2001	% Change 1991-2001
Australia	16,847,310	17,752,829	18,769,249	5.4	5.7	11.4
Western Australia	1,586,219	1,713,023	1,832,008	8.0	6.9	15.5
Group 1	104,532	120,502	155,598	15.3	29.1	48.9
Geraldton	24,449	25,148	25,323	2.9	0.7	3.6
Fremantle	23,831	24,029	24,709	0.8	2.8	3.7
Mandurah	23,325	35,839	46,548	53.7	29.9	99.6
Bunbury	24,078	24,885	45,155	3.4	81.5	87.5
Busselton	8,849	10,601	13,863	19.8	30.8	56.7
Group 2	7,377	8,446	10,002	14.5	18.4	35.6
Kalbarri	1,540	1,720	2,123	11.7	23.4	37.9
Dongara	1,649	1,868	2,196	13.3	17.6	33.2
Jurien Bay	573	631	1,138	10.1	80.3	98.6
Two Rocks	1,266	1,367	1,494	8.0	9.3	18.0
Yanchep	1,544	1,785	1,954	15.6	9.5	26.6
Augusta	805	1,075	1,097	33.5	2.0	36.3
Group 3	1,986	2,033	2,163	2.4	6.4	8.9
Leeman	570	506	551	-11.2	8.9	-3.3
Green Head	213	257	236	20.7	-8.2	10.8
Cervantes	533	486	535	-8.8	10.1	0.4
Lancelin	486	604	668	24.3	10.6	37.4
Ledge Point	184	180	128	-2.2	-28.9	-30.4
Seabird	--	--	45	--	--	--

Source: Australian Bureau of Statistics, *Census of Population and Housing, 1991 and 2001*.

Trends noted in the ABS data for median age of the population in the 17 communities indicate the impact of aging *in situ*, together with the influx of a more permanent population of retirees. Table 3 shows an increase in the median age for most of the communities between 1991 and 2001, with the exception of Augusta, Lancelin and Busselton. In 2001, just over 11 per cent of the total Western Australian population was aged 65 years and over and the median age was 34 years. The figures for Geraldton and Bunbury are very similar to this Western Australian population profile, but most other centres involved in the fishery are characterised by a higher proportion of residents of retirement age and higher median age for the resident population. The older population profile in most of the 17 communities can also be explained in terms of family types, with most communities characterised by relatively few families with children.

The most notable exception to this situation is Leeman, which could be attributed to the fact that the town was also made up of workers employed in the mineral sands industry near Eneabba. In 2001, children accounted for almost 30 per cent of Leeman’s resident population. Other communities that exhibited a higher proportion of young residents compared to the State average were Geraldton, Lancelin, Dongara, Yanchep, Bunbury and Busselton.

The changing proportions of young and elderly in these communities have also had a significant economic impact generally, as the young and the elderly are the non-wage producing or dependent segments of the population. Where more detailed data are lacking, the age dependency ratio is often used as an indicator of the economic burden the productive portion of the population must ‘carry’.⁷ The dependency ratio is thus a measure of the dependence that non-working people have on working people. The larger the dependency ratio, the greater is the need to invest in social infrastructure such as schools and health care for those people who are dependent.

The communities included in the study exhibited high dependency ratios⁸ compared with the Australian and Western Australian ratios, with the highest registered in Augusta, Green Head and Ledge Point (see Figure 3). However, some care needs to be taken with the figures on the aged population, since the growing number of people with accumulated superannuation funds means that many people over the age of 65 are self funded retirees, and could make a major contribution to local economies.

Community	1991	2001		
	Median Age	Median Age	Proportion Aged 14 and Below	Proportion Aged 65 and Over
Australia	32	35	20.8	12.6
Western Australia	31	34	21.4	11.2
Group 1				
Geraldton	29	32	25.4	11.7
Fremantle	38	40	14.8	15.9
Mandurah	35	39	21.5	18.0
Bunbury	31	33	23.5	10.3
Busselton	36	36	23.2	16.4
Group 2				
Kalbarri	40	48	15.3	22.2
Dongara	34	38	23.1	16.1
Jurien Bay	30	40	22.4	17.2
Two Rocks	37	42	21.4	16.9
Yanchep	34	38	23.1	15.5
Augusta	54	51	14.5	31.4

⁷ Haupt, A and Kane TK., Population Reference Bureau’s Population Handbook, 4th International Ed. Washington DC: Population Reference Bureau 2000.

⁸ Defined as the combined child population (0-14 years) and the aged population (65 years and over) – persons in the dependent ages – to every 100 people of the intermediate age population (15-64 years) – economically active ages.

Community	1991	2001		
	Median Age	Median Age	Proportion Aged 14 and Below	Proportion Aged 65 and Over
Group 3				
Leeman	28	32	29.2	8.2
Green Head	33	46	22.5	19.1
Cervantes	32	45	20.4	15.3
Lancelin	37	36	24.7	15.1
Ledge Point	31	49	9.4	31.3
Seabird	n.a.	48	6.7	26.7

Source: Australian Bureau of Statistics, *Census of Population and Housing, 1991 and 2001*.

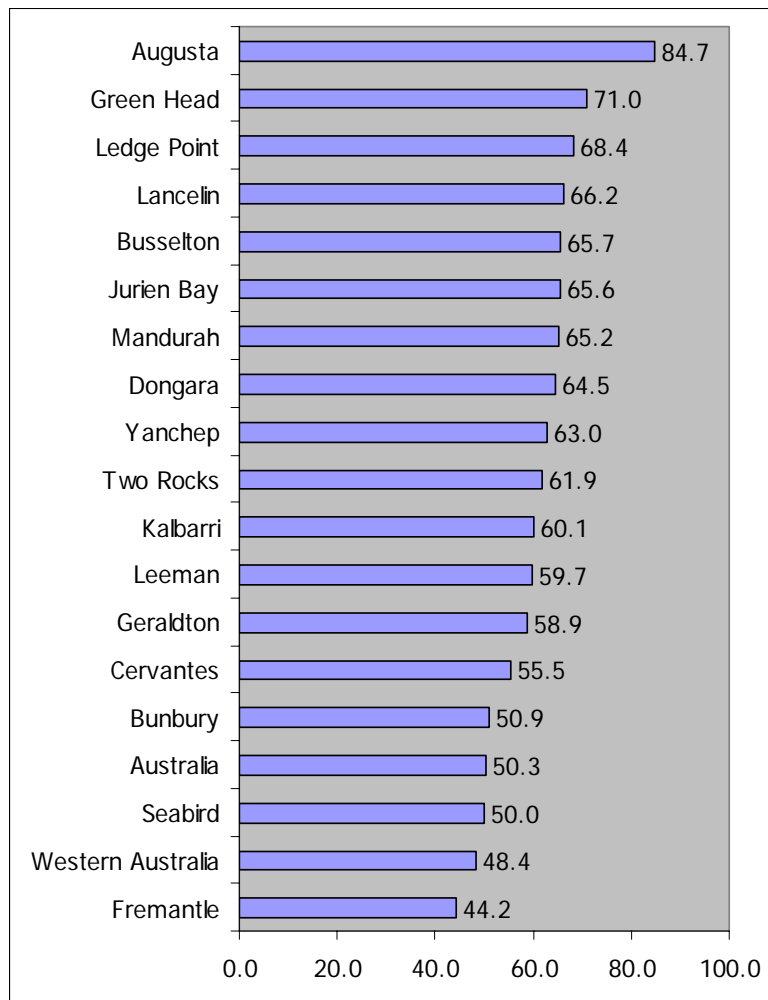


Figure 3: Dependency Ratios, 2001

It is interesting to note that with the exception of Geraldton, Green Head and Leeman, most of the communities were characterised by lower proportion of indigenous persons⁹. As for birthplace characteristics, most of the study communities have a high proportion of Australian-born residents. Only Two Rocks, Fremantle and Yanchep are exceptions, with a third of their population born overseas¹⁰.

The 2001 Census data on dwelling occupancy also provides an indication of seasonal changes in population size. Table 4 indicates that in the larger population centres of Geraldton, Fremantle and Bunbury, about 9-10 per cent of dwellings are normally unoccupied. In the smaller coastal centres, the proportion is much higher, rising from 15-20 per cent in Dongara, Kalbarri, Mandurah, Two Rocks, Busselton and Yanchep, to 50 per cent in Cervantes, 60 percent in Lancelin and Green Head, and more than 70 per cent in Ledge Point and Seabird.

Community	Occupied Private Dwellings	Unoccupied Private Dwellings	Proportion of Unoccupied to Total Dwellings
Australia	7,072,202	717,877	9.2
Western Australia	695,649	77,129	10.0
Group 1			
Geraldton	9,521	1,129	10.6
Fremantle	10,904	1,198	9.9
Mandurah	18,990	4,962	20.7
Bunbury	16,860	1,643	8.9
Busselton	5,376	959	15.1
Group 2			
Kalbarri	943	186	16.5
Dongara	917	235	20.4
Jurien Bay	505	307	37.8
Two Rocks	661	172	20.6
Yanchep	799	204	20.3
Augusta	509	317	38.4
Group 3			
Leeman	212	86	28.9
Green Head	96	161	62.6
Cervantes	254	255	50.1
Lancelin	298	515	63.3
Ledge Point	66	239	78.4
Seabird	25	59	70.2

Source: Australian Bureau of Statistics, *Census of Population and Housing, 1991 and 2001*.

⁹ The proportion of indigenous persons ranged from 0.4 per cent to 3.3 per cent of the total population of these communities in 2001.

¹⁰ Based on the 2001 Census data, 34.4 per cent, 33.9 per cent and 32.1 per cent are overseas-born for Two Rocks, Fremantle and Yanchep, respectively.

5.2 Comparison based on Economic Diversity

The growth prospects and incomes of regions are a reflection of the industries they contain. But ... it is not just the industry that matters; increasingly it is the mix within those industries and the willingness of individual enterprises to embrace change (Beer et al, 2003, p. 4).

Diversity, within regional science literature, as noted by Attaran (1987), has been defined as:

1. “the presence in an area of a great number of different types of industries” (Rodgers, 1957:16);
2. “the extent to which the economic activity of a region is distributed among a number of categories” (Parr, 1965:16); or
3. “in terms of balanced employment across industry classes” (Attaran, 1987:45).

Much of the research evidence suggests that those localities or regions with diverse economies are generally more able to withstand downturns in a particular sector or industry. It is important to note, however, that “no one diversity measure is critique free; care should be taken when using a diversity measure as the only factor in a policy designed to change the structure of a region’s economy, given the goals of growth and stability” (Wagner, 2000:1).

Comparison is made here of the 17 communities using the proportion of persons employed in the top three sectors¹¹ to the total number of persons employed per community as a measure of economic diversity. A higher ratio would indicate that the community is highly dependent on the top three sectors of employment and is thus less diversified in economic terms. An ideally diversified economy, on the other hand, would be one that would have equal levels of activity across industries.

Figure 4 shows that Yanchep, Jurien Bay, Geraldton and Fremantle exhibited higher levels of economic diversity in 2001, with ratios equal to or less than the Australian national ratio. Less diversity is displayed by communities like Seabird, Ledge Point, Leeman, Cervantes and Green Head, where more than half of the employed persons were in the top three sectors of employment. The remainder of the communities exhibited moderately diversified economies.

Based on the 2001 Census data, Seabird, Ledge Point and Green Head recorded the highest proportion of employment in the agriculture, forestry and fishery sector to total employment. Other communities that recorded the agriculture, forestry and fishery sector as one of the top three sectors of employment include Dongara, Leeman, Cervantes, Lancelin and Augusta. The lowest shares for this sector were recorded for Fremantle, Mandurah and Bunbury. Retail trade accounted for the highest share of sectoral employment for most of the 17 communities.

¹¹ See Appendix 2 for the list of the top three sectors of employment in each community for 1996 and 2001.

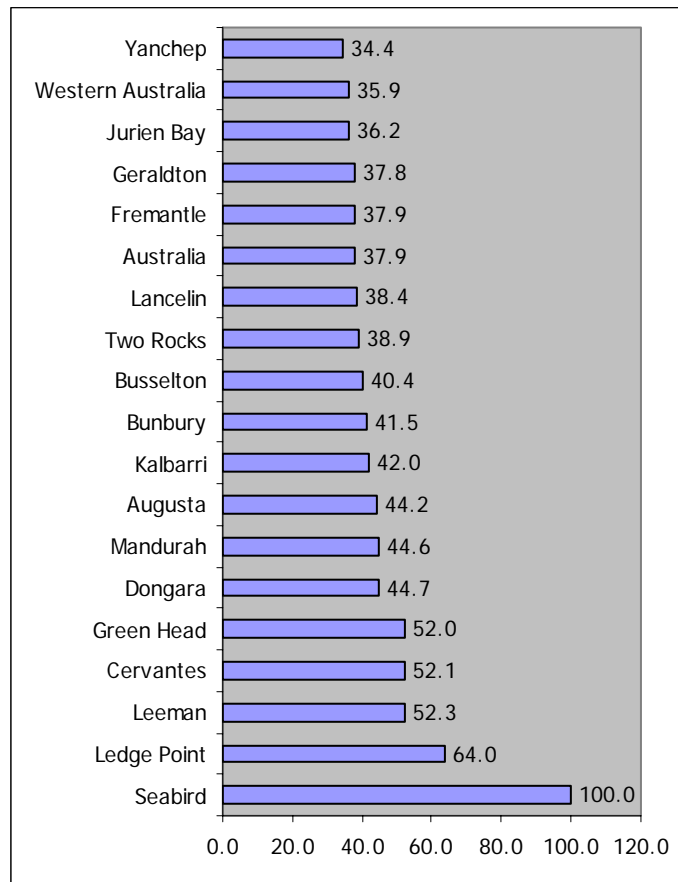


Figure 4: Measure of Economic Diversity, 2001

Table 5 shows that in August 2001, unemployment rates throughout the communities hosting the rock lobster fleet were, on average, almost twice those of the national and Western Australian rates. The highest rates of unemployment during this period were recorded in Two Rocks, Green Head and Dongara. Only Kalbarri and Augusta recorded total unemployment rates lower than the national and Western Australian rates. The same trend is noted in the 1991 Census.

Community	Unemployment Rate		Proportion of Part-Time Employment to Total	
	1991	2001	1991	2001
Australia	11.6	7.4	25.8	32.4
Western Australia	12.4	7.5	27.4	34.4
Group 1				
Seabird	n.a.	0.0	n.a.	57.1
Ledge Point	37.7	11.3	54.2	59.6
Leeman	10.2	7.6	25.0	33.2
Cervantes	27.9	12.5	46.6	50.5
Green Head	20.2	17.2	34.3	40.3

Table 5: Unemployment Rate and Part-Time Employment, 1991 and 2001				
Community	Unemployment Rate		Proportion of Part-Time Employment to Total	
	1991	2001	1991	2001
Group 2				
Dongara	20.2	14.9	35.7	42.4
Mandurah	19.2	12.6	31.0	39.5
Augusta	6.6	5.5	47.4	43.2
Kalbarri	14.2	7.7	44.1	48.8
Bunbury	12.4	8.4	28.8	34.9
Busselton	13.3	7.9	33.7	40.7
Two Rocks	32.3	17.0	27.6	41.2
Lancelin	31.8	11.6	50.7	59.7
Group 3				
Fremantle	18.3	10.1	29.6	37.8
Geraldton	17.2	12.2	30.3	36.3
Jurien Bay	24.8	10.4	36.9	37.8
Yanchep	24.0	12.5	34.8	36.6

Source: Australian Bureau of Statistics, *Census of Population and Housing, 2001*.

A number of the smaller fishing communities, notably Seabird, Ledge Point and Lancelin, were also characterised by high levels of part-time employment. In most of the larger centres, part-time employment rates were comparable to the Western Australian average of 34 per cent¹². This could be due to the fact that the populations of most of the communities included in this study fluctuate greatly according to the season. During school holidays, it is likely that the population of some centres more than doubles. Some fishers are also only seasonal residents, living with their families in coastal communities for most of the year but moving back to farms in rural areas in winter or to the city or regional centres such as Geraldton, Fremantle and Bunbury. As a result, official census data can often be misleading, particularly in the area of employment. Nevertheless, the figures provided in Table 5 do give a relative indication of employment trends.

Most communities recorded median weekly individual income levels¹³ comparable to the \$300-\$399 national and Western Australian levels (see Table 6). Leeman and Seabird were the exception with weekly individual income levels of \$400-\$499 and \$500-\$599, respectively. In the case of Leeman, this could be attributed to the higher income levels in the mining sector while in the case of Seabird, this could be a factor of the scarcity of labour in the community, necessitating a higher than average income levels to attract employees.

¹² Of the communities included in this study, Leeman had the lowest rate (33.2 per cent), which could be attributed to its association with mineral sands mining.

¹³ Income data collected by Census is on gross income basis.

Table 6: Income Data, 2001		
Community	Median Weekly Individual Income	Proportion of Families Earning below \$800-\$899
Australia	\$300 - \$399	36.8
Western Australia	\$300 - \$399	36.2
Group 1		
Seabird	\$500 - \$599	33.3
Ledge Point	\$300 - \$399	53.2
Leeman	\$400 - \$499	32.4
Cervantes	\$200 - \$299	48.1
Green Head	\$200 - \$299	56.7
Group 2		
Dongara	\$300 - \$399	45.3
Mandurah	\$200 - \$299	49.8
Augusta	\$200 - \$299	59.0
Kalbarri	\$200 - \$299	54.8
Bunbury	\$300 - \$399	37.1
Busselton	\$300 - \$399	48.5
Two Rocks	\$200 - \$299	57.4
Lancelin	\$300 - \$399	42.6
Group 3		
Fremantle	\$300 - \$399	38.8
Geraldton	\$300 - \$399	43.2
Jurien Bay	\$300 - \$399	51.3
Yanchep	\$200 - \$299	55.3
Source: Australian Bureau of Statistics, <i>Census of Population and Housing, 2001</i> .		

Table 6 also shows the proportion of families with incomes below the \$800-\$999 median weekly family income. Again, families in Leeman and Seabird exhibit the lowest proportion of families earning below the average national and Western Australian income levels.

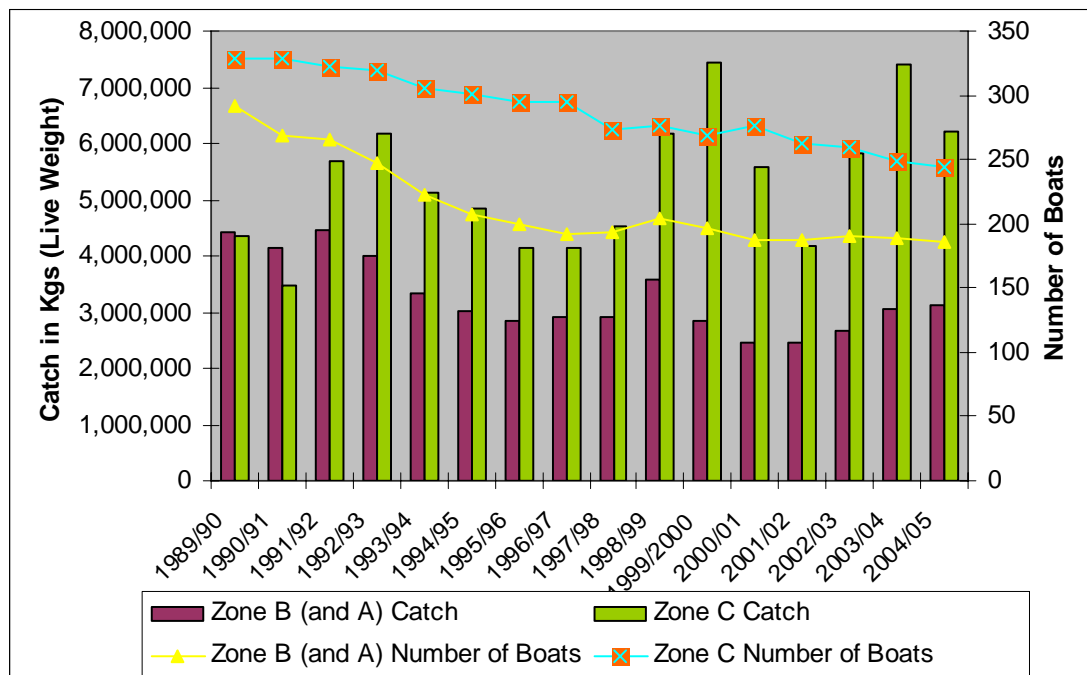
5.3 Comparison based on Western Rock Lobster Fishing Zones

Rock lobster fishing has been responsible for the establishment of, and is a critical element in the economic survival of, many towns along Western Australia's west coast from Mandurah to Kalbarri (Department of Fisheries, 2005, p.17).

Grouping the communities included in this study by Fishing Zones, the communities from Kalbarri to Leeman will have fishers in the B Zone and the communities from Green Head down to Augusta will have fishers in the C Zone. Around half of the fishers in the communities from Kalbarri to Leeman also have licenses to fish in Zone A, the Abrolhos Islands, operating from 15 March to 30 June.

A review of the monthly data compiled by the Department of Fisheries on catch and effort by anchorage since the 1989/90 season indicates fluctuations in catch data, reaching a record catch of 14,543,541 kgs in 1999/2000 and a low catch of 8,983,276 kilograms in 2001/02 (see Figure 5). The catch in the 2004/05 season reached 12,234,053 kilograms.

Figure 5 also indicates that the number of boats operating in the rock lobster fishery had also declined steadily, from 704 in 1989/90 to 537 in 2003/04¹⁴. This declining trend is observed in most of the communities included in the study.



Source: Department of Fisheries.

Figure 5: Trends in Catch (kgs.) (LWT) and Number of Boats, 1989/90 – 2004/05

The decline in the number of boats has implications at the community level inasmuch as the rock lobster fishing industry is important to the infrastructure¹⁵ existing in these communities and to the employment created by this infrastructure. Fewer boats mean lesser revenues from these facilities. This may result in reduced budget for their maintenance and possibly, their eventual closure¹⁶, a situation that will affect seasonal or visiting recreational fishers and tourists in these communities.

For example, in the case of the Cervantes Keys Common User Jetty Facility, the decline in the rock lobster fleet has had serious implications on the capacity of the WRL fishers left in the industry to repay capital costs and cover the operational, repair

¹⁴ The number of boats represents data collected in December for each season which, according to informal consultations with the Department of Fisheries, historically represented the maximum effort during the WRL season.

¹⁵ Examples include marinas, boat lifts, jetties and car parks.

¹⁶ It is to be noted, however, that the Government can address this issue by, for instance, imposing levies on recreational fishers who use the facilities.

and maintenance upkeep costs of the public jetty¹⁷. This could lead to a corresponding loss of local jobs for fabricators, marine electricians, diesel engineers, and other related trades.

Data from the Department of Fisheries shows a declining trend in the number of persons engaged in the industry, from 1,819 persons in the 1989/90 season to 1,496 persons in the 2004/05 season. Using the ABS Census data for 2001, Table 7 shows the number of persons employed in the rock lobster fishing and seafood processing sector. In looking at the data on labour force, it is important to note that the ABS Statistics on Industry and Occupation data suffers from under-reporting. This is because the 2001 Census was carried out in August and therefore outside the rock lobster fishing season. In effect, many fishers are officially recorded as being unemployed¹⁸. Table 7 also shows that the proportion of employment in rock lobster fishing and seafood processing to the total employment in the agriculture, forestry and fishing sector is highest in Cervantes, Green Head, Dongara, Jurien Bay, Lancelin and Geraldton.

Community	Persons Employed in Rock Lobster Fishing	Persons Employed in Seafood Processing	Proportion to Employment in Agriculture, Forestry and Fishing	Proportion to Total Employment
Australia	1,462	2,217	1.1	0.0
Western Australia	723	242	2.6	0.1
Zone B (and A)				
Kalbarri	10	3	25.5	1.7
Geraldton	160	26	37.2	1.9
Dongara	55	9	47.1	8.6
Leeman	20	0	58.8	8.2
Zone C				
Green Head	9	0	47.4	12.0
Jurien Bay	17	6	45.1	6.5
Cervantes	21	9	100.0	18.0
Lancelin	16	0	38.1	6.2
Two Rocks	3	0	18.8	0.7
Yanchep	6	0	15.4	0.9
Fremantle	33	6	27.9	0.4
Mandurah	29	0	10.9	0.2
Bunbury	6	0	1.4	0.0

Source: Australian Bureau of Statistics, *Employment and Income Data, 2001*.

¹⁷ From the Cervantes Hardship Case prepared by the Central West Coast Professional Fishermen's Association and the Cervantes Maritime Advisory Committee, September 2004.

¹⁸ The specific question asked for the 2001 Census was: "Last week, did the person have a full-time or part-time job of any kind?"

The decline in the number of persons engaged in the rock lobster fishery has important implications to small business operations in the accommodation, cafes and restaurant sector in these communities. These include reduced spending and negative multiplier effects on other industries. As one fisher noted during an interview (Interviewee No. 1994, 2004):

We spend money wherever we are (we fish basically where the crays are) - on vehicle and boat repairs, food, accommodation, local pubs or taverns, local ship handlers, marine fabricators, etc.

5.4 Comparison based on Measures of Resilience

Resilience is the ability to cope with change. To express more fully:

Resilience is the capacity of human groups or communities to cope with environmental, economic, political or other kinds of change stemming from internal or external factors. It is related to uncertainty, vulnerability and risk and it can be considered at various geographical and temporal scales. An alternative interpretation of resilience is the capacity and speed of an ecosystem to recover from a disturbance. This refers either to the elasticity of the ecosystem which enables it to accommodate change while maintaining its original state, or to the elasticity of an ecosystem which permits the assimilation of change by transformations of the ecosystem.¹⁹

A number of studies have been conducted on social resilience, including the definition of the term and the manner in which it is measured. It is important to note that “no single indicator captures the totality of resilience and that resilience can be examined in both temporal and spatial fashions” (Adger, 1997:17-18). Other studies of resilience have identified a number of variables and proxy indicators that are also worth noting. Adger (2000) summarises them as follows:

1. At the community level, other elements of resilience can be observed through proxies, such as formal sector employment, recorded crime rates, and by demographic factors;
2. At the individual level, choices in livelihoods and social investments are more likely to be observed through income and other variables such as migration, which indicate stability at the household level; and
3. Mobility is another set of important indicator of resilience.

The approach used in this research is similar to a study undertaken by the Conservation Commission and the Forest Products Commission in 2002 that used time-series indicators to describe the resilience or sensitivity of communities and regions to change²⁰. Specific social and economic indicators were used to provide an indication of the “fragility” or “robustness” of the community to change or shocks.

¹⁹ From the Sustainability and Public or Private Environmental Management web-accessible database of glossary items relating to subjects of sustainability.

²⁰ Coakes Consulting (2002), Socio-Economic Assessment of the Forest Management Plan prepared for the Conservation Commission and the Forest Products Commission, August 2002.

The selection of indicators in this research has been restricted to those that are available in a time series format and for which 2001 Census data are available. In addition to Census data, two fishery-related indicators were also included in the computation of the resilience scores. Data from the Department of Fisheries were those of the 1991/92, 1996/97, 2001/02 and 2004/05 WRL seasons. The indicators used in measuring community resilience include percentage changes in:

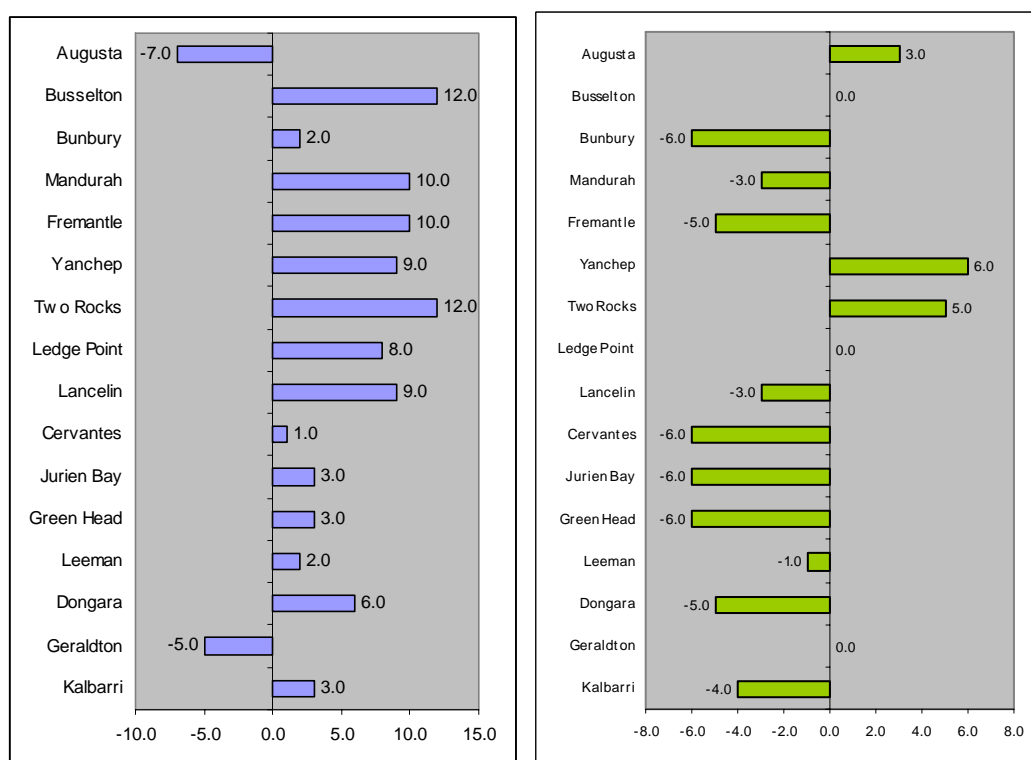
1. Total resident population;
2. Elderly dependency ratio defined as the number of elderly people for every 100 people of working age;
3. Child dependency ratio defined as the number of children for every 100 people of working age;
4. Number of occupied dwellings;
5. Labour force participation rate, calculated by expressing the number of persons in the labour force as a percentage of the population aged 15 years and over;
6. Unemployment rate defined as the number of unemployed people expressed as a percentage of the labour force;
7. Economic Diversity defined as the proportion of persons employed in the top three sectors to the total number of persons employed;
8. Total potlifts for the whole season; and
9. Number of boats recorded in December.

To derive the composite indicator of community resilience to change, the scoring system shown in Table 8 was adopted, with resilience scores summed to provide a Total Resilience Score (TRS) for each community²¹. The TRS is based on the direction and magnitude of the percentage change in each of the indicators between the 1996 and 2001 census periods and between 2001/02 and 2004/05 WRL seasons. The scores vary between -27 to 27, with high positive values indicating greater robustness to change and large negative values indicating greater fragility and sensitivity to change.

Percent Change 1996-2001		Community Resilience Score
Greater than	-10.0	-3.0
Between	-10.0 - -5.0	-2.0
Between	-5.0 - -2.5	-1.0
Between	-2.5 – 2.5	0.0
Between	2.5 – 5.0	1.0
Between	5.0 – 10.0	2.0
Greater than	10.0	3.0

²¹ See Appendix 3 for the detailed computation of the Total Resilience Scores for each community, except Seabird in view of the lack of time-series Census data.

The TRS computed for each of the communities are shown in Figures 6A (using Census data only) and 6B (using Department of Fisheries data) and 6C (integrating all 9 variables). It should be noted that these measures are only indicative and should be treated with caution as they are limited by the availability of secondary data obtained from the Census of Population and Housing. The scores also need to be looked into vis-à-vis the number of persons engaged in the WRL fishery, with communities such as Augusta, Busselton, Bunbury, and Yanchep employing only a limited number (between 3 to 12 persons) and communities such as Geraldton, Fremantle, Dongara and Lancelin employing between 124 to 211 persons. The overall resilience scores may change with the inclusion/refinement of other indicators, as data becomes available during the course of this research²².



Figures 6A and 6B: Resilience Scores based on Indicators Using Census Data and Department of Fisheries Data

The total resilience scores (generated by combining both Census and the Department of Fisheries data) are shown in Figure 6C. The combined TRS indicate that the communities that would be less resilient and more sensitive to change are Geraldton, Cervantes, Bunbury, Augusta, Green Head and Jurien Bay. Meanwhile, Two Rocks, Yanchep and Busselton, together with Ledge Point, Mandurah, Lancelin and Fremantle, are communities that would be more robust and better able to handle change.

²² For example, once the community surveys are complete, indicators on social capital and human capital will be incorporated in the overall resilience scores.

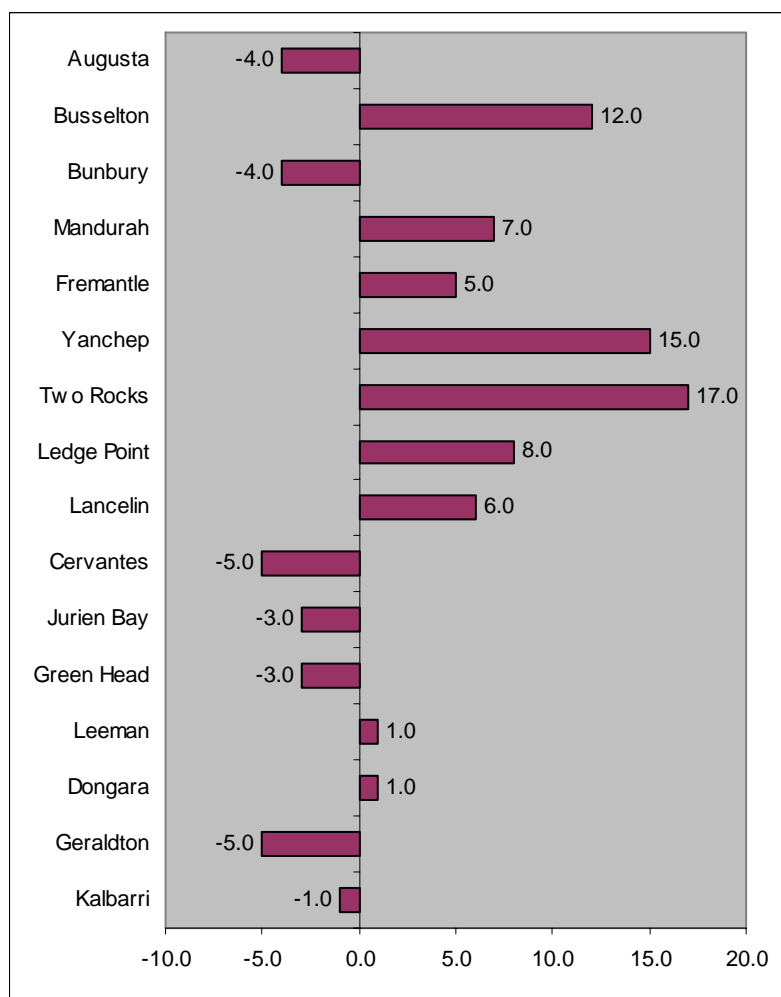


Figure 6C: Overall Community Resilience Scores

6.0 INITIAL RESEARCH FINDINGS AND TRENDS

Management of the industry has to take account of the changing circumstances to ensure that the measures adopted provide the benefits being sought and that its management remains one of the outstanding examples of management achievement. This will require objective analysis of the alternatives available and a high degree of cooperation between all of the interested parties (Department of Fisheries, 1994, p. 1).

This section provides a summary of research findings to date, both from the postal survey undertaken in April 2004 and the various interviews conducted by the author and other members of the research team from October 2004 to September 2005. The main database used in the postal survey was a list of commercial WRL license holders as of April 7, 2004, which indicated a total of 601 operational license holders in the fishery.

A review of this list indicated that some licensees held multiple licenses. For those with multiple licenses, a decision was made to send out only one questionnaire to these multiple license holders. A total of 568 questionnaires were thus sent out by mail in April 2004. A letter of reminder, including another copy of the questionnaire, was sent out in June 2004. By July 2004, total responses to the postal survey numbered 147. This represented 25.9 per cent of all license holders²³ (see Table 9 for the breakdown of respondents by community).

Postal survey respondents were predominantly male (96.6 per cent), married (81.0 per cent) and born in Australia (85.0 per cent). Almost half of the respondents (43.5 per cent) have dependent children of school age attending classes in the local school and nearby towns. With respect to work done by the wives, 40.8 per cent of the respondents indicated that their wives worked, mostly in secretarial jobs related to the fishing business. On the primary source of income, 61.2 per cent of the respondents indicated that they get all their income from rock lobster fishing. For those who have other fishery-related source of income, wet line fishing and charter fishing were identified as other sources of income.

The majority of the respondents were owner-operators (62.6 per cent), followed by investors (19.7 per cent). The most frequent reasons for entry to the fishery included early exposure to fishing activities during youth, family inheritance/operation, and increased income opportunities. Almost half of the respondents operate between 101-150 pots during the lobster season, with about a fifth indicating that they lease some of their pots to other fishers.

A total of 190 semi-structured interviews were conducted in the various areas (see Table 9 and Figure 7 for the breakdown of interviewees)²⁴. The interviewees consisted not only of those involved in the fishing industry (catching and processing sectors) but also included their wives, local community residents, business groups, and local government officials. The interviews (tape recorded after securing permission from the interviewees) were conducted face-to-face, individually or together with partners, and ranged from 30 minutes to 2 hours. The specific questions asked during the interviews are available in Appendix 4.

The results of both the postal survey and the 116 semi-structured interviews with fishers were analysed to provide an indication of the issues that face fishers and their communities²⁵. They also provide insights into fishers' perceptions on the potential positive and negative impacts of current and future management arrangements in the industry and their views on the consultation process.

²³ Informal comments received from some rock lobster fishers indicated that the number of responses would have been higher if the questionnaire did not include questions pertaining to their income levels. While the research team was sensitive to this issue, the inclusion of income data was seen to be crucial for the overall analysis.

²⁴ Interviews are ongoing and as such, this number will increase as the research unfolds.

²⁵ For this assessment, only the interviews with fishers have been content-analysed.

	Number of License Holders (as of April 2004)	Number of Postal Survey Respondents	Number of Interviewees	Classification of Interviewees				
				Fishers	Processors/ Depot Workers	Community Residents/ Fishers' Wives	Business Owners	Local Officials
Kalbarri	21	5	18	14	--	3	--	--
Port Gregory	--	--	2	2	--	--	--	--
Geraldton	161	31	29	19	3	6	2	--
Dongara and Port Denison	47	20	17	15	--	2	--	--
Leeman	14	11	20	11	--	5	1	3
Green Head	2	5	12	5	--	5	1	1
Jurien Bay	11	9	29	9	5	5	8	2
Cervantes	5	5	18	7	1	2	5	3
Lancelin	19	7	11	7	--	2	2	--
Ledge Point	6	2	5	5	--	--	--	--
Seabird	--	--	1	1	--	--	--	--
Two Rocks	--	--	4	4	--	--	--	--
Yanchep	1	2	3	2	--	1	--	--
Fremantle	145	10	7	4	3	--	--	--
Mandurah	28	7	6	5	--	1	--	--
Other areas, including Metro	108	30	8	6	1	1	--	--
Not Indicated	0	3	0	--	--	--	--	--
Total	568	147	190	116	13	33	19	9

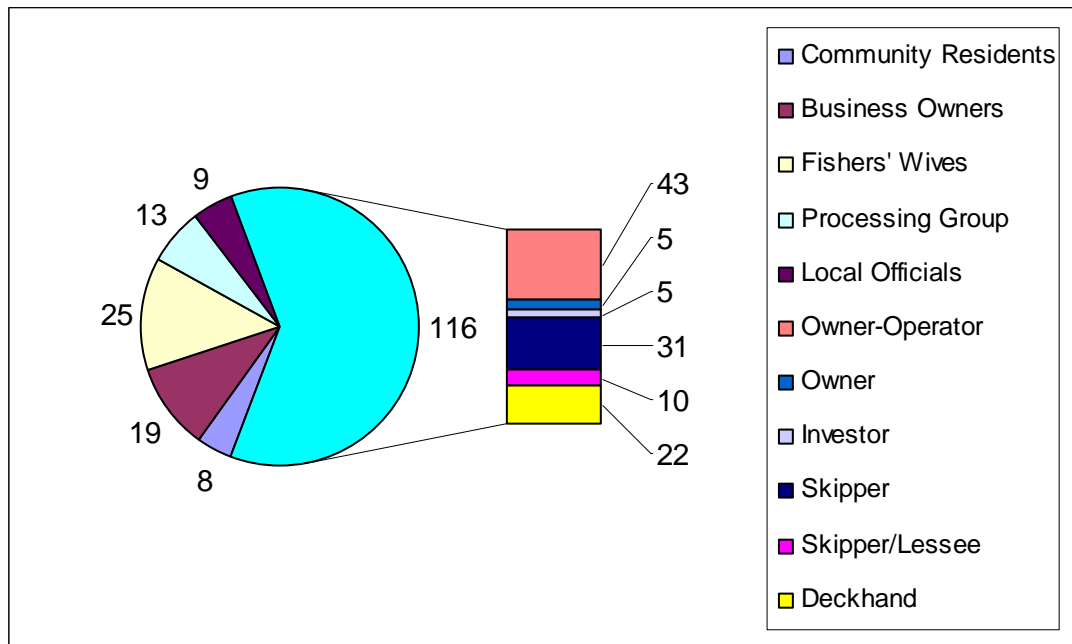


Figure 7: Interviews Conducted by Classification

6.1 Problems and Issues facing Fishers and their Communities

A list of the fishers' views of the problems within the fishery and in their communities is presented in Appendix 5. This list was derived from a sample of interviewees and was not meant to be an exhaustive list. The problems and issues expressed by the fishers, broken down into economic, social, environmental, and political/institutional types, are presented in their own words.

The interviews with the fishers were varied in terms of their views on the different management arrangements, but clearly, the need to have more information on the alternative arrangements was raised. The respondents also raised the following points about the consultation process:

- Before decisions are taken, fishery managers and fishers will need to look closely at the options and discuss these further before announcements are made;
- The current consultations through the socio-economic study being conducted here were regarded as extremely positive. Many thought it was the first time fishers and their communities were being consulted on the issues;
- A large number of fishers agreed that while it is good to strive for unity and agreement on a management plan, in reality this is unlikely to happen. There was a view that the Rock Lobster Industry Advisory Committee (RLIAC) needs to be decisive before things get worse;
- Setting quotas by zone is going to be a problem;

- There is not a lot of information on the alternatives. Individual Transferable Efforts (ITEs) are unheard of, even for those who are members of the Professional Fishermen's Associations (PFAs);
- When making decisions for fishers and the fishing community as a whole, there needs to be an ongoing flow of information;
- There is a need for more discussion about how quotas will be implemented. Participation especially from the fishers themselves is absolutely critical; and
- In making a decision on these issues, consideration should be given to families, communities and traditions ahead of economic gain.

6.2 Fishers' Views on Fishery Management Arrangements

A list of potential positive and negative impacts raised by the respondents during the interview is also presented in their own words. Appendix 6A provides the fishers' views on the current management arrangements involving input controls²⁶. Appendix 6B presents the fishers' views of the possible consequences of adopting an Individual Transferable Effort while Appendix 6C provides their views on what are the likely consequences of moving into an output controlled management arrangement, specifically the Individual Transferable Quota.

6.3 Fishers' Perceptions about their Communities

The most frequently identified reason given by the respondents on what they think about their communities and what they like best in these communities was the lifestyle – 'idyllic', 'peaceful and quiet', 'a place where everybody knew everybody', and 'where the fishing grounds are good'. Family life was also rated highly in terms of the communities being 'small and safe to raise young children', 'where the schools are close by' and 'where one knows their neighbours and can easily ring up friend and have a barbecue in half an hour'.

A number of respondents pointed out that the community is getting more populated, built up and busier with more traffic than there previously was. While some respondents noted the limitations of their communities (e.g. lack of doctors, limited recreation facilities, high business turnover, lack of employment opportunities for spouses, etc.) they nonetheless indicated that it is nice to live in these communities. For those who are older, the respondents indicated that city life is too fast for them and the coastal communities provide them with the opportunity to slow down. While some respondents noted that the communities are hard to break into socially, residents seem to stick together in times of crisis.

²⁶ The management plan for the Western Rock Lobster fishery is in line with the worldwide experience of restricting the fishing effort to prevent stocks from being over-fished. Amended from time to time, depending on specific circumstances, the management plan has been based primarily upon a control on the number of boats and pots, a legal minimum carapace length, and closures, depending on the biological sustainability of the fishery.

On factors that result in the movement of some residents into the City or into bigger regional centres, the majority of the respondents identified the following factors:

1. Schooling for older children;
2. More intensive and specialised medical needs for children and the aging population;
3. More varied lifestyle and circle of friends for the whole family.

Some of the recent migrants to these communities also left town due to the windy and dusty conditions in these communities during certain months of the year.

Most of the respondents also acknowledged that fishing was the main economic activity of the town in the earlier periods of its development. As Crombie (2001:135) pointed out:

With the exception of a community of mining employees at Leeman, all of the centres along the coast are totally dependent upon fishing. Over the years, the attraction of recreational fishing has provided additional income in the form of tourism and retirement settlement. Overall, however, the economy is still very much at the mercy of the crayfishing community.

However, while fishing remains an integral part of the community, rock lobster fishing is not necessarily a major factor. The movement of retirees and investors to these communities has resulted in their becoming retirement towns. In some communities, tourism is also on the rise, resulting in the creation of job opportunities for the residents.

When asked about their contribution to the community, some respondents noted that rock lobster fishers were involved in the communities (e.g. voluntary associations, building of infrastructure such as town oval) in the past but a lot had retired and don't get as involved anymore. WRL fishers were also involved in voluntary activities such as the Bushfire Brigade, Ambulance, First Aid and Sea Search and Rescue. The financial contribution of fishers in terms of donating money or lobsters for charitable activities such as local school, local gun club, Silver Chain, Rotary Clubs and community events was also noted. The employment of local residents as fishing crew members and processing plant workers and support for local businesses and tradesmen (e.g. lobster pot makers, boat lifters and repair facilities, boiler makers, diesel fitters, electricians, etc.) was also raised as an important contribution to the local economies of the coastal communities. Most of the respondents indicated that they spend money locally on vehicle and boat repairs, food, and accommodation as well as fuel, basic commodities, and on local pubs or taverns, local ship handlers, marine fabricators, etc. But major shopping and specialised boat repair and maintenance are done in bigger regional centres and in Perth. Some fishers and their families have also started up businesses in their communities.

7.0 CONCLUSION

Community development extends beyond the formal economy to consider the needs of the population at large, and that in setting about its task it aims to balance economic, social and environmental concerns, rather than prioritising the economic approach above all else (Haughton, 1999, p. 8).

Analysis of the 17 communities revealed trends in population, employment and housing that are important in assessing the general socio-economic characteristics of the communities. The growth of most of these communities can be traced to the development of the rock lobster industry in the late 1950s and early 1960s. The rapid expansion of the WRL fishing industry led to ad hoc residential development at many points along the coast, many of which were reached by sea and virtually inaccessible by road in the early years.

Most of the communities experienced substantial population growth between 1991 and 2001. The median age increased because of aging *in situ*, and the increasing number of retirees from inland communities and larger centres. Most of the communities also exhibit high dependency ratios compared with the Australian and Western Australian ratios. This has significant economic impact, given the need to invest in social infrastructure such as schools and health care for the dependent population.

Some communities also exhibit a large seasonal population change, with the number of dwellings not permanently occupied ranging between 15-20% and 60-70% of the total number of dwellings. This seasonality is likely to affect business activities in the communities.

With the exception of Yanchep, Jurien Bay, Geraldton and Fremantle, the rest of the communities exhibit lower to moderately-diversified economies. In the smaller fishing communities, unemployment rates are almost double the national average. Smaller fishing communities also have high levels of part-time employment. Median weekly incomes for most communities are comparable to the national average (\$300-\$399).

The number of boats operating in the WRL fishery declined across the 17 communities resulting, in some cases, in a potential loss of fishing-related physical facilities in some communities. The number of persons engaged in the fishery also declined, with important implications to small businesses operating in the accommodation, cafes and restaurant sector. Some communities have been found to be less resilient and more sensitive to external changes while some have the capacity to handle change.

Analysis of the interviews revealed the fishers' perceptions of the problems and issues confronting them during these times of uncertainty over the price of lobsters and input costs such as fuel. Lower profitability resulted in some fishers leaving the industry

and an ongoing struggle for those who remain. As one respondent put it, “the economics of fishing is now far more important than they used to be. It used to be lifestyle, but this is changing now, with people thinking monetary wise [in financial terms] before any other reason”.

Fishers’ perceptions on alternative management arrangements indicate a number of potential positive and negative impacts at the economic, social, environmental, and institutional levels.

The preliminary findings from interviews and consultations highlight the fact that:

- 1) WRL fishers had been instrumental in the earlier growth and development of coastal communities, with business operations and employment revolving primarily around rock lobster fishing;
- 2) While rock lobster fishing is no longer the dominant economic activity in some of these communities, it is still regarded as a significant economic and social contributor to local economies and communities;
- 3) These communities/locations have offered good fishing grounds and a relaxed secure lifestyle; and
- 4) For communities that have young families, these towns offer a good environment for raising children.

As the towns grew and the population increased and became more diversified, these towns are less dependent on the WRL fishery. The decline in the number of rock lobster fishers coupled with the change in the mindset of younger fishers towards less community orientation, have resulted in rock lobster fishers becoming less involved in community events and activities and generally becoming less community-minded. Nonetheless, there are still some fishers who contribute both financially and physically to community activities. With the increased mobility of the fleet, the number of wives participating in community/school activities is also higher because they are left behind to look after the children. Rock lobster fishers spend their income mostly in their community of residence and contribute to the financial well-being of these communities.

As in most small towns, there is some social segregation (e.g. between long-term and recent residents). There are also disadvantages especially for those with children of high school age. Parents face the dilemma of sending the children to boarding school or having split families, with the husband staying behind in the coastal towns and the wife and children relocating somewhere else. For the older population who require more intensive health care, these towns have limited medical care.

A key recommendation for finding a workable management arrangement in the WRL fishery is the support of those involved in the fishery – fishers and industry managers – and the other stakeholders in the communities, including business groups, local government and community residents. Having an intensive and open consultation and ongoing information flow among the various stakeholders would go a long way towards ensuring that the management arrangement changes introduced in the WRL fishery will result not only in a sustainable fishery but also in viable and contented communities.

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Appendix 1A: Country Experiences on ITQs – Australia and New Zealand

	General	South Australia	Tasmania	New Zealand
Fishery		Rock lobster fishery; Southern bluefin tuna fishery	Tasmanian Rock Lobster Fishery	30 Species or species groups as of Oct 1994 (179 fish stocks), with the rock lobster introduced into the QMS in 1990
Current Management Arrangement	ITQs are management tools that allocate privileges or rights to harvest specified amounts of a quota to individuals or enterprises. They also may have the right to transfer them to others; if they do not, they are “IQs”. The “T” refers to transferability.	Management of the Southern Zone RL fishery is primarily based on a quota system that places a direct control on the annual commercial catch, but is complemented by a mix of input controls including limited entry, seasonal closures and gear restrictions.	Changed in March 1998, at a time when the unit price for the rock lobster was generally high and increasing. With the introduction of quota management, the fishing season was changed from one that ran from November until September each year to one that runs from March until February.	QMS with ITQs as fundamental element was introduced in Oct 1986. The TAC available for commercial fishing for each fish species in catch area is predetermined; rights (ITQs) are issued that authorise the holders to annually take specified quantities of each species in each quota area. ITQs operate in tandem with other administrative and management controls.
	Communication and education are critical to the success of ITQ programs. How ITQ systems of fisheries management are designed, is important to how they work and their consequences.	Resource sustainability has been ensured by the implementation of a strategic research program, ongoing effort reductions to the commercial fishing fleet over time and the introduction of an ITQ.	The output control QMS adopted in March 1998 was on top of “traditional” technical conservation measures and input restrictions such as a shortened fishing season, gear stipulation, size limits and a cap on the number of licenses.	ITQs were changed from a fixed to a proportional basis in Oct 1990. An “adaptive management” scheme was adopted from the 1991-1992 fishing year where increases had been granted for 39 fish stocks.
		The TACC is set each year and is divided evenly between license holders as ITQs. The daily catch of individual boats is monitored via catch and disposal records.		The ITQs were allocated in perpetuity and are fully transferable, including rights to lease. Maximum/ minimum quota holdings have been set as well as restrictions on quota ownership (ITQs may not be held by persons not ordinarily resident in NZ, or by companies with overseas control).

	General	South Australia	Tasmania	New Zealand
Current Management Arrangement	ITQs are fisheries management tools designed to complement other more traditional measures such as restrictions on the total catch, size limits and closed seasons.	Current management of southern bluefin tuna stocks is under a trilateral arrangement between Australia, Japan and New Zealand.		A new Fisheries Bill was introduced in Dec 1994 providing a complete rewrite of the Fisheries Act, building on the strengths of the QMS, refining some aspects of the QMS and adding other fisheries management features.
Rationale for New Arrangement	The principal aims are to achieve tighter control over fishing effort, reduce levels of overcapitalisation and thereby improve the efficiency of the fishing fleet.	ITQs were introduced to the Australian southern bluefin tuna fishery as a conservation measure. Quota units were initially apportioned among operators using a formula based on boat value (assessed by registered marine insurance assessors and boat history of catch.	Fishers are expected to maximise the value as opposed to the quantity of fish caught. It is also expected to result in the quality of fishing effort and in the dynamics of the fleet.	Conservation – to limit catches to levels that will result in maximum production from the stock and Allocation – to maximise the net economic return to the nation
Issues Faced by the Fishery	Alternative policies that promote social equity and achieve conservation by mechanisms other than property rights may ultimately be more successful in making progress towards sustainability.			Prior to the introduction of ITQs, domestic inshore fishery had reached a crisis point – overfishing, overcapitalisation, potential biological damage to some fish species, and a declining economic performance in the inshore fishery.
Economic	ITQs result in the end of a costly and often dangerous “derby” or race to catch as much as possible before the quota is reached and the fishery is closed.	ITQ resulted in a rapid downward adjustment of the fleet with the number of vessels reduced by more than 70% (1984-1988); increased efficiency among the remaining vessels with improved catches; and a lowering of the costs of fishing and enhanced market prices for the catch.	Since the introduction of the quota, there has been an increase in the rate of increase towards winter fishing (maximising profits.	Although there are few actual data for analyses, there is a widely held perception that the efficiency, competitiveness and profitability of the industry had increased.

	General	South Australia	Tasmania	New Zealand
Economic			The number of vessels and entitlement owners participating in the fishery saw a large decline in the first 2 years of quota management.	In some fisheries, the negative aspect of under-catching the TAC is that it can result in a considerable economic cost to the industry.
Socio-Economic	While good at reducing fishing capacity, this comes at social and economic costs: the windfall profits that may go to a select few at the initial allocation; the reduced employment opportunities for crew, captains, and shore support workers; effects of ITQs on processors and processing labourers; the increased cost of entry into the fishery; and various costs of consolidation of ownership in a select few.	With the incentive to maximise the profit obtained from their quota, operators concentrated on catching larger fish because of the higher prices received from higher canning conversion rates for larger fish and the price received for larger fish on the Japanese sashimi market.	Reduction in the number of boats and therefore in employment were negative impacts commonly raised. In 2002, there were about 240 vessels in the fleet, down from about 320 prior to the introduction of the Quota Management system in 1998. Ports that had few “home” based vessels lost economic activity as vessels’ away trips declined in number and affected employment associated with the industry, especially regarding deckhands.	Government intervention in the form of QMS, while restricting access to particular commercial species to prevent further depletion of stocks has in many cases separated ownership of quota from harvesting activities, with the result that smaller operators are finding it difficult to remain in the industry. Ownership of quota is now concentrated in the hands of a few major companies, and their vessels and processing facilities are located at major ports rather than in small coastal communities.
			Although no rural coastal towns in Tasmania are economically dependent on commercial rock lobster fishing, any decline in activity and employment in these places exacerbates already declining employment opportunities and infrastructure needs.	The downturn in fishing activity has had serious consequences for the economic and social viability of small coastal communities, and each of them is seeking to diversify its economic base by moving into tourism activities.

	General	South Australia	Tasmania	New Zealand
Social	The emphasis on cultural distinctiveness is a global phenomenon in which marginalised populations emphasise their local identities in terms of local “culture” in an attempt to survive.		It is possible that human capital and knowledge in the fishery is running down, as many older skippers are nearing retirement and in par, due to a number of owner-operators having consolidated their licenses at the expense of lessees.	While it is difficult to reach any firm conclusions on the social impacts of ITQs, Boyd and Dewees are not aware of any significant negative social and economic impacts on small fishing-dependent communities.
	Questions of social justice also refer to compensation for those crew members dispossessed of their livelihood by the vessel owner’s decision to capitalise the value of harvesting rights in the quota market.		ITQs moved the fishery from a position of over-capitalisation to one of over-privatisation. There is a trend towards increased ownership of quota units by non-fishing investors and increased ownership by non-Tasmanians. Investors syndicates are now apparent in the Tasmanian commercial rock lobster fishery and so called “quota catchers” are beginning to replace owner-operators on the water.	
			The high cost of quota units has now made it almost impossible for fish workers without capital to work their way up from deckhand to skipper, to eventually acquiring access rights and becoming owner-operators.	
Environmental		The introduction of output controls to the Southern Zone in 1993 has effectively controlled the harvest level.	The majority of positive responses related to improvement in rock lobster stocks, reduction in the number of boats and an end to the “race for fish”.	A positive aspect of undercatching the TAC is that it helps to conserve the stock and may provide some rebuilding.

	General	South Australia	Tasmania	New Zealand
Environmental				Quota busting is known to occur in high-value species such as rock lobster, a fishery that had the highest estimated level of illegal catch, but industry is taking a more active role to reduce this.
Institutional	Some doubts do exist about the costs of monitoring ITQs. The need to attribute landings to specific vessels, and at the same time correlate these with harvesting rights through the quota market, may make the monitoring of ITQs more complicated. In general, however, the alleged cost effectiveness of ITQs is one of the most persuasive arguments in their favour.		Making it possible for one generation of owner-operators to receive windfall gains through the private market has been at the expense of some longer-term inflexibility. For example, faced with a dearth of young fishers in the industry, the Tasmanian Government supported a draft proposal for government creation of quota units for the short-term use of new entrants, only to have this initiative thwarted by litigious quota owners, the majority of whom either never did fish, or had ceased to do so.	A high-profile enforcement presence at sea, combined with industry discussions, had reduced level of dumping. Severe penalties for quota infringements also reduced dumping.
	It may be naïve to think that the introduction of ITQs can lead to effective management outcomes without careful consideration of the institutional framework.		How might the relationship between state and market be approached differently in the Tasmanian commercial rock lobster fishery? One answer is to retain some degree of state ownership. Quota could be allocated for varying lengths of time and with flexible terms. Conditions could also be put on ownership and transferability of quota units.	The complicated nature of the QMS has required very complex computer systems to track catch against quota.

	General	South Australia	Tasmania	New Zealand
Institutional	Among lessons learned from comparative study are the critical importance of decisions about transferability of quotas and the political and historical context and pre-existing industry structure to the acceptance, design and performance of ITQs.		Without careful consideration, quota management combined with individual and transferable input restrictions run the risk of over-empowering owners at the expense of responsible state management.	There is a requirement that all fish taken by commercial fishermen may now only be sold to licensed fish receivers. This is an essential requirement as product flow monitoring is an integral part of the enforcement approach.
	Care needs to be taken to design a workable system that does not need major modification and that can stand the test of time.			Fundamental change is often controversial, and gaining industry acceptance for ITQs was necessary. Consultation and communication were also important. It is essential that both concepts and details of the system be properly explained so industry can fully assess its implications for their own businesses and entire industry.
	Critical to the success of ITQ fisheries in meeting their economic and conservation objectives, is finding a way to monitor behaviour and enforce the rules of the system. An ITQ system is more data-intensive because individual vessel catches must be accurately recorded against their quotas.			It is important to think “up-front” about the legitimate claimants when allocating quota shares. A High Court injunction obtained by Maori in 1987 led to a great uncertainty within the industry but this was settled in 1992, making the Maori the single largest player in the industry. The settlement protected the livelihoods of existing quota holders by bringing security to the commercial fishing industry.

Appendix 1B: Country Experiences on ITQs – Canada, Iceland, Netherlands, United States and South Africa

	Canada	Iceland	Netherlands	United States	South Africa
Fishery	Began with Atlantic Herring, and expanded to a wider number of fisheries, e.g. the Scotia-Fundy dragger groundfish fishery	Demersal or groundfish fisheries - cod, haddock, redfish, saithe, Greenland halibut and plaice	Sole and plaice since 1977	In 1990, surf clam and ocean quahog fishery in the mid-Atlantic region and in 1995, for halibut and sablefish in US waters off Alaska	Since 1984, the South Coast rock lobster fishery has been managed by enforcement of a TAC and restricted entry to vessels of quota holders.
Current Management Arrangement	Whatever industry participation in management decisions occurred emerged after, not before, the decision to move to ITQs. This is because, in comparison with the US, Canadian marine fisheries management has fewer requirements for public participation and a different tradition of industry involvement.	When ITQ was first implemented in 1984, the quotas were allocated to fishing vessels according to previous 3 years catch records. Restrictions were set on transferability. Effort quotas (introduced to appease owners dissatisfied with their initial allocation) were phased out in 1989; ITQs extended to all vessels over 6 tonnes, licensed to fish quota restricted species from 1991.	From individual vessel quotas introduced in 1977, a new management regime was introduced in 1993 relocating responsibility for quota management to “management groups”.	The time taken between making a general agreement that some kind of individualised quota or boat quota would be a good way to manage the fishery, to reaching an agreement on ITQs was 11 years, largely because of disputes over the basis for making the original allocation.	Management strategy shifted from a solely TAC-managed fishery to one based on a TAC and a TAE during the 2000/01 fishing season.
		At the outset, the Iceland ITQ had special equity-protecting features. Changes made in 1991 marked the full institution of ITQ system in the demersal fisheries.			

	Canada	Iceland	Netherlands	United States	South Africa
Current Management Arrangement		By the 1990 Fisheries Management Act, TAC-shares were allocated permanently to boat owners.			
Rationale for New Arrangement	Although the problem of overcapacity and overfishing in the Canadian mobile gear fishery grew dramatically during late 70s to mid-80s, leading to several recommendations for change, a 1989 resource crisis became the rationale for such change.	To curb the dramatic rise in domestic fishing effort and to reduce the high level of overcapitalisation in the industry. An ITQ was introduced in 1984 to prevent the collapse of the cod stock and make fishing more economical.		ITQs in surf clam fishery followed a 13-year period of regulation based on a vessel moratorium, overall quotas and time restrictions – a bureaucratic nightmare and an extremely capitalized system where, by mid-1980s, each vessel was allowed to fish for only 6 hours every 2 wks.	
Issues Faced by the Fishery		Implicit in the ITQ system is a profound change in economic and social policy, moving away from the established principles of maximising social benefits of resources and protecting local community structures, to a more strongly market-oriented approach involving a fundamental restructuring of the fishing fleet and the processing sector.		Much of the resistance to the use of ITQs in the US centres on the concern that ITQs will change participants' relative positions in the fishery – in particular the fear that small-scale fishermen will be disadvantaged relative to larger producer.	Reallocation of access rights in South Africa under the apartheid system, ITQ systems were used in fishery management with the deliberate intent of maintaining control over resource wealth in order to support the perpetuation of racially based social inequality.

	Canada	Iceland	Netherlands	United States	South Africa
Economic	For the Nova Scotia “under 65’ dragger” ITQ system for the mobile gear fishery that began in 1991, demands for coastal community economic viability and employment conflicted with the need for fleet rationalisation.	The system, based on a quick review of the first decade of ITQ in Iceland, had in fact improved the economic efficiency of the fishery.		The most striking change was a significant reduction in the number of vessels in the industry. It is to be noted, however, that some firms have made a transition from harvesting clams to a new business model where they generate revenue by leasing property rights to harvesting firms.	
		With progressive reduction in TACs and quotas, many small boat owners find themselves with too little quota to sustain an economically viable operation.		Increased efficiency is found among the SCOQ vessels in terms of amount of effort per vessel and per firm. Fishing hours per vessel increased, as did productivity per vessel.	
Socio-Economic	Trading of quota shares resulted in regional shifts in the landing of groundfish, whereby some ports emerged as major centres and others declined, reducing the processing sector employment available in them.	The most significant results from the reform are a rather massive redistribution of wealth and income. The winners are the big quota owners and the losers are the fishermen or the fishing crews (who experienced a drop in income given the tendency towards a		On balance, the claim that ITQs unfairly harm “small” fishermen, forcing them out of the fishery to the benefit of larger fleets and vertically integrated processors, is not borne out by the evidence of a study that analysed 17 years of	

	Canada	Iceland	Netherlands	United States	South Africa
		reduction of fishing crew-member's share of catch value) as well as fishing communities who are losing quota shares and consequently losing their opportunity to earn income from fishing.		data in the surf clam and ocean quahog fishery. However, a survey of crew indicates that displaced workers generally tried to stay in fishing-related work but found this work to be scarce given downturns in other fisheries.	
	Crews are very unhappy. Beyond the reduction in the quality of life (due to working longer hours because the owners demand it), working trips back to back bring fatigue and reduce crewmen's ability to work safely with heavy, swinging equipment operated on a moving platform.	Despite restrictions placed on the permanent sale of quotas to protect the local community's social investment in the cod fishery, there has been movement away from areas experiencing sharp declines in the cod fishery and strong accumulation of quotas around the successful processing centre in the north.		Vessel owners generally reduced the crews' share when ITQs began or soon after. In effect, crew is paying for the purchase or leasing of ITQ. Given sharply reduced need for labour with the decline in fishing vessels participating, their bargaining position is weak.	
Social	Empirical evidence shows rapid concentration of ownership of ITQs in surf clam and ocean quahog fisheries as well as the groundfish fisheries of the Scotia-	This rapid concentration of ownership is true for the groundfish fisheries of Iceland. Many Icelanders were wary of the concentration of ITQs in the hands of the large vertically-integrated	Generally, with the rising value of ITQs, retirement and succession within family businesses have become problematic, and the solution of	Empirical evidence shows rapid concentration of ownership of ITQs in surf clam and ocean quahog fisheries as well as the groundfish fisheries of the Scotia-Fundy district of	

	Canada	Iceland	Netherlands	United States	South Africa
	Fundy district of Canada.	companies and the emergence of new relations of production associated with fishing for others.	incorporation has its own costs that make it unacceptable to some.	Canada.	
		In the “tenancy” system, the “quota-kings” made the rules; not only do they own most of the ITQs, they also control many of the plants that buy the catch.	Death and divorce can also force the exit of otherwise healthy firms from the fishery as people find themselves forced to sell fishing rights to meet inheritance taxes or divorce settlements.		
	In a study on role of ITQs in social stratification and cultural conceptions of an Acadian community of Nova Scotia, it was observed that there are strains imposed upon a close-knit community and egalitarian culture by rise of “fish lords” controlling ITQs.	Fisheries-dependent municipalities and coastal communities are heavily dependent upon quota owners for their survival and no one seems responsible for the victims of the system; the people living in communities which the quota owners have abandoned.		Specifically, the surf clam program decreased employment and it also decreased opportunities for young people to become vessel owners and for independent vessel owners to find markets for their clams.	
		Some communities are being marginalised by the loss of quotas, with those communities with less than 500 inhabitants have lost a			

	Canada	Iceland	Netherlands	United States	South Africa
		much larger share of their quotas than the bigger communities.			
		Little attention has been paid to the social effects on family and work life in small villages that have not been able to take advantage of the new system. In Eyri, both village men and women are marginalised as actors in the Icelandic fisheries.			
Environmental	The failure of the system of Atlantic Canada's groundfishery can be largely attributed to an over-reliance on quota management and its process of setting and sub-dividing the TAC, and an adversarial relationship between government and fishers, which created an environment in which fishers operated illegally, dumped and discarded fish, and grossly misreported catches.	There is some evidence for an erosion of responsibility I fisheries as a result of ITQ management. Discarding of small and immature fish during fishing operations and the "high-grading" of the catch (the dumping of species of relatively low economic value) seem to be major problems in many fisheries.			

	Canada	Iceland	Netherlands	United States	South Africa
Institutional	To preserve community perceptions of equity, the Scotia-Fundy case is one where social concerns were to be protected by the use of caps on the proportion of a quota owned by any one entity, provisions preserving the right of ownership to practicing fishers and restrictions on transfer.	The study of Palsson and Helgason indicated that Icelanders in general do seem to be concerned with how production in the fisheries is organised and how access to the fishing stocks is defined and regulated. Economics and administrators must take heed of such considerations when implementing a system with such far-reaching transformational effects. The efficiency of such a system is likely to be jeopardised in the long run in the absence of public acceptance.		For the surf clam and ocean quahog, excessive concentration of shares would be adequately handled by monitoring the allocation of shares and working with agencies whose job it is to protect against monopoly formation.	Under-reporting of catches has allegedly taken place systematically throughout the 1990s. Systematic underreporting and over-quota catches are most likely the result of poor compliance, a situation worsened by the lack of sufficient resources for compliance purposes, such as funding and manpower.
	Early ITQ experiments such as for herring in the Canadian waters of the Bay of Fundy showed the importance of monitoring and enforcement: unreported landings weaken or even destroy a market for quotas.	The court cases filed demonstrate that the ITQ-legislation has not been sufficiently well designed from the start and that it did not anticipate the wide-ranging consequences of perpetual quota allocation. The legal framework must be carefully worked out to build a firm basis for as far reaching reform.		The Alaska Community Development Quota program for the species Pollock was created to bring those communities into the fisheries allocation system, explicitly recognising the special needs of communities as distinct from business firms or individuals.	The problem (seen from a management point of view) is the widespread lack of trust in the administration, their regulations and their officers, a fact which makes poaching all the more reasonable and acceptable at the grassroots levels.

	Canada	Iceland	Netherlands	United States	South Africa
Institutional		Despite critical attitude toward the system, the <i>basic principle</i> of fisheries management by some sort of transferable quotas now seems widely accepted by the Icelandic public. A consensus solution should take into account the insecure situation of fishing communities. It should safeguard the income of fishing crew, and include payments of resource rentals, taxes or cost recovery from those who have benefited from the system.			

Appendix 2: Top Three Sectors of Employment by Community, 1991 and 2001

Community	1996	2001
Australia	Retail Trade	Retail Trade
	Manufacturing	Manufacturing
	Property and Business Services	Property and Business Services
Western Australia	Retail Trade	Retail Trade
	Manufacturing	Property and Business Services
	Property and Business Services	Manufacturing
Kalbarri	Accommodation, Cafes and Restaurants	Accommodation, Cafes and Restaurants
	Retail Trade	Retail Trade
	Agriculture, Forestry and Fishing	Property and Business Services
Geraldton	Retail Trade	Retail Trade
	Health and Community Services	Health and Community Services
	Construction	Education
Dongara	Agriculture, Forestry and Fishing	Agriculture, Forestry and Fishing
	Retail Trade	Retail Trade
	Accommodation, Cafes and Restaurants	Construction
Leeman	Mining	Mining
	Agriculture, Forestry and Fishing	Agriculture, Forestry and Fishing
	Retail Trade	Retail Trade
Green Head	Mining	Agriculture, Forestry and Fishing
	Agriculture, Forestry and Fishing	Construction
	Government Administration and Defence	Retail Trade
Jurien	Agriculture, Forestry and Fishing	Retail Trade
	Construction	Accommodation, Cafes and Restaurants
	Retail Trade	Education
Cervantes	Agriculture, Forestry and Fishing	Accommodation, Cafes and Restaurants
	Accommodation, Cafes and Restaurants	Agriculture, Forestry and Fishing
	Retail Trade	Retail Trade
Lancelin	Accommodation, Cafes and Restaurants	Agriculture, Forestry and Fishing
	Agriculture, Forestry and Fishing	Retail Trade
	Retail Trade	Property and Business Services
Ledge Point	Agriculture, Forestry and Fishing	Agriculture, Forestry and Fishing
	Accommodation, Cafes and Restaurants	Construction
	Manufacturing	Accommodation, Cafes and Restaurants

Community	1996	2001
Seabird	--	Agriculture, Forestry and Fishing
	--	Accommodation, Cafes and Restaurants
	--	Cultural and Recreational Services
Two Rocks	Retail Trade	Retail Trade
	Health and Community Services	Manufacturing
	Manufacturing	Construction
Yanchep	Retail Trade	Retail Trade
	Construction	Construction
	Manufacturing	Health and Community Services
Fremantle	Retail Trade	Health and Community Services
	Health and Community Services	Retail Trade
	Manufacturing	Property and Business Services
Mandurah	Retail Trade	Retail Trade
	Manufacturing	Manufacturing
	Construction	Construction
Bunbury	Retail Trade	Retail Trade
	Manufacturing	Manufacturing
	Construction	Construction
Busselton	Retail Trade	Retail Trade
	Construction	Construction
	Manufacturing	Health and Community Services
Augusta	Construction	Agriculture, Forestry and Fishing
	Retail Trade	Retail Trade
	Accommodation, Cafes and Restaurants	Accommodation, Cafes and Restaurants
Source of Basic Data: Australian Bureau of Statistics, <i>Census of Population and Housing, 1996 and 2001</i> .		

Appendix 3: Computation of Total Resilience Score by Community

In generating the total resilience scores for each community, the direction and magnitude of the change in the indicators were used in the computation. A positive increase in the population size, labour force participation rate, and occupied dwellings are given positive scores while an increase in unemployment rates is given negative scores. In terms of fisheries-related data, a decline in both the total potlifts and the number of boats are given negative scores.

For the Census data, the percentage change in the selected indicators between the 1996 and 2001 census was used and for the data from the Department of Fisheries, the percentage change in the indicators between the 2001/02 and 2004/05 Western Rock Lobster seasons were used.

The following scoring system was adopted, with resilience scores summed to provide a Total Resilience Score:

Percent Change 1996-2001		Resilience Score
Greater than	-10.0	-3.0
Between	-10.0 - -5.0	-2.0
Between	-5.0 - -2.5	-1.0
Between	-2.5 - 2.5	0.0
Between	2.5 - 5.0	1.0
Between	5.0 - 10.0	2.0
Greater than	10.0	3.0

Kalbarri					
Variables	1991	1996	2001	2004	Resilience Score
Resident Population	1,540	1,720	2,123		
% Change		11.7	23.4		3.0
Population under 15	258	284	325		
Population over 65	247	330	472		
Age Dependency Ratio	48.8	55.5	60.1		
Elderly Dependency Ratio	23.9	29.8	35.6		
% Change		24.7	19.5		-3.0
Child Dependency Ratio	24.9	25.7	24.5		
% Change		3.2	-4.7		1.0
Occupied Dwellings	528	697	943		
% Change		32.0	35.3		3.0
Employed	592	608	740		
Unemployed	98	87	57		
Labour Force Participation Rate	53.8	48.4	44.6		
% Change		-10.0	-7.9		-2.0
Unemployment Rate	14.2	12.5	7.7		
% Change		-12.0	-38.4		3.0
Economic Diversity		38.3	42.0		
			9.7		-2.0
Resilience Score using Census data only					3.0
Total Potlifts	569,130	494,719	448,097	427,580	
% Change		-13.1	-9.4	-4.6	-1.0
Number of Boats (December)	28	26	13	11	
% Change		-7.1	-50.0	-15.4	-3.0
Resilience Score using Fisheries Data only					-4.0
Total Resilience Score					-1.0

Geraldton					
Variables	1991	1996	2001	2004	Resilience Score
Resident Population	24,449	25,148	25,323		
% Change		2.9	0.7		0.0
Population under 15	6,499	6,460	6,421		
Population over 65	2,100	2,528	2,966		
Age Dependency Ratio	54.3	55.6	58.9		
Elderly Dependency Ratio	13.2	15.6	18.6		
% Change		18.2	19.2		-3.0
Child Dependency Ratio	41.0	40.0	40.3		
% Change		-2.4	0.7		0.0
Occupied Dwellings	8,116	9,116	9,521		
% Change		12.3	4.4		1.0
Employed	9,134	10,024	9,891		
Unemployed	1,900	1,326	1,380		
Labour Force Participation Rate	61.5	60.7	59.6		
% Change		-1.3	-1.8		0.0
Unemployment Rate	17.2	11.7	12.2		
% Change		-32.0	4.3		-1.0
Economic Diversity		34.7	37.8		
			8.9		-2.0
Resilience Score using Census data only					-5.0
Total Potlifts	2,475,025	1,268,727	1,161,050	1,165,884	
% Change		-48.7	-8.5	0.4	0.0
Number of Boats (December)	131	82	82	82	
% Change		-37.4	0.0	0.0	0.0
Resilience Score using Fisheries Data only					0.0
Total Resilience Score					-5.0

Dongara					
Variables	1991	1996	2001	2004	Resilience Score
Resident Population	1,649	1,868	2,196		
% Change		13.3	17.6		3.0
Population under 15	390	413	508		
Population over 65	208	309	353		
Age Dependency Ratio	56.9	63.0	64.5		
Elderly Dependency Ratio	19.8	27.0	26.4		
% Change		36.4	-2.2		0.0
Child Dependency Ratio	37.1	36.0	38.1		
% Change		-3.0	5.8		-2.0
Occupied Dwellings	625	754	917		
% Change		20.6	21.6		3.0
Employed	554	622	771		
Unemployed	140	134	135		
Labour Force Participation Rate	55.1	52.0	53.8		
% Change		-5.6	3.5		1.0
Unemployment Rate	20.2	17.7	15.0		
% Change		-12.4	-15.3		3.0
Economic Diversity		41.0	44.7		
			9.0		-2.0
Resilience Score using Census data only					6.0
Total Potlifts	987,270	823,390	889,262	780,394	
% Change		-16.6	8.0	-12.2	-3.0
Number of Boats (December)	70	53	58	55	
% Change		-24.3	9.4	-5.2	-2.0
Resilience Score using Fisheries Data only					-5.0
Total Resilience Score					1.0

Leeman					
Variables	1991	1996	2001	2004	Resilience Score
Resident Population	570	506	551		
% Change		-11.2	8.9		2.0
Population under 15	205	170	161		
Population over 65	25	18	45		
Age Dependency Ratio	67.6	59.1	59.7		
Elderly Dependency Ratio	7.4	5.7	13.0		
% Change		-23.0	128.1		-3.0
Child Dependency Ratio	60.3	53.4	46.7		
% Change		-11.4	-12.5		3.0
Occupied Dwellings	188	180	212		
% Change		-4.3	17.8		3.0
Employed	212	228	220		
Unemployed	24	16	18		
Labour Force Participation Rate	64.7	72.6	62.3		
% Change		12.2	-14.2		-3.0
Unemployment Rate	10.2	6.6	7.8		
% Change		-35.3	18.2		-3.0
Economic Diversity		64.6	52.3		
			-19.0		3.0
Resilience Score using Census data only					2.0
Total Potlifts	541,323	356,778	457,805	402,398	
% Change		-34.1	28.3	-12.1	-3.0
Number of Boats (December)	36	31	35	38	
% Change		-13.9	12.9	8.6	2.0
Resilience Score using Fisheries Data only					-1.0
Total Resilience Score					1.0

Green Head					
Variables	1991	1996	2001	2004	Resilience Score
Resident Population	213	257	236		
% Change		20.7	-8.2		-2.0
Population under 15	50	68	53		
Population over 65	14	29	45		
Age Dependency Ratio	43	60.6	71.0		
Elderly Dependency Ratio	9.4	18.1	32.6		
% Change		92.6	80.1		-3.0
Child Dependency Ratio	33.6	42.5	38.4		
% Change		26.5	-9.6		2.0
Occupied Dwellings	78	96	96		
% Change		23.1	0.0		0.0
Employed	67	60	77		
Unemployed	17	32	16		
Labour Force Participation Rate	51.5	48.7	50.8		
% Change		-5.4	4.3		1.0
Unemployment Rate	20.2	34.8	16.1		
% Change		72.3	-53.7		3.0
Economic Diversity		49.2	52.0		
			5.7		2.0
Resilience Score using Census data only					3.0
Total Potlifts	308,317	313,353	209,378	147,393	
% Change		1.6	-33.2	-29.6	-3.0
Number of Boats (December)	21	23	17	10	
% Change		9.5	-26.1	-41.2	-3.0
Resilience Score using Fisheries Data only					-6.0
Total Resilience Score					-3.0

Jurien Bay					
Variables	1991	1996	2001	2004	Resilience Score
Resident Population	573	631	1,138		
% Change		10.1	80.3		3.0
Population under 15	166	151	255		
Population over 65	55	82	196		
Age Dependency Ratio	62.8	58.5	65.6		
Elderly Dependency Ratio	15.6	20.6	28.5		
% Change		32.1	38.3		-3.0
Child Dependency Ratio	47.2	37.9	37.1		
% Change		-19.7	-2.1		0.0
Occupied Dwellings	218	271	505		
% Change		24.3	86.3		3.0
Employed	179	222	407		
Unemployed	59	52	47		
Labour Force Participation Rate	58.5	57.1	50.6		
% Change		-2.4	-11.4		-3.0
Unemployment Rate	24.8	19.0	12.1		
% Change		-23.4	-36.3		3.0
Economic Diversity		36.5	36.2		
			-0.8		0.0
Resilience Score using Census data only					3.0
Total Potlifts	797,556	690,802	487,262	344,142	
% Change		-13.4	-29.5	-29.4	-3.0
Number of Boats (December)	46	44	31	25	
% Change		-4.3	-29.5	-19.4	-3.0
Resilience Score using Fisheries Data only					-6.0
Total Resilience Score					-3.0

Cervantes					
Variables	1991	1996	2001	2004	Resilience Score
Resident Population	533	486	535		
% Change		-8.8	10.1		3.0
Population under 15	141	98	109		
Population over 65	41	57	82		
Age Dependency Ratio	51.9	46.8	55.5		
Elderly Dependency Ratio	11.7	17.2	23.8		
% Change		47.0	38.4		-3.0
Child Dependency Ratio	40.2	29.6	31.7		
% Change		-26.4	7.1		-2.0
Occupied Dwellings	198	200	254		
% Change		1.0	27.0		3.0
Employed	163	147	196		
Unemployed	63	51	28		
Labour Force Participation Rate	57.7	51.0	51.6		
% Change		-11.6	1.2		0.0
Unemployment Rate	27.9	25.8	13.2		
% Change		-7.5	-48.8		3.0
Economic Diversity		46.5	52.1		
			12.0		-3.0
Resilience Score using Census data only					1.0
Total Potlifts	922,578	854,026	610,643	522,991	
% Change		-7.4	-28.5	-14.4	-3.0
Number of Boats (December)	43	46	34	30	
% Change		7.0	-26.1	-11.8	-3.0
Resilience Score using Fisheries Data only					-6.0
Total Resilience Score					-5.0

Lancelin					
Variables	1991	1996	2001	2004	Resilience Score
Resident Population	486	604	668		
% Change		24.3	10.6		3.0
Population under 15	111	148	165		
Population over 65	59	83	101		
Age Dependency Ratio	53.8	61.9	66.2		
Elderly Dependency Ratio	18.7	22.2	25.1		
% Change		18.7	13.1		-3.0
Child Dependency Ratio	35.1	39.7	41.0		
% Change		13.1	3.3		-1.0
Occupied Dwellings	216	249	298		
% Change		15.3	19.7		3.0
Employed	152	177	221		
Unemployed	71	56	29		
Labour Force Participation Rate	59.5	51.1	54.9		
% Change		-14.1	7.4		2.0
Unemployment Rate	31.8	24.0	15.6		
% Change		-24.5	-35.0		3.0
Economic Diversity		42.0	38.4		
			-8.6		2.0
Resilience Score using Census data only					9.0
Total Potlifts	993,937	865,148	811,563	756,202	
% Change		-13.0	-6.2	-6.8	-2.0
Number of Boats (December)	55	48	43	42	
% Change		-12.7	-10.4	-2.3	-1.0
Resilience Score using Fisheries Data only					-3.0
Total Resilience Score					6.0

Ledge Point					
Variables	1991	1996	2001	2004	Resilience Score
Resident Population	184	180	128		
% Change		-2.2	-28.9		-3.0
Population under 15	52	46	12		
Population over 65	14	9	40		
Age Dependency Ratio	55.9	44.0	68.4		
Elderly Dependency Ratio	11.9	7.2	52.6		
% Change		-39.5	630.6		-3.0
Child Dependency Ratio	44.1	36.8	15.8		
% Change		-16.6	-57.1		3.0
Occupied Dwellings	68	62	66		
% Change		-8.8	6.5		2.0
Employed	48	33	47		
Unemployed	29	22	6		
Labour Force Participation Rate	58.3	41.0	49.1		
% Change		-29.7	19.8		3.0
Unemployment Rate	37.7	40.0	14.0		
% Change		6.1	-65.0		3.0
Economic Diversity		71.4	64.0		
			-10.4		3.0
Resilience Score using Census data					8.0
Total Potlifts	581,445	448,015	390,101	392,345	
% Change		-22.9	-12.9	0.6	0.0
Number of Boats (December)	31	27	20	20	
% Change		-12.9	-25.9	0.0	0.0
Resilience Score using Fisheries Data only					0.0
Total Resilience Score					8.0

Two Rocks					
Variables	1991	1996	2001	2004	Resilience Score
Resident Population	1,266	1,367	1,494		
% Change		8.0	9.3		2.0
Population under 15	286	292	319		
Population over 65	187	232	252		
Age Dependency Ratio	59.6	62.2	61.9		
Elderly Dependency Ratio	23.6	27.5	27.3		
% Change		16.5	-0.7		0.0
Child Dependency Ratio	36.1	34.6	34.6		
% Change		-4.2	0.0		0.0
Occupied Dwellings	500	611	661		
% Change		22.2	8.2		2.0
Employed	294	353	434		
Unemployed	140	98	89		
Labour Force Participation Rate	44.3	42.0	45.4		
% Change		-5.2	8.1		2.0
Unemployment Rate	32.3	21.7	17.8		
% Change		-32.8	-18.0		3.0
Economic Diversity		35.1	38.9		
			10.8		3.0
Resilience Score using Census data					12.0
Total Potlifts	755,046	659,729	657,019	767,224	
% Change		-12.6	-0.4	16.8	3.0
Number of Boats (December)	33	30	30	32	
% Change		-9.1	0.0	6.7	2.0
Resilience Score using Fisheries Data only					5.0
Total Resilience Score					17.0

Yanchep					
Variables	1991	1996	2001	2004	Resilience Score
Resident Population	1,544	1,785	1,954		
% Change		15.6	9.5		2.0
Population under 15	402	455	452		
Population over 65	183	227	303		
Age Dependency Ratio	61	61.8	63.0		
Elderly Dependency Ratio	19.1	20.6	25.3		
% Change		7.9	22.8		-3.0
Child Dependency Ratio	41.9	41.2	37.7		
% Change		-1.7	-8.5		2.0
Occupied Dwellings	584	685	799		
% Change		17.3	16.6		3.0
Employed	469	567	675		
Unemployed	148	114	96		
Labour Force Participation Rate	54.0	51.2	51.6		
% Change		-5.2	0.8		0.0
Unemployment Rate	24.0	16.7	12.3		
% Change		-30.4	-26.3		3.0
Economic Diversity		31.5	34.4		
			9.2		2.0
Resilience Score using Census data only					9.0
Total Potlifts	34,381	52,983	32,558	42,531	
% Change		54.1	-38.6	30.6	3.0
Number of Boats (December)	1	2	1	2	
% Change		100.0	-50.0	100.0	3.0
Resilience Score using Fisheries Data only					6.0
Total Resilience Score					15.0

Fremantle					
Variables	1991	1996	2001	2004	Resilience Score
Resident Population	23,831	24,029	24,709		
% Change		0.8	2.8		1.0
Population under 15	4,068	3,784	3,665		
Population over 65	3,496	3,709	3,918		
Age Dependency Ratio	46.5	45.3	44.2		
Elderly Dependency Ratio	21.5	22.4	22.9		
% Change		4.2	2.2		0.0
Child Dependency Ratio	25.0	22.9	21.4		
% Change		-8.4	-6.6		2.0
Occupied Dwellings	9,170	10,136	10,904		
% Change		10.5	7.6		2.0
Employed	9,045	10,062	10,907		
Unemployed	2,023	1,403	1,219		
Labour Force Participation Rate	56.0	56.6	57.6		
% Change		1.1	1.8		0.0
Unemployment Rate	18.3	12.2	10.0		
% Change		-33.3	-18.0		3.0
Economic Diversity		35.0	37.9		
			8.3		2.0
Resilience Score using Census data only					10.0
Total Potlifts	1,128,375	678,585	738,682	620,480	
% Change		-39.9	8.9	-16.0	-3.0
Number of Boats (December)	61	52	53	49	
% Change		-14.8	1.9	-7.5	-2.0
Resilience Score using Fisheries Data only					-5.0
Total Resilience Score					5.0

Mandurah					
Variables	1991	1996	2001	2004	Resilience Score
Resident Population	23,325	35,839	46,548		
% Change		53.7	29.9		3.0
Population under 15	5,476	8,727	9,989		
Population over 65	3,973	5,788	8,374		
Age Dependency Ratio	68.1	68.1	65.2		
Elderly Dependency Ratio	28.6	27.1	29.7		
% Change		-5.2	9.6		-2.0
Child Dependency Ratio	39.5	40.9	35.4		
% Change		3.5	-13.4		3.0
Occupied Dwellings	9,149	14,047	18,990		
% Change		53.5	35.2		3.0
Employed	7,233	11,886	15,964		
Unemployed	1,714	1,961	2,293		
Labour Force Participation Rate	50.1	51.1	49.9		
% Change		2.0	-2.3		0.0
Unemployment Rate	19.2	14.2	12.6		
% Change		-26.0	-11.3		3.0
Economic Diversity		45.0	44.6		
			-0.9		0.0
Resilience Score using Census data only					10.0
Total Potlifts	321,464	255,437	474,873	463,191	
% Change		-20.5	85.9	-2.5	-1.0
Number of Boats (December)	14	11	17	16	
% Change		-21.4	54.5	-5.9	-2.0
Resilience Score using Fisheries Data only					-3.0
Total Resilience Score					7.0

Bunbury					
Variables	1991	1996	2001	2004	Resilience Score
Resident Population	24,078	24,885	45,155		
% Change		3.4	81.5		3.0
Population under 15	7,729	5,516	10,597		
Population over 65	2,790	3,194	4,642		
Age Dependency Ratio	77.6	53.8	50.9		
Elderly Dependency Ratio	20.6	19.7	15.5		
% Change		-4.4	-21.3		3.0
Child Dependency Ratio	57.0	34.1	35.4		
% Change		-40.2	3.8		-1.0
Occupied Dwellings	8,496	9,502	16,860		
% Change		11.8	77.4		3.0
Employed	9,725	10,857	20,416		
Unemployed	1,373	1,174	1,873		
Labour Force Participation Rate	67.9	62.1	52.8		
% Change		-8.5	-15.0		-3.0
Unemployment Rate	12.4	9.8	12.6		
% Change		-21.0	28.6		-3.0
Economic Diversity		41.0	41.5		
			1.2		0.0
Resilience Score using Census data only					2.0
Total Potlifts	81,143	77,171	170,066	94,884	
% Change		-4.9	120.4	-44.2	-3.0
Number of Boats (December)	1	1	5	4	
% Change		0.0	400.0	-20.0	-3.0
Resilience Score using Fisheries Data only					-6.0
Total Resilience Score					-4.0

Busselton					
Variables	1991	1996	2001	2004	Resilience Score
Resident Population	8,849	10,601	13,863		
% Change		19.8	30.8		3.0
Population under 15	1,980	2,398	3,217		
Population over 65	1,668	1,930	2,280		
Age Dependency Ratio	70.1	69.0	65.7		
Elderly Dependency Ratio	32.1	30.8	27.2		
% Change		-4.0	-11.7		3.0
Child Dependency Ratio	38.1	38.2	38.4		
% Change		0.3	0.5		0.0
Occupied Dwellings	3,394	4,183	5,376		
% Change		23.2	28.5		3.0
Employed	3,140	4,002	5,589		
Unemployed	482	405	477		
Labour Force Participation Rate	52.7	53.7	57.0		
% Change		1.9	6.1		2.0
Unemployment Rate	13.3	9.2	7.8		
% Change		-30.8	-15.2		3.0
Economic Diversity		37.9	40.4		
			6.6		-2.0
Resilience Score using Census data only					12.0
Total Potlifts	0	0	51,730	111,490	
% Change				115.5	3.0
Number of Boats (December)	0	0	7	1	
% Change				-85.7	-3.0
Resilience Score using Fisheries Data only					0.0
Total Resilience Score					12.0

Augusta					
Variables	1991	1996	2001	2004	Resilience Score
Resident Population	805	1,075	1,097		
% Change		33.5	2.0		0.0
Population under 15	112	154	159		
Population over 65	277	301	344		
Age Dependency Ratio	93.5	73.4	84.7		
Elderly Dependency Ratio	66.6	48.5	57.9		
% Change		-27.2	19.4		-3.0
Child Dependency Ratio	26.9	24.8	26.8		
% Change		-7.8	8.1		-2.0
Occupied Dwellings	350	461	509		
% Change		31.7	10.4		3.0
Employed	268	420	359		
Unemployed	19	24	21		
Labour Force Participation Rate	41.4	48.2	40.9		
% Change		16.4	-15.1		-3.0
Unemployment Rate	6.6	5.4	6.5		
% Change		-18.2	20.4		-3.0
Economic Diversity		45.6	44.2		
			-3.1		1.0
Resilience Score using Census data only					-7.0
Total Potlifts /1	75,013	4,378	90,461	187,791	
% Change		-94.2	1966.3	107.6	3.0
Number of Boats (December) /1	5	2	2	2	
% Change		-60.0	0.0	0.0	0.0
Resilience Score using Fisheries Data only					3.0
Total Resilience Score					-4.0

/1 Includes data for Hamelin Bay anchorage.

Appendix 4: Interview Guide Questions

FOR FISHERS:

1. Personal Characteristics
- <i>Age/Year of Birth</i>
- <i>Gender</i>
- <i>Place of Birth</i>
- <i>Marital Status</i>
- <i>Number/Age of Children</i>
2. History in the Industry
- <i>Classification in the industry</i>
- <i>Number of pots owned</i>
- <i>Reasons for entry to the rock lobster fishery</i>
- <i>Average gross weekly individual income during rock lobster season</i>
- <i>Are you leasing any pots? If yes, what problems do you face?</i>
- <i>Boat characteristics</i>
- <i>Number of people engaged</i>
- <i>In what major town do you fish?</i>
- <i>Do you fish in other towns?</i>
3. Community Aspects
- <i>How long have you lived or worked in this community?</i>
- <i>Why did you move to this community?</i>
- <i>What do you like about community?</i>
- <i>What changes have you noticed in the community since you moved here?</i>
- <i>Are there aspects in the community you don't like or wishes to change?</i>
- <i>What voluntary activities are you engaged in?</i>
- <i>What voluntary activities do your family engage in?</i>
- <i>What do fishermen contribute to the community? Please cite concrete examples.</i>
4. On changes to the management arrangement
- <i>Fisherman's thinking on the alternatives</i>
- <i>Status Quo of Input Controls</i>
- <i>Individual Transferable Effort</i>
- <i>Output Controls/ Individual Transferable Quota</i>
- <i>Perceived problems/issues in the industry</i>
5. Other Comments

FOR COMMUNITY RESIDENTS:

1. Personal Characteristics
- <i>Age/Year of Birth</i>
- <i>Gender</i>
- <i>Place of Birth</i>
- <i>Marital Status</i>
- <i>Number/Age of Children</i>
2. Community Aspects
- <i>How long have you lived or worked in this community?</i>
- <i>Why did you move to this community?</i>
- <i>What do you like about community?</i>

- <i>What positive or negative changes have you noticed in the community?</i>
- <i>Are there aspects in the community you don't like or wishes to change?</i>
3. Perceptions of Cray Fishing and Cray Fishers
- <i>This town is known as a crayfishing town. Do you think it is still a crayfishing town?</i>
- <i>To what extent was crayfishing important to the development of the community? Examples?</i>
- <i>What do you think are the contributions of crayfishers in this town?</i>
- <i>What is the participation of crayfishers in community events? In volunteer activities?</i>
- <i>Do you think that the crayfishing industry is important to the continued growth and development of this town? If yes, to what extent is it important?</i>
4. Other Comments

FOR SMALL BUSINESS OWNERS/OPERATORS:

1. Personal Characteristics
- <i>Age/Year of Birth</i>
- <i>Gender</i>
- <i>Place of Birth</i>
- <i>Marital Status</i>
- <i>Number/Age of Children</i>
2. Business Aspects
- <i>What is the type of business you operate? How many staff? What is the staff turnover in the past 5 years?</i>
- <i>How long have you owned/operated the business?</i>
- <i>What made you decide to own/operate this business?</i>
- <i>What are the main challenges facing business in the town?</i>
- <i>Do you do any business with crayfishers in this town? If yes, elaborate.</i>
- <i>How is your business affected with fewer boats/less crew in the crayfishing industry?</i>
- <i>What is the extent to which your business depends on the crayfishing industry?</i>
3. Community Aspects
- <i>How long have you lived or worked in this community?</i>
- <i>Why did you move to this community?</i>
- <i>What do you like about community?</i>
- <i>What positive or negative changes have you noticed in the community since you moved here?</i>
- <i>Are there aspects in the community you don't like or wishes to change?</i>
4. Perceptions of Cray Fishing and Cray Fishers
- <i>This town is known as a crayfishing town. Do you think it is still a crayfishing town?</i>
- <i>To what extent is crayfishing important to the continued development of the town? Provide specific examples.</i>
- <i>What do you think are the contributions of crayfishers in this town?</i>
4. Other Comments

FOR PROCESSORS:

1. Personal Background
2. Business Operations
- <i>How many kgs./tons do you process in a season?</i>
- <i>What percentage of your business is rock lobster processing?</i>
- <i>Where are your processing plants located?</i>
- <i>How many people do you employ? Permanent or regular workers? Casual or temporary staff?</i>
- <i>Does the company own and lease boats? Pots?</i>
- <i>How many rock lobster fishermen supply to your company – regularly? Not on permanent basis?</i>
- <i>What has been the effect of better infrastructure such as the road network along the coast (e.g. Indian Ocean Drive) to your operations? From the receival depots, are the lobsters transported immediately to the nearby processing plants by your mobile truck freezers?</i>
- <i>What are the major challenges facing the processing industry today?</i>
2. Community Links
- <i>To what extent was crayfishing important to the development of the community? Examples?</i>
- <i>Is it still important today?</i>
- <i>What activities does your company support that benefits the community? Examples?</i>
- <i>What is the participation of fishermen in these activities?</i>
3. Community Development
- <i>What positive or negative changes have you noticed in the community over time?</i>
- <i>What do you consider as the major challenges facing the communities that host the rock lobster fleet today?</i>
4. Other Comments

Appendix 5: Indicative Problems and Issues facing WRL Fishers and their Communities

Fishers	Community
<i>Economic Problems or Issues</i>	
There are lots of problems with the smaller licenses not being able to get the kilos. With the lower price of crays (a big unknown), the profit is getting less and the expenses are going up unfortunately.	The trend towards bigger operators is not doing any good to the community since it aggravates the unemployment issues already affecting the community.
For a lot of owner-operators, their retirement fund is their boat and their declining income levels just can't support them.	The family-operated pot making industry is struggling as demand for pots declined. The guys who do the engineering work are also having difficulties.
The view that fishermen have lots of money is not borne by the fact that we are just wealthy on paper.	With super fleets, you won't need moorings and the marinas in the communities will suffer.
There have been a lot of people leaving the industry because the lease price is too high, with the price being low, even on a bumper season it is still difficult to survive with lease pots. Those who are leasing are struggling.	A lot of the big boats come in now and all their needs come up on the truck; they don't buy things in town anymore. They do buy fuel.
When investors start losing money, all of a sudden pots go missing, people cut corners, they start fishing in silly places, take risks, boats get damaged, lives get lost and the industry is finished.	With a bad season, no one gets any work done on their boats and their houses, so it's not only the boating community that gets affected, it's the bricklayers, the gardeners, etc.
The difficulty of getting deckhands is an ongoing problem because people don't want to pay them money. The guys who have trouble getting deckhands are those who pay them nothing and treat them like shit. A lot of the dissatisfaction with crewman in the industry is due to very low shares.	For communities such as Fremantle, the industry's collapse would also bring down a lot of people (electricians, boat builders, mechanics, etc.)
It was an industry that gave work when one needed immediate work. People aren't really getting into fishing so much since the price has come down; there are a lot easier ways to make a buck. Deckhands do not seem to stay long in the industry; as one fisherman stated, "(I'm) getting sick of signing separation certificates".	There is a need for more infrastructure facilities in these towns including coastal roads (since) they had grown bigger in population size. Unfortunately, there are also a few factions in town and making decisions on which infrastructure to prioritise get difficult.

Fishers	Community
<p>The economics of fishing is now far more important than they used to be. It used to be lifestyle but this is changing now, with people thinking monetary wise before any other reason. The price you pay your crew is critical to your margin of profit and (yet) they are demanding more.</p>	<p>The National Competition Policy (NCP) has had highly detrimental effect on the fishery. Lower price for product, higher costs and a situation where all boats are forced to become "mobile fleet" have greatly affected the industry. Maintaining a family lifestyle for the skipper and deckhand has become extremely hard. A lot of small business in town has become unviable with the reduced family populations in the town.</p>
<p>The industry will still survive as long as there are deckhands/skipper who really enjoy what they are doing. But it's getting to the point when the amount of hard work you are doing and the amount of money you get from it may outweigh the enjoyment that you get out of it.</p>	<p>With reduced number of boats and less crew, there will be less support for towns along the coast.</p>
<p>The main visible problem in this fishery is not having the product when our customers want it (all year round) and too much at odd times (whites in deep water). A unit/time quota could be considered to give continuity of supply to our processors and give fishers time off.</p>	
<p><i>Social Problems and Issues</i></p>	
<p>Younger fishers do not seem to care; they don't attend meetings and don't get involved on issues.</p>	<p>Being mobile fishers, we don't have much time in participating in local activities, such as footy games.</p>
<p>Some fishers remain so competitive, posing a threat to the simpler lifestyle afforded by fishing.</p>	<p>We only get involved in the community because of the kids so whatever the kids are interested in, that's what you do.</p>
<p>Closures are great from a family point of view in terms of being able to spend time with family. But a period of not having any income will impact on our way of life.</p>	<p>When the boats are in, people congregate and look at them. Part of the character of the town is looking at the boats when they are unloading.</p>
<p>I used to know everyone but the town had grown and I don't know many people because I am always out at sea.</p>	<p>There are a lot of retirees in town, and we are starting to see factions in the town council politics. While they have only lived in town in a short period, they're starting to call the shots in council matters and other stuff.</p>
<p>There are huge divisions in the industry because there is no trust and no one trusts anybody.</p>	<p>Fleet rationalisation will result in young families moving out of the community which will make the community a marginal area for education funding.</p>

Fishers	Community
<p>Normally, you sort of have your own circle of friends, other fishermen and that, but as your kids get older and go to school, you meet more people and realise how many different people are out there and how few fishermen there really are.</p>	<p>There is not a lot of awareness of what the fishers do in the community (e.g. donations to hospitals, schools, etc). There is a need for some really positive propaganda around the community and the fishermen.</p>
<p>For skippers, there is no social life, being on the boat all the time. You've got responsibility for all your crew and try to set an example for them. (When you are young and don't have ties), you don't mind travelling up and down but it's getting too hard.</p>	<p>Drinking and drugs are shocking especially in small country towns. It's a kind of image (including partying) especially of young deckhands. In some areas, probably 15% of the crew is the only one not on drugs. (But) we have cleaned our act up and becoming more responsible. Unfortunately, the public perception had not changed.</p>
<p>I don't see any future in fishing for my children (especially if you are a lessee). It is not a particularly good profession, particularly starting up as a deckhand. The industry is a little bit insecure and it would be best if they (the children) have a trade.</p>	<p>Sometimes, there can be negative attitudes to fishermen having newer, bigger houses and more expensive cars/boats. It does create a bit of friction but that's perfectly understandable.</p>
<p>There are some factions in the industry, some sort of hierarchy where the deckhands are in one group, the skippers in another and the owners in a different category. But sometimes, this can just be personality clashes. It is also aggravated by big business throwing parties only for specific groups in the fishery.</p>	<p>The NCP's lack of ability to recognise the right of workers' lifestyle issues and the work done by the rock lobster industry, proven to be ecologically sustainable, furthers the argument that the drive for the almighty dollar is not necessarily the only consideration when making a fair assessment of the health of a particular industry.</p>
<p>As a boat skipper/fisher, we are now forced to "travel" to keep our jobs which have a very high impact on lifestyle and family life. The industry seems very unstable and most skippers/deckhands are very disillusioned and unsure about what the future will bring. We do not only work for 32 weeks of the year. There is also another 8-10 weeks of unpaid work on gear and pots that we perform. If we are lucky, we may end up with 8-10 weeks off and it is very hard to find any work for this amount of time. For an industry that a few years ago was judged the best managed fishery worldwide, my, how things have changed!</p>	<p>People pull other people's pots - it's not as bad, it's all right, but it does happen a lot. This causes tension and rivalry.</p>

Fishers	Community
<i>Environmental Problems and Issues</i>	
With lessees needing to pay their leases and investors wanting to get their returns, coupled with indebted fishermen who want to pay off their debts, sustainability of the resources is at stake.	If the crays are in the area, the mobile fleet comes and mobs the place, skin it clean and then they are gone...this causes a little resentment among the local fishermen.
We are getting that good; we could probably cut down the season significantly and probably catch the same amount of crays.	There is conflict with surfers down south and a problem of where we can and cannot fish in some of the communities.
In general, we have been fishing too hard and some areas (such as the B-Zone) are really starting to show the bad signs.	
The health of an industry is not necessarily just measured in dollar terms. However, the decreasing profit margins to fishers over the past few years cannot be ignored. Current costs are pushing away the father/son generation fishing business in favour of large multi-purpose vessels which can only, in the long-term, increase pressures on the industry's sustainability as a whole.	
The high pressure on cray grounds if not slowed will have a large effect in a few short years to come. Boats do not have any days off in a month. It's just go-go-go from one place to another. Mobile boats go up and down the coast chasing the crays completely gutting the areas. The mobility of the fleet needs to be restricted.	
At present, the greater environmental impact that recreational fishermen have is being ignored.	

Fishers	Community
<i>Political/Institutional Problems and Issues</i>	
Fishermen should have been more proactive than reactive and taken control of their own industry.	It would be good for the industry if some fishermen moved to the Capes permanently as the locals would get used to having them there all the time.
Leasing your license entails risks in that you can sometimes get black marks against it due to the lessee's fault.	
Fishers are so fragmented and not united and this is the biggest downfall of the industry.	
The condition of the fishery should be judged on what fish are in the water. And quota is all about politics and money.	
Most fishermen are not necessarily in an association and so don't know about the issues.	

Appendix 6A: Perceived Positive and Negative Impacts of Status Quo – Input Controls

Management Arrangement	Positive Impacts	Negative Impacts
<i>Economic</i>	Pot controls allow fishermen to fish as much as he could, and allow young fishers to pay off their debts and remain in the industry.	For lessees, paying for pots you can't use is a killer. We could employ another person on every boat if we could get those pots back.
		The price of crays reflects problems with the marketing of the product. We should try to sell to northern hemisphere market in their summer time.
		It's getting to the stage where everything is costing money like that new sea lion device.
<i>Social</i>		Pot reductions cause more angst to fishermen.
		Pot reductions are an inequitable management tool which is continuously rendered ineffective by the greater effort or improved fishing techniques of the larger and more mobile operators. Their catches/pots continue to increase while the small operators' catch/pots generally remain the same. Consequently, the small operators shoulder the greatest burden for conservation under a pot reduction policy.
<i>Environmental</i>	There are no great problems in the industry right now so why change. But there should be more research done on the breeding stock from Dongara northwards.	With technological advances and increased effort, the exploitation rate in the industry is increasing and the independent breeding stock is going down.
	To build up the stock in the deep water would require quite serious measures.	The 77-mm gauge does not seem to offer any benefit.
	The current management program has proven successful in controlling stocks.	Temporary pot reductions have not had any effect on the sustainability of the industry because all it has done is to make the fishers fish twice as hard. The fishing effort increases to compensate for the loss of pots. Small operators have had to lease pots at an added expense to remain viable, therefore increasing the fishing effort again.

Management Arrangement	Positive Impacts	Negative Impacts
<i>Institutional</i>	We have input controls that are tools to use for our benefit. We can adapt and use the tools we are already familiar with. There's no reason why we can't have variations with the way we fish now.	The current management system can only work if it's managed and decisions are made; (but) there has been an overwhelming lack of decision making and this culture of not making decisions just resulted in a culture of greed that has just been allowed to run free.
	The industry works together with all bodies including Fisheries Department and the recreational sector. It is proactive.	The current system is good - the biggest problem has been the Minister's removal of the 150-pot rule.
	The quota system doesn't mean getting better just because others do it. We already have in force a de-facto quota system via pot license restrictions without the over-governed administration and enforcement cost which run with quota. Don't fix what isn't broken!	Since 1980, some 250 fishers have taken their boats out of the fishery not because of poor fishing but because of the continuous interference from fisheries management. Why is it that Zones B and A are singled out for increased management? Zone C lobsters are not a separate fishery.
		In the 60s and 70s, the industry was wealthy and healthy. More recently, advisory committees and subcommittees have complicated the industry to the extent that there are now fewer boats and less people involved in fishing.

Appendix 6B: Perceived Positive and Negative Impacts of Individual Transferable Effort

Management Arrangement	Positive Impacts	Negative Impacts
<i>Economic</i>	An extended catching period would be preferable so that crew could be paid during the year - seasonal pay lets them spend it in a hurry.	It might be hard to get good crew since you would change fishing style to only fish in the reds since we get a higher price for them.
	This would allow those who want to work harder and catch more crays to be able to do so at times that suits them.	It would make it hard to find crew, to get them to work sporadically or you would have to put them on a wage and this would definitely affect the Islands.
		It would mean that people would tend to concentrate their effort on more productive periods, which is going to lead to spikes in the supply of lobsters to factories and probably, low income to fishers.
		It would be difficult to put an investment plan to a bank and get them to finance you for another year based on what you think you are going to make during the season by taking risks and trying to catch crays when the price is high.
<i>Social</i>	This would completely change the fishing strategy with everyone picking prime time.	Work safe issues come in, since months like June can be pretty rugged and the weather cold and miserable.
	It would give people more flexibility to plan things. If they want to do something at a certain time of the year they can just do that.	Not a good idea since there would be a concentration in December for the whites whereas reds are better for the market and more valuable.
<i>Environmental</i>	Closures would be a preferred option since we are too efficient at catching crays.	Nominating the time to fish is dangerous because the concern about the weather is a legitimate concern.
	Catching the crays at different times with seasonal closures would be good for the breeding stock.	

Appendix 6C: Perceived Positive and Negative Impacts of Individual Transferable Quota

Management Arrangement	Positive Impacts	Negative Impacts
<i>Economic</i>	Amalgamation of small licences and hiring fewer deckhands to keep costs down.	Quotas for those with relatively high catch rates would mean a reduction in income.
	The industry will stabilise itself and find a cost effective way of operating. A lot of fishermen on the coast have overcapitalised their boats and are now starting to realise that the monies that were there in the start aren't there now under the current economic climate.	A lot of the experienced deckhands will end up leaving the industry and going to other sectors such as mining. It would be harder to get them to hang around with no income during certain months. If they are more transient, it could be a problem since they spend most of their income in the community.
	Now that deckhands do not earn a lot of money fishing, the extra months after you had secured the quota would be used to make money elsewhere.	With the uncertainty in the beach price, fishers will not make any money and/or won't survive. This could result in an exit of these fishers from the industry.
	There would be a marketing advantage if supply was more stable and price would stabilise as well. Continuity of supply is a positive aspect.	This would place the industry in the hands of a few big boat/license owners and there will be a demise of the family-operated businesses in the industry.
	It would take the competition or the "race-to-fish" mentality.	The quotas will accelerate the problem faced by young skippers who will be forced out of the industry in view of high cost of entry to the fishery. Some skippers will be out of job since they are employed on their ability to catch a good quantity of crays for the owners. For those who have debts, this would make it more difficult to repay their loans.
		This would give the processors more leeway over what they are willing to pay for crays.
		The way it works now, there is only just enough money to cover the costs of repairs and stuff for fishing. If they put the quota in and spread it out over the whole season, there won't be enough money for maintenance.

Management Arrangement	Positive Impacts	Negative Impacts
		Young skippers setting out to establish their own family business would be at a major disadvantage. Generally starting out with a minimum number of pots, the quota system will give an automatic advantage to those well established in the business. The quota system puts a ceiling on hard work and initiative for the fledging operator. It not only provides no incentive to start off in the industry; it acts as a disincentive and actively discourages those setting out, as well as limiting those smaller operators already in the industry.
<i>Social</i>	It would save a lot of relationships, for sure. A lot of guys have broken up with their "missus" because they spend too much time at sea. Time off would be better for family time.	I love fishing and enjoy what I do but if I can't catch a lot of crays, what's the point of being there for me?
	With a quota, you would be able to have the weekend off if you wanted to, and fish whenever you want. You would get the best value out of the crayfish.	A quota takes away the competition out of fishing. You set yourself goals and when you can't do that, you would probably lose interest in the industry real quick and move out.
	Fishing when the price is good may actually turn the industry back to smaller/day boats (and also because crew may be hard to get).	With the loss of deckhands, the sporting clubs will be affected because it is the young blokes that are in the sporting clubs. They are also involved in the voluntary sea search and rescue.
	There is an upside to having a lifestyle-based fishery. Having a bit more time off, that's a by-product, a positive one. You can definitely be more involved in community and sports stuff.	It's a bit unfair if one gets a smaller quota when his efficiency is higher than other fishermen. (Some of) those who favour quota are underachievers who want to drag everyone else down to their level.
		It will create more rifts, especially if quotas are different between zones.

Management Arrangement	Positive Impacts	Negative Impacts
		<p>Our industry is touted as the best managed, environmentally sustainable. The lifestyle it provides is excellent; it is a family-based industry and provides the backbone to thriving coastal communities. Why change it? Quotas will result in corporate-based fishing companies run out of Perth or overseas, utilising big licenses on mobile fleets. Companies will have their service personnel; will negotiate equipment purchases without middlemen that live in the towns, etc. Skippers/Deckhands will be transients like miners and the towns will suffer.</p>
<i>Environmental</i>	<p>In terms of conservation, it may take the heat off the breeding grounds for a bit.</p>	<p>I don't think the industry is in such dire straits that it needs a quota. The common view is that you only go to quotas when the industry is in danger of a collapse.</p>
		<p>Every conservation policy brought in over the last 20 years has been wasted and all the sacrifices fishers have made for the sake of the industry have effectively been made for the big boys and government. Leave industry as it; it's supposedly sustainable. Quota is brought only to industries in decline, not sustainable ones.</p>
<i>Institutional</i>	<p>Having a quota may actually result in the Fisheries Department not having to police as much. Once the fisher has secured all his allocated catch, then he's out of the fishery for the season.</p>	<p>Policing the catch is an issue. Given the long coastline, there are so many places where people can deliver black market crays and the compliance costs to ensure this does not happen do not come cheap.</p>
		<p>This could be very complicated to run as experience in other places like South Australia had experienced.</p>
		<p>Why change a management policy to quota after the New Zealand experience? All points to interference from Commonwealth public servants intent on forcing change for changes sake, not for the benefit of the fishery.</p>

Management Arrangement	Positive Impacts	Negative Impacts
		The allocation of the quota is an issue. They have to divide it evenly since it can't be done on history, it's just too hard. Another issue is the transferability of the quota.
		With the ability to catch as much as possible, there is still the incentive to go to work. But if the quota set is below my average, why would I bother going to work? I would just sell up and move out.
		The paperwork is astronomical with a quota but a lot of the young guys aren't able to get much education and they will really struggle with the paperwork.
		Care must be taken in implementing quotas - equal numbers of units per pot and kilos per unit would be the best method of implementing quotas.
		Compliance costs are the scariest because we will have to pay for it under cost recovery.

FISHERIES MANAGEMENT PAPERS

- No. 1** The Report of the Southern Western Australian Shark Working Group. Chairman P. Millington (1986)
- No. 2** The Report of the Fish Farming Legislative Review Committee. Chairman P. Rogers (1986)
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- No. 6** The King George Sound Purse Seine Fishery Working Group. Chairman R. Brown (1986)
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- No. 39** Establishment of a registry to record charges against fishing licences when used as security for loans. P. Rogers. (1991)
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- No. 212** Assessment of Western Rock Lobster Strategic Management Options How do Quota Management Systems Work in Rock Lobster Fisheries? (Volume 4 of 4)