

**INTEGRATED FISHERIES MANAGEMENT REPORT
WESTERN ROCK LOBSTER RESOURCE**

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EXECUTIVE SUMMARY

This report is the first in a series of Integrated Fisheries Management (IFM) reports required under the 2004 Government Policy on IFM. Under this policy, the Executive Director of Fisheries is required to approve a sustainability report for each fishery, which includes a clear statement on the harvest level. The sustainable harvest level is that total catch, or catch range, that is to be allocated among the various user groups identified for that particular fishery.

These IFM reports will assist in the process of allocating explicit shares in the use of Western Australia's fish resources. They do not establish the initial allocations for use of fish resources. They are a statement of what is known about those resources and current use patterns. The reports will become a primary, but not exclusive, resource for the Integrated Fisheries Allocation Advisory Committee (IFAAC) when forming their recommendations to the Minister on initial allocations for each fish resource. The Minister for Agriculture, Forestry and Fisheries established IFAAC in October 2004 specifically to advise him on these allocations. The Minister, on consideration of IFAAC's advice, will then make a determination on the allocations to each sector.

This IFM report addresses the western rock lobster resource throughout its range.

Western rock lobster (*Panulirus cygnus*) occurs on the continental shelf of Western Australia from Exmouth Gulf to Augusta, with much of the stock occurring between Perth and Geraldton. It is fished in two phases of its life – as “white” lobsters and as “reds”.

Based on strong scientific research, the sustainable harvest level for the rock lobster resource taken by all sectors has been set as a range – 9,500 to 15,000 tonnes. Predicted catches for each of the three major user groups – commercial, recreational and customary fishers – have also been estimated for each zone of the commercial fishery.

The West Coast Rock Lobster Managed Fishery (WCRLMF) is recognised internationally as one of the most effectively managed commercial fisheries in the world. With an annual average catch of 11,400 tonnes, the fishery contributes between \$250 – 350 million to the State's economy. The fishery also has regional significance, as its 545 boats are based in a number of centres along the west coast between Augusta and Kalbarri. Consequently, management of this fishery is not just an ecological issue, but also a socio-economic one, as whole towns and regions have been built on the back of the fishing industry.

The WCRLMF is open from 15 November each year until 30 June in the following year. The fishery is managed using input controls – specifically through the allocation of total allowable effort (total number of pot lifts) to individual pot holders operating in three zones. The three zones are the waters south of latitude 30° S (C Zone), north of latitude 30° S (B Zone) and, within this northern area, a third offshore zone (A Zone) around the Abrolhos Islands. Total effort (which is aligned to harvest rates and hence to predicted catches from the fishery) in the fishery is controlled by changing the value of the effort unit; affecting the number of pots that can be used for that season. This system is backed up by various biological controls such as size limits, and bans on keeping tarspot or setose lobsters and berried females.

Co-existing with the commercial fishery is an increasing recreational fishery. Population growth, an aging population, increasing leisure time and a move of people to live near the coast all contribute to the rise in numbers of people involved in recreational lobster fishing. Recreational catches have grown from an estimated 486 tonnes in 1997/98 to an estimated 815 tonnes in 2003/04. Although these figures are based on a survey technique that is likely

to overestimate catch, the results are valuable as there is a long data series that provides good indications of trends.

The recreational fishery is managed through the requirement to hold a recreational rock lobster fishing licence. There is no restriction on the number of licences that can be issued. In 2002/03, 44,455 licences that allowed rock lobster fishing were issued. It is estimated that about 75% of these were used to take rock lobster. Other controls include a limit of two pots per licensee, size limits on lobsters, limits on how divers can take catch, and daily bag limits.

The majority of recreational fishing occurs in Zone C off the metropolitan region of Perth, with the key recreational fishing occurring in waters out to 20m depths. The prime time for recreational fishing is during the “whites” run, as the migrating lobsters are most available to the recreational sector. This also coincides with the peak holiday period of summer.

The lack of data on customary fishing complicates the allocation process, however it is recognised that inshore fish resources are an important component of indigenous life. To accommodate continued access to these resources, estimates of catch have been developed based on population census data and recreational fishing survey results.

Existing data and estimates results in the following table for catches and shares during the period 1997/98 to 2001/02.

Fishing year	Total commercial	Total rec mail survey	Estimated total indigenous	Total catch ¹	% Com of total	% Rec of total	% Ind of rec	% Ind of total
1997/98	10478	486	8.3	10964	96	4	1.7	0.08
1998/99	13009	626	10.6	13635	95	5	1.7	0.08
1999/00	14433	747	12.6	15180	95	5	1.7	0.08
2000/01	11273	564	9.6	11837	95	5	1.7	0.08
2001/02	8983	545	9.3	9528	94	6	1.7	0.10

The motivation for each of the sectors is very different – an important recognition when looking at the data with the view to allocating access to each sector. Recreational fishers fish for quality experience. This means different things to different fishers (some its for quantity, some its for the experience) but is important in terms of social environment. Most recreational fishers would fish from a home base (either permanent or holiday home); only a small number would travel the coast to fish.

Commercial fishers are trying to maximise catch and value of that catch. They are impacted not only be the variability of the resource, but by exchange rates, competition within markets, and changing factor input costs, particularly fuel prices. Commercial fishers are more mobile and can travel to where rock lobster are more available – near or far from home port, inshore or offshore.

Customary fishers are fulfilling dietary, cultural and spiritual traditions.

Management of the allocations to these sectors needs to account for these differences in motivations for fishing. Further, the diverse motivations within the recreational sector are likely to cause intrasectoral allocation issues, which will also require management action.

¹ Indigenous catch is estimated at 1.7% of the recreational catch and therefore is included in recreational total. Total catch is the sum of the commercial and recreational catch.

Impacting particularly recreational and commercial fishers is the increasing area of water being assigned to marine conservation areas over recent years. Commonwealth and State marine planning processes often result in exclusions for fishing; which has even more significance when placed in inshore waters where there are competing interests.

The consideration of allocation to these often competing interests is not an easy process. This report is the first stage in this process for the western rock lobster fishery.

INTRODUCTION

IFM is a Government initiative aimed at making sure that Western Australia's fisheries continue to be managed sustainably in the future. In essence, this new approach involves the setting of the level of fish that can be sustainably harvested in total from each fishery, and then making explicit allocations of this potential harvest between the State's commercial, recreational (including charter boats) and customary fishers. Each sector is then managed within the explicit allocated share. A copy of the Government Policy on IFM is available from the Department of Fisheries (DoF) website www.fish.wa.gov.au.

For each resource addressed through IFM, a report must be prepared to provide information on at least the following aspects of the resource and associated fishing activity:

- The current management practices within the fishery;
- Historical catch levels, or estimates of catch, by each sector;
- The biology of the fish species involved;
- The sustainable harvest level of the resource; and
- Other relevant data, such as regional employment, economic and social/lifestyle issues.

The Government requires that the Executive Director, Department of Fisheries, approve each IFM report, which must include a clear statement on the harvest level.

The report is prepared primarily to provide the Integrated Fisheries Allocation Advisory Committee (IFAAC) a factual account of the resource and its exploitation; current at the time it is written. It is, however, available to anyone interested in the western rock lobster fishery and has been written with this audience in mind. Copies of this report are available on the DoF website.

This report should be read in conjunction with the State of the Fisheries Report and the western rock lobster sustainability report prepared for Environment Australia. These are also available on the DoF website.

It is not the purpose of this paper to set out which sector will get what share of the resource.

The Minister has established IFAAC to consider all the information on a resource and its users, and to consult widely in order to make recommendations on how the resource should be allocated. This will be documented by IFAAC after its deliberations and submitted to the Minister to assist him in determining the initial allocation. The Minister may choose to release IFAAC's report to the public.

The Government's priority for the introduction of IFM is the western rock lobster, abalone and west coast demersal finfish resources.

This IFM Report addresses the western rock lobster resource. It covers the take of all rock lobster species in their distribution off the west coast, that is between Augusta and Exmouth Gulf by extractive users – Western Rock Lobster Managed Fishery (WRLMF) licensees, holders of rock lobster recreational fishing licences, indigenous fishers of rock lobster. It does not cover southern rock lobster fishery off south coast or tropical rock lobster off north west coast.

SECTION 1 LIFE HISTORY FACTORS THAT AFFECT AVAILABILITY TO USERS

1.1 Distribution

The western rock lobster, *Panulirus cygnus*, is a decapod crustacean of the family Palinuridae. Its primary area of distribution is the continental shelf on the west coast of Western Australia, from Exmouth Gulf to Augusta, with greater abundances off the mid west coast (Geraldton – Perth) than the northern and southern parts of the west coast. Western rock lobster, in low population densities, can also be found on the south coast between Albany and Augusta, and occasionally north of Exmouth.

1.2 Life History

The species can live for over 20 years and reach sizes of up to 5.5 kg, although animals over 3 kg are rarely caught under current harvesting practices. In the southern areas of its distribution, the lobsters become mature at about 6-7 years old at a carapace length of about 90 mm. In the northern waters near Kalbarri and at the Abrolhos Islands, they mature at smaller sizes, usually at about 70mm carapace length.

When lobsters mate, the male attaches a package of sperm, which resembles a blob of tar, to the underside of the female. This “spermatophore” is generally called a tarspot and remains there until the female is ready to spawn her eggs. At spawning, the female releases eggs from small pores at the base of the third pair of walking legs. At the same time, the female scratches the spermatophore, releasing sperm and the eggs are fertilised as they are swept backwards and become attached to the sticky setae on the pleopods. Females with eggs attached under their abdomen are known as “berried” females. The eggs hatch in about 5-8 weeks (depending upon water temperature), releasing tiny larvae called phyllosoma into the water currents.

The phyllosoma larvae spend 9-11 months in a planktonic state, carried by ocean currents where they feed on other plankton before the last phyllosoma stage moults into what is called the puerulus stage. This stage is now capable of settling out of the plankton into suitable habitats, which are mostly shallow inshore reefs where they can begin life as a tiny juvenile rock lobster.

1.3 Recruitment

‘Recruitment’ is defined as the number or weight of lobsters reaching legal size at the start of or during the course of each season.

Although rock lobsters produce millions of larvae, most do not survive their long oceanic journey. Many are eaten by predators or are not carried close enough to the shallow reefs by the ocean currents to allow them to settle. Therefore, the number settling can vary greatly from year to year largely as a result of changes in environmental factors. When the Leeuwin Current is flowing strongly, a higher proportion of the larval lobsters return to the coast.

Westerly winds at the time of year when the puerulus are ready to settle may also help more to reach the shallow reefs along the coast.

The puerulus that successfully return to the coast moult to become juveniles, which look like miniature adults. These juveniles feed and grow on the shallow inshore reefs for the next three or four years. About four years after settlement, the lobsters undergo a synchronised moult in late spring when they change from their normal red shell colour into a paler colour. They are then known as “white” lobsters until they return to their normal red colour at the

next moult a few months later. The white phase of a rock lobster's life is the migratory phase. It is during this time they are most available to recreational fishers, who generally fish in shallower water. At this time (summer) they leave the coastal reefs and undergo a mass migration into deeper water where they become sedentary again on deeper reefs (40-100m). A small percentage makes longer migrations in deep water (100-200m), usually following the continental shelf in a northerly direction.

1.4 Ecology

Growth rates of rock lobster vary from place to place and also between individuals. In the central west coast region (the middle of the species distribution), most lobsters reach 76mm carapace length (the legal size for most of the fishery) about three years after settlement, before they moult into the white phase or in their fourth year, after they have moulted into the white phase.

At about the time they reach legal size, lobsters have two major synchronized moults in about November and February. This results in large numbers of rock lobsters becoming legal-size and hence there is a peak in catch in December and March.

The western rock lobster is opportunistic in its feeding habits - from coralline algae to mollusca and crustacea, the populations of which probably have high productivity, high turnover rates and short life cycles. Juveniles in particular have a range of diets and feeding strategies, varying greatly between seasons and between different habitats in the same season, and reflecting the abundance and size distribution of benthic macrofauna available.

As juveniles, *P. cygnus* are eaten by a number of fish species whilst at large sizes they are one of a number of prey items for octopus and a variety of larger finfish. There are no predators that rely on western rock lobster as their only prey item.

1.5 Physical environment

The lower-mid west coast of Western Australia is characterised by coastal limestone reefs covered in macroalgae. Offshore there are a series of deeper reefs that were formed under previous lower sea level conditions. In between these reefs are extensive areas of sand.

In the northern areas, particularly around the Abrolhos Islands, fishing occurs in regions where there are extensive areas of coral reef, interspersed with limestone reefs covered by macroalgae. The water in this region is oligotrophic (nutrient-poor) and is influenced greatly by the seasonal flow of the Leeuwin Current, which is a warm body of water of tropical origin that flows most strongly during the winter months of April – September. The strength of the Leeuwin Current varies annually depending upon the occurrence of the El Nino event, measured by the Southern Oscillation Index, which is the difference in air pressure between Darwin and Tahiti.

SECTION 2 THE FISHERY

2.1 The Commercial Fishery

2.1.1 Boundaries

The boundaries of this fishery are *'the waters situated on the west coast of the State bounded by a line commencing at the intersection of the high water mark and 21°44' south latitude drawn due west to the intersection of 21°44' south latitude and the boundary of the Australian Fishing Zone; thence southwards along the boundary to its intersection with 34°24' south latitude; thence due east along 34°24' south latitude to the intersection of 115°08' east longitude; thence due north along 115°08' east longitude to the high water mark; thence along the high water mark to the commencing point and divided into zones'*.

The fishery is managed in three zones: south of latitude 30° S (C Zone), north of latitude 30° S (B Zone) and, within this northern area, a third offshore zone (A Zone) around the Abrolhos Islands (Figure 1). Within B Zone is a ridge running east west within the deep water called "Big Bank". This ridge and waters to the north, as per schedule 4 of the management plan and Figure 1 of this paper, constitute a sub-zone for which A and B Zone fishers must nominate.

2.1.2 Main fishing method

Operators in the West Coast Rock Lobster Managed Fishery may take any species of rock lobster but the majority of catch is western rock lobsters. Fishers in this fishery are only permitted to use baited traps (pots), which they usually pull daily.

2.1.3 Fishing Season

The fishing season runs from 15 November to 30 June of the following year, with Zone A open between 15 March and 30 June and Big Bank between 10 February and 30 June each year. Zone A licensees fish in Zone B prior to the opening of the Abrolhos Islands Zone (A).

2.2 Recreational Fishing

2.2.1 Boundaries

The recreational rock lobster fishery encompasses all rock lobster species in all WA waters; however, western rock lobster is the major species. The majority of western rock lobster is taken in waters less than 20m deep between Augusta and North West Cape.

2.2.2 Main fishing method

Fishers may use pots or may dive for lobster, except at the Abrolhos where pots are the only permissible method. Charter boat fishing for rock lobster is included under the recreational fishing sector, as these businesses exist to provide a platform for recreational fishing activity.

2.2.3 Fishing Season

The fishing season is the same as for the commercial fishery – November to June.

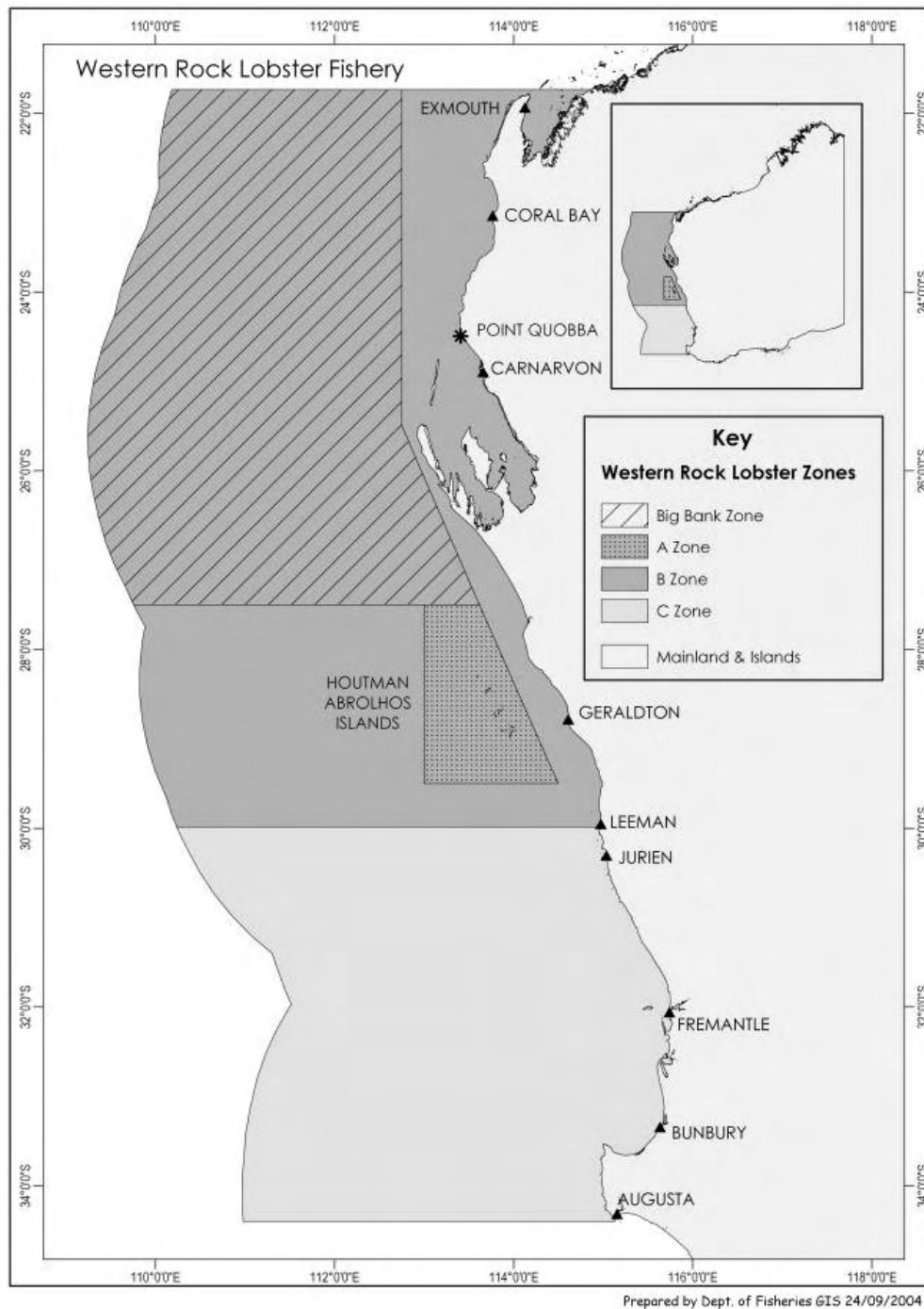


Figure 1: Management Boundaries for the Commercial West Coast Rock Lobster Managed Fishery.

2.3 Indigenous (customary) fishing

“Customary fishing” is the fishing activity of indigenous people who have a right (in accordance with aboriginal law and customs) to fish in a customary manner. Customary

fishing applies within a sustainable fisheries management framework to persons of Aboriginal descent; fishing in accordance with the traditional law and custom of the area being fished; and fishing for the purpose of satisfying non-commercial personal, domestic, ceremonial, educational or communal needs.

It is important to differentiate between the activity and the people, as not all indigenous people are permitted to undertake customary fishing under aboriginal law and custom.

Indigenous people involved in fishing commercially for rock lobster are bound by the rules of the West Coast Rock Lobster Management Plan. Indigenous people engaged in either recreational or customary fishing are bound by the recreational fishing rules, except that an indigenous recreational or customary fisher is not required to hold a licence.

Greater clarification on the application of customary fishing in policy and practice will continue to evolve as government continues to develop its position in response to the Aboriginal Fishing Strategy.

3.4 Illegal Take

The illegal and unreported catch of western rock lobster falls into four broad categories -

Recreational fishermen illegally taking lobsters for their personal use contrary to the management rules – this usually involves the taking of undersize or otherwise protected lobster generally in small numbers to meet their bag limit expectations, or opportunistically taking over bag limit lobster when catch rates are high. The seasonal variation in the availability of lobsters can influence recreational attitudes to compliance.

Commercially licensed operators taking lobsters illegally for personal use – this form of non-compliant activity usually involves the illegal retention of small numbers of protected lobster for the purpose of food for the commercial fisherman and family.

Commercial licensed operators taking lobsters illegally for sale, gain or reward – this practice usually involves the retention of protected lobsters for sale in conjunction with legitimate commercial lobster fishing activity. This form of activity is usually well organised to avoid detection by the compliance officers and may have a well-developed black market arrangement for the transportation and distribution of significant quantities of illegal product. Habitual operators are well aware of compliance practices and adopt sophisticated countermeasures to minimise the risk of detection.

Unlicensed operators illegally taking lobsters for sale, gain or reward. This class of offender usually operates with a recreational lobster fishing licence to gain lawful access to the resource but is in fact a *de facto* unlicensed commercial fishing operator who is targeting lobsters for the purpose of sale. The market for the illegal product will usually be the retail trade or through networks of friends or employees. There are two basic types of illegal operations in this category;

- a. The sale of catch by those who fish legitimately within the rules but fish regularly and with a high degree of expertise, and
- b. The sale of catch by those who take excessive catches whenever the opportunity presents, whether protected or unprotected lobster.

These operators are usually well organised, are attuned to compliance activity and practices, and adopt counter measures.

This list does not attempt to cover all illegal activity or possible offences in the lobster fishery. The above classes of offender deals with fishing practices that result in the illegal taking of lobster that is unlikely to be accounted for or fully recorded in data relating to both

the recreational and commercial lobster fisheries and needs to be considered in an IFM/resource sharing context.

Section 3 Summary of management arrangements

3.1 Management objectives

3.1.1 Biological objective

Ensure the abundance of breeding lobsters is maintained or returned to, as the case may be, at or above the levels in 1980, which is estimated to be about 20% of the unfished parental biomass.

3.1.2 Ecological objectives

Ensure management arrangements are consistent with the principles of ecosystem-based management and in particular:

- that bycatch of marine mega-fauna is minimised to acceptable levels; and
- that the effects of fishing do not result in irreversible changes to the ecological processes upon which life depends.

3.1.3 Socio-economic objectives

Ensure that management arrangements:

- maximise the opportunity for optimum economic returns to the Western Australian community from the use of the western rock lobster resource, and
- foster the maintenance and development of regional communities while not unnecessarily restricting normal business practices.

3.1.4 Recreational objective

Ensure that management arrangements do not detract from the fundamental ethos of recreational fishing, i.e. it is an enjoyment-motivated activity.

3.2 Current Commercial Fishery Management Arrangements

A chronology of the development of management arrangements for the WCRLMF is at Appendix 1.

This fishery is managed using input controls. The primary mechanism is a limit on the total number of usable pots, which places an overall cap on effort. Unitisation of the effort in the fishery and relatively liberal transferability provisions allow market forces to determine what is the most efficient use of licences and available entitlement (pots). This system of management is known as an Individually Transferable Effort (ITE) system.

The fishery is divided into zones that distribute effort across the fishery, reducing risks from concentration of effort and the potential for higher harvest rates or localised depletion. They also enable management controls aimed at addressing zone specific issues to be implemented, including different maximum size restrictions in the northern and southern regions of the fishery.

The management arrangements also include the protection of females in breeding condition, minimum carapace length and maximum carapace length. Gear restrictions, such as limits on the size of pots and standardised pot design also play a significant role in controlling exploitation rates.

To assist the Rock Lobster Industry Advisory Committee² (RLIAC) and its subordinate committees in developing management advice for the Minister, a fisheries management decision rules framework for the western rock lobster fishery has been developed.

This decision framework is currently in draft form, however it is anticipated that it will be implemented during the 2004/05 season.

3.2.1 Management changes in response to the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The Commonwealth Department of Heritage and Environment has declared the fishery as being managed in an ecologically sustainable manner under the provisions of the EPBC Act³. While subject to a variety of recommendations, this approval allows product from the fishery to be exported for a five-year period.

The evaluation of the fishery under an ecologically sustainable development (ESD) framework is now a key element of rock lobster management. Specific initiatives to support this approach include:

- Research to address and mitigate against interactions with protected species as listed in the *Wildlife Conservation Notice 2002*, such as Australian sea lions and leatherback turtles;
- The development of an explicit harvest strategy in the form of fisheries management decision rules; and
- A review of the composition of, and process for appointing members to, RLIAC⁴.

3.2.2 Management changes in response to the Marine Stewardship Council (MSC)

As part of the MSC's⁵ annual audit process, an ecological risk assessment and more recently an environmental management strategy are completed. A number of risks have been identified in the risk assessment at either a moderate or low level. In their assessment of the report, the MSC certifiers highlighted two key issues: the interaction of the fishery with protected fauna such as sea lions and leatherback turtles, and the lack of research data about the ecological impacts of removing rock lobster biomass from the environment, particularly from deep water. These issues have been the focus of additional research projects and reporting since 2002/03.

² For a description of this committee see section 6.2.

³ See section 5.6.1 of this paper

⁴ This was in response to a Labor Party commitment before the 2001 State Government election (also in response to the Marine Stewardship Council and the EPBC Act).

⁵ See section 5.6.2 of this paper

3.2.3 Management changes in response to National Competition Policy (NCP)

The Government's commitment to legislative reform in response to the requirements of the NCP⁶ saw a number of changes implemented during 2002/03, including:

- removal of restrictions on 'domestic' rock lobster processing authorisations;
- development of a rock lobster aquaculture policy; and
- removal of the 150 maximum unit holding entitlement from the legislation.

A review of the 63 minimum unit holding and input/output management commenced on the 2004 coastal tour.

3.3 Management of the Recreational Fishery

3.3.1 Management philosophy

The management arrangements for the recreational rock lobster fishery have been designed to complement those in the commercial fishery. As there is no limit on the total number of licences, the arrangements do not constrain total catch. The primary objectives of management are to facilitate a quality fishing experience and to provide appropriate social benefits rather than limiting total number/tonnage of lobsters taken from the fishery.

3.3.2 Current management arrangements

Recreational fishers are required to obtain a recreational fishing licence for rock lobster. These licences are not limited in number, but are supported by a number of supplementary controls that assist in limiting fishing efficiency and the temporal spread of fishing effort; and protect juvenile and breeding lobsters.

Controls include

- a prohibition on night fishing for lobster, by either diving or pots;
- a restriction of 2 pots per licensee (size requirements apply to pots and pots must have an escape gap);
- divers are restricted to catching by hand, snare or blunt crook, with diving not a permitted method within Zone A (Abrolhos Islands);
- minimum and maximum sizes for lobsters are in place, with the take of breeding female lobsters prohibited at all times; and
- a daily bag limit of 8 lobsters per fisher and a daily boat limit of 16 lobsters. These limits are 4 and 8 respectively within Ningaloo Marine Park.

These controls also govern the taking of rock lobster through the aquatic tour (charter boat) industry. This industry is restricted through a separate licensing system, with associated conditions, that was introduced in 2001. Operators are licensed for the bioregion(s) in which they wish to operate and for the type of charter involved – fishing charter (262 licences), restricted fishing charter (30 licences) or eco-tour (3 licences).

⁶ See section 5.6.3 of this paper

There is a moratorium on the issue of any new fishing tour licences in fully exploited fisheries until there is sufficient data for an assessment of the sector's impact on the resource (DoF, in draft).

3.4 The Indigenous fishery

Indigenous people involved in commercial fishing for rock lobster must comply with the legislation associated with commercial fishing (see section 2.1). Similarly, indigenous people recreationally fishing for rock lobster must comply with all regulations, however they are not required to hold a recreational fishing licence.

The Aboriginal Fishing Strategy, currently before the Minister for his consideration, proposes that indigenous people are always assumed to be fishing for customary purposes (unless commercially fishing) and that specific areas be set aside for customary fishing only.

3.5 Conservation areas

3.5.1 Marine Parks

Ningaloo, Jurien Bay, Marmion and Shoalwater Bay Marine Parks all have "no take" sanctuary zones. For Ningaloo Marine Park a modified bag limit exists. There are eight "no take" sanctuary zones.

3.5.2 Point Quobba Reef Observation Area

All marine life protected, except oysters, which may be collected from the rocks by hand.

3.5.3 Abrolhos Islands

Fishing for rock lobster is by pots only within Zone A. Diving for rock lobsters is not permitted. Season opens 15 March, closes 30 June.

3.5.4 Seven Mile Beach Research Area (Dongara)

Fishing is not permitted within the Research Area (Dongara).

3.5.5 Jurien Bay Research Area

A triangle between Boullanger Island and Osprey and Whitlock islets is closed to rock lobster fishing.

3.5.6 Waterman Reef Observation Area

All reef animals protected. Line fishing is permitted.

3.5.7 Rottnest Island

All marine life is protected in two conservation areas near the island. These are near Pocillopora Reef, and at the north end of Thompson Bay. Outside these areas, rock lobsters may be caught in season. There is also a recreational only area for rock lobster fishing around Rottnest.

3.5.8 *Dampier Archipelago*

There is a daily bag limit of 4 tropical rock lobsters per fisher and a boat limit of 8 between Cape Preston and Cape Lambert.

3.5.9 *Lancelin Island Lagoon*

All fishing is prohibited in the Fish Habitat Protection Area.

3.5.10 *Dive Wrecks*

All fishing is prohibited on the HMAS “Swan” and “Perth” and “Gudrun” Dive sites.

3.5.11 *Cottesloe Reef*

All commercial fishing is prohibited. Recreational fishers may take rock lobster in season.

Section 4 Factors that influence net benefit from use of the resource

4.1 Economic Environment

4.1.1 Commercial fishery environment

The commercial fishery operates out of a large number of ports along the central coast of WA and therefore has significance in terms of regional economies. The 545 vessels usually have a crew of 2 or 3 (a skipper and one or two deckhands), thus there are typically about 2000 people directly employed by this fishery. In addition there are around 6500 people employed by the lobster processing sector and the associated support and service industries. This compares with 4,500 people directly involved in commercial fishing in Western Australia, and 15,000 indirectly employed through associated industries (G. Short, pers. com.).

Fleet size has been gradually decreasing in a trend towards rationalization of the fleet fuelled by the desire to maximise economic efficiency. This trend is likely to continue, possibly reaching a plateau at 50-60% of the current number of boats, depending on the management rules applied. Decreasing numbers of boats to date has had no negative impact on the catch and effort levels of the fleet as a whole. On the contrary, increasing electronic sophistication has resulted in increasing efficiency, and the goodwill value of units has shown an increasing trend long term.

The fishery also contributes directly to the state economy. The catch from the commercial fishery has averaged 11,400 t per season over the past 10 years, the majority of which is exported to Asia, North America and, to a lesser extent, Europe.

This catch makes the fishery Australia's most valuable single species fishery, with a seasonal gross value of production between \$250 and \$350 million. If this figure is multiplied out to associated industry, the fishery has a flow on worth of \$670 million as part of a \$1.2 billion contribution of the total commercial fishing industry in Western Australia (2001/02, G. Short, pers. com.).

Along with playing a role in the generation of significant economic activity and employment, for many coastal communities, much of the infrastructure associated with their ports, and in many cases the towns themselves, has been created as a result of this fishery.

There are 9 rock lobster processing establishments (with 19 associated processing licences permitting export), which are all located between the Perth metropolitan area and Geraldton. These employ over 100 people in the closed season and about 10 times that during the fishing season. The processing establishments' receival depots or trucks service every location where fishing occurs. In addition to the export-approved unrestricted processing licences, there are 17 other licences allowing processing for the domestic market.

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. Regional figures available (RDC of WA, 2001) show:

- In the Peel region, in 1999/2000 the rock lobster catch accounted for 90.3% of the region's commercial fishing value; with rock lobster having an estimated value of \$18.3 million.
- In the southwest, in 2001/02, there was a 36.5% increase in total commercial catch from the region, mainly attributed to rock lobster. The rock lobster catch increased by

50% but the value of that catch increased by almost 100% from \$5.9 million to \$11.4 million from the previous year due to high rock lobster prices.

- The mid west has the highest value fishing industry in the state and the rock lobster fishery dominates this. Of the \$176.7 million value of seafood caught, 93.8% can be attribute to the rock lobster industry. This represented in value 42.9% of the State total in 1999/2000.

4.1.2 Market Environment

Western Australian commercial rock lobster fishers are 'price takers', that is, they are not big enough (nor have a differentiated product) in the world market to set the price they receive for their product. Many factors influence the price received, including variations in supply by other producers, variations in supply by Western Australian rock lobster fishers, world currency rates, and other world events.

The Western Australian catch is exported live or frozen, as whole cooked or whole raw lobsters, to Taiwan, Japan, and Hong Kong/China or processed into frozen raw tails for the United States, and new product lines are constantly being developed.

Small quantities of live and whole cooked lobster are now penetrating the European market. The USA was once the sole market for WA lobster with product being sold as frozen tails, but the focus shifted dramatically to whole frozen and live trade to the Asian region in the 1990s. However, with the very large catch in 1998/99 and the record breaking catch of 1999/2000, the US tail market again remained important as processors sought to distribute product to maintain returns. However, the most lucrative market is Hong Kong, with a value over ten times that of exports to Japan (WRLDA, June 2004).

A symbol of good fortune and happiness in Japan, and highly prized for weddings or other ceremonial occasions, a small red lobster in perfect condition may still fetch top prices. This niche market is not as secure as it once was and hence the Japanese market is not as lucrative. Japanese couples are opting for cheaper, smaller weddings and putting money into other priority areas, such as housing. However, production of sushi-style lobster is endeavouring to expand opportunities in the Japanese market (T Gibson, pers.comm.).

There are now over 40 countries that produce live spiny and rock lobsters and over 50 countries that produce frozen spiny and rock lobsters in competition to Australian product (WRLDA, 2004). With the move of large production lobster fisheries in countries such as Cuba, the Caribbean and Mexico, combined with the increase in quality from these producers, competition has challenged the prices once received for quality Western Australian rock lobster. Rock lobster has increasingly become a commodity with very little product differentiation, rather than a prized product consistently commanding top dollars.

Consequently, the beach price (price paid to fishers) for rock lobster had been variable over the past few years. In 2000/01, the average price was just under \$27 /kg. In 2001/02 this rose dramatically to an average of \$33.75/kg, however the 2002/03 season saw dramatic variability in the beach price of rock lobsters.

The season started with an average price of \$36/kg, The prices then dropped to significantly lower levels due to a number of influences, which included:

- competitive behaviour between processors for the available volume of product;
- the severe acute respiratory syndrome (SARS) epidemic in south-east Asia and the consequences for demand in that market;

- loss of market share in past lucrative markets as increased volumes of cheaper, comparable product are imported from countries that previously were a minimal threat; and
- world currency exchange rates and the weakening of the US dollar.

The season finished on an average beach price of \$14/kg, with an overall average price for the season of \$24.45/kg.

The price in 2003/04 was more consistent with an average of about \$19/kg. Many of the weddings in Japan deferred because of SARS were held, lifting consumption in Japan. Economic conditions in Japan and the US also improved, although insurance premiums into the US post-September 11 impose a cost on the industry. These costs have possibly been offset by increased consumption that usually accompanies an election year (T.Gibson, pers. com.). The lack of any international crisis in 2003-04 resulted in all catch being sold and although the prices were not as high as in the past, they were still among the highest paid internationally for western rock lobster.

The 2004/05 season has started well.

4.1.3 Recreational fishing environment

In 1991, Economic Research Associates (Lindner, R. and McLeod, P. 1991) undertook a survey of participation and expenditure patterns of recreational fishers in WA. This survey estimated that recreational fishing activity had a direct expenditure of \$205 million in 1989/90, and an indirect impact of \$184 million, giving an aggregate impact of \$389 million and an employment impact of 5,700 full time jobs.

The State economic impact was updated by a repeat survey in 1998, based on a State population of 1.755 million and a participation rate of 36 per cent. Direct expenditure associated with recreational fishing was estimated at of \$299 million in 1995/96, giving an aggregate impact of \$569 million and an employment impact of 7,000 full time jobs.

It is, however, important to note that direct comparison between expenditure on recreational fishing and the gross value of commercial fisheries has no validity and will mislead indications regarding allocations (McLeod and Nicholls, 2004). McLeod and Nicholls state that

“The appropriate economic values of benefits and costs for a benefit-cost analysis of resource allocation options between competing users are:

- The benefit enjoyed by seafood consumers or recreational fishers in excess of what was sacrificed to buy or catch fish; and
- The benefits enjoyed by commercial fishermen, and fish wholesalers, distributors and retailers in excess of what was sacrificed to catch and supply fish to consumers.” (Part 1, pii)

4.2 Socio-economic Environment

4.2.1 Commercial fishing environment

Very little is known about the socio-economics of commercial fishing. Given that the fleet is spread over much of the west coast and based out of a number of regional centres, the

commercial fishing industry contributes greatly to the social characteristics of a number of coastal towns.

The need to consider changes to the management framework of the commercial fishery has sparked some research into this aspect of the fishery. The Institute for Regional Development, associated with the University of Western Australia, has been funded to study the social impacts of potential management changes on fleet-hosting communities.

4.2.2 Recreational fishing environment

With an increase in recreational fishing participation from 287,000 people in 1987 to around 598,819 people in 2003, population growth could continue to the trend of increasing recreational fishing pressure (DoF, 2004). Based on projected population growth, projected increases in recreational fishing effort are represented in Figure 2.

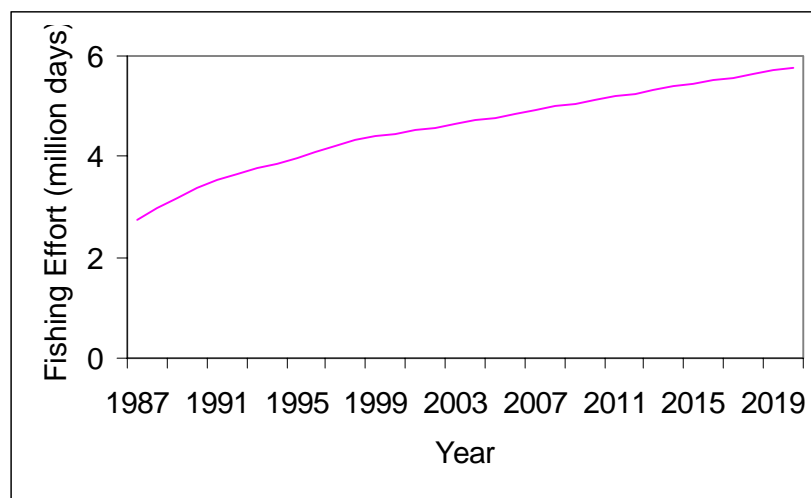


Figure 2: Future projection of recreational fishing effort based on projected population growth from the Australian Bureau of Statistics (1998).

This projection has beneath it a number of assumptions (T. Bahathrah, pers. comm.):

- The mean number of days fished per recreational fisher is 7 per year (Henry and Lyle, 2003).
- For the years 1987 to 2004, the participation rate was estimated by fitting a curve to the participation rates for those years. After 2004, the participation rate was assumed to be constant, and was set to the rate of 34%.

The level of fishing effort in Figure 2 may be an underestimate on the real number of fishing days, due to variability surrounding the survey methods used and underlying assumptions, however the upward trend is accurate.

Although these figures show trends in total recreational fishing of all species in Western Australia, it is expected rock lobster fishing would roughly follow this trend, although it is more sensitive to stock variability from year to year. Figure 3 indicates a general increasing trend in the number of days fished by recreational fishers on rock lobster; however, it also indicates that the number of people fishing is responsive to predictions in availability of rock

lobster for that season and the perceptions of success of commercial and recreational fishing (compare with Figure 9 showing commercial catch and effort over time).

This trend is likely to continue, however, in upcoming years there may be a more significant drop in recreational fishing compared with results from the commercial fishery, for the following reasons. The vast majority of recreational fishing for rock lobster occurs in the southern zone (Zone C). Due to environmental factors over the past few years, there will be a drop in availability of rock lobster in the coming seasons and this is likely to be more significant in Zone C. Given the emphasis of recreational fishing in Zone C, the drop in recreational fishing effort is predicted to be more severe than the drop in commercial fishing effort (Dr Roy Melville-Smith, pers. comm.).

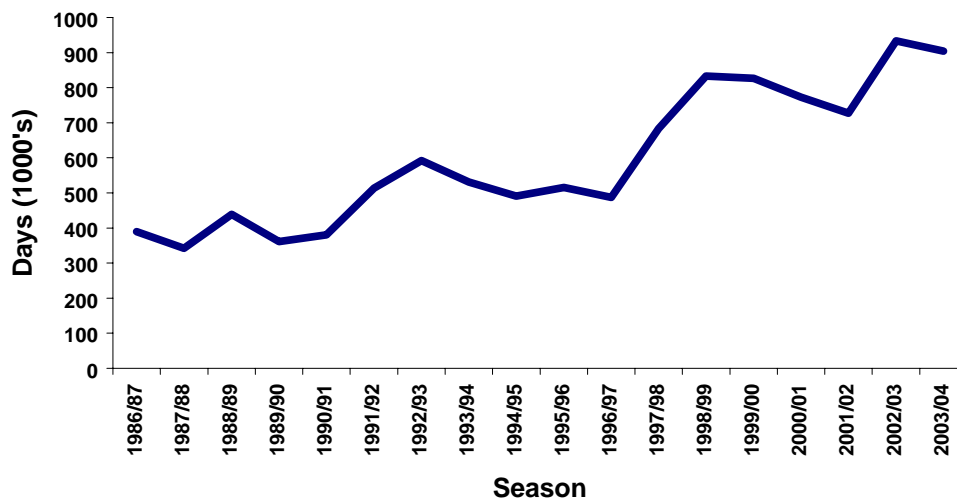


Figure 3: Plot of the estimated number of days spent by recreational fishers fishing for western rock lobster, over time.

The dynamics of recreation fishing, and the complex interaction of socio-economic factors that drive it, present managers with challenges – not only because of the inter-sectoral issues that result but because there are resource sharing issues within the recreational sector which need to be addressed. Unlike commercial fisheries, where operators are driven by commercial objectives, recreational fishers have a diverse range of motivations for fishing based on the quality of the fishing experience. Quality, however, means different things to different people - some want to catch lots of fish, some fish for the experience regardless of catch, some want company, some want isolation – and there are many variations in between and surrounding these. These objectives play an important role in how recreational fisheries are managed and will become even more significant once that management is based on an explicit allocation to the sector.

4.2.3 Key socio-economic statistics

Table 1 sets out recent movements in key socio-economic indicators for each of the regions of Western Australia where western rock lobster is taken. These provide a framework, albeit limited, within which to view commercial and recreational fishing and the socio-economic trends that may influence participation in these fishing activities in a particular region –

movements in population size, employment, income and visitor levels. These trends show increasing populations, employment and income in most coastal regions.

	Population (10 year trend)	Employment (4 year trend)	Unemployment (4 year trend)	Av. Taxable income (from 1998/99 to 1999/00) (5yr trend)	Overnight domestic visitor expenditure (4 yr trend)
Mid west	-0.3% (↑)	+6.4% (↑)	-2.3% to 5.8% (↓)	-5.3% (↔)	+56.1% (↑)
Perth metro	+1.5% (↑)	+2.1% (↑)	-0.1% to 6.1% (↓)	+4.6% (↑)	+1.8% (↓)
Peel	+3.2% (↑)	+0.4% (↑)	+1.5% to 8.1% (↓)	+4.3% (↑)	-4.3% (↓)
Southwest	+2.0% (↑)	+1.8% (↑)	+1.0% to 6.0% (↑)	+4.3% (↑)	+0.5% (↔)
Great Sthn	+0.4% (↑)	-9.0% (↔)	+1.6% to 6.8% (↑)	+2.5% (↑)	-13.2% (↓)

Table 1: Change in indicators over the 12 months to June 2003 for main regions associated with rock lobster fishing (DoLGandRD, 2003). Arrows in brackets indicate longer term trends (4 – 10 years).

Section 5 Major Indirect Fishery Management Influences on Fishing

The management of fishing cannot be undertaken in a vacuum. There are a number of external influences that affect why, how and where commercial and recreational fishers fish and hence have relevance to any decision on allocation of access to fish resources.

5.1 Marine planning

Marine planning by non-fishery agencies has the potential to impact on access for both commercial and recreational fishers. Potential exclusion through this process from large areas of water has significant implications for allocations to fishers within near shore waters where there is likely to be the greatest number of competing interests. This is especially an issue for rock lobster because the resource is tightly linked to habitat and hence there are changes in abundance and in catchability with depth. Recreational fishers, for example cannot fish in waters as deep as commercial fishers, given the equipment available to most.

By limiting the areas within which commercial and recreational fishers can fish, not only is access to space reduced, but also the total catch permitted under an allocation.

5.1.1 National Marine Planning

The Australian Government's 'Oceans Policy' involves two major marine planning initiatives:

- National Oceans Office regional marine planning; and
- Department of Environment and Heritage 'National Representative System of Marine Protected Areas' (NRSMPAs)

5.1.2 National Oceans Office (NOO)

The NOO was established to, among other things -

- coordinate the development of Regional Marine Plans;
- coordinate the overall implementation and further development of Australia's Oceans Policy.

The primary objective of the NOO is to maintain marine biological diversity and health of ocean ecosystems. One of the programs NOO has put in place to support this objective involves the identification and allocation, in Commonwealth waters, of components of ocean resources specifically for conservation of marine biological diversity and ocean ecosystem processes.

The primary mechanism for implementing this strategy is the development of Regional Marine Plans for areas based on large marine ecosystems (see Figure 4). Regional Marine Plans will incorporate economic, environmental and social and cultural objectives. The Plans are intended to be a focus for coordination between existing and developing ocean uses and the range of sectoral and administrative agencies with responsibilities for marine systems (CoA, 1998).

To date, the bioregional marine planning process has been completed for the southeast region and continues for the northern gulf and Torres Strait regions. A southwest bioregional marine planning process (extending from St Vincent's Gulf, South Australia to approximately Lancelin) is due to commence within the next 3 – 6 months.

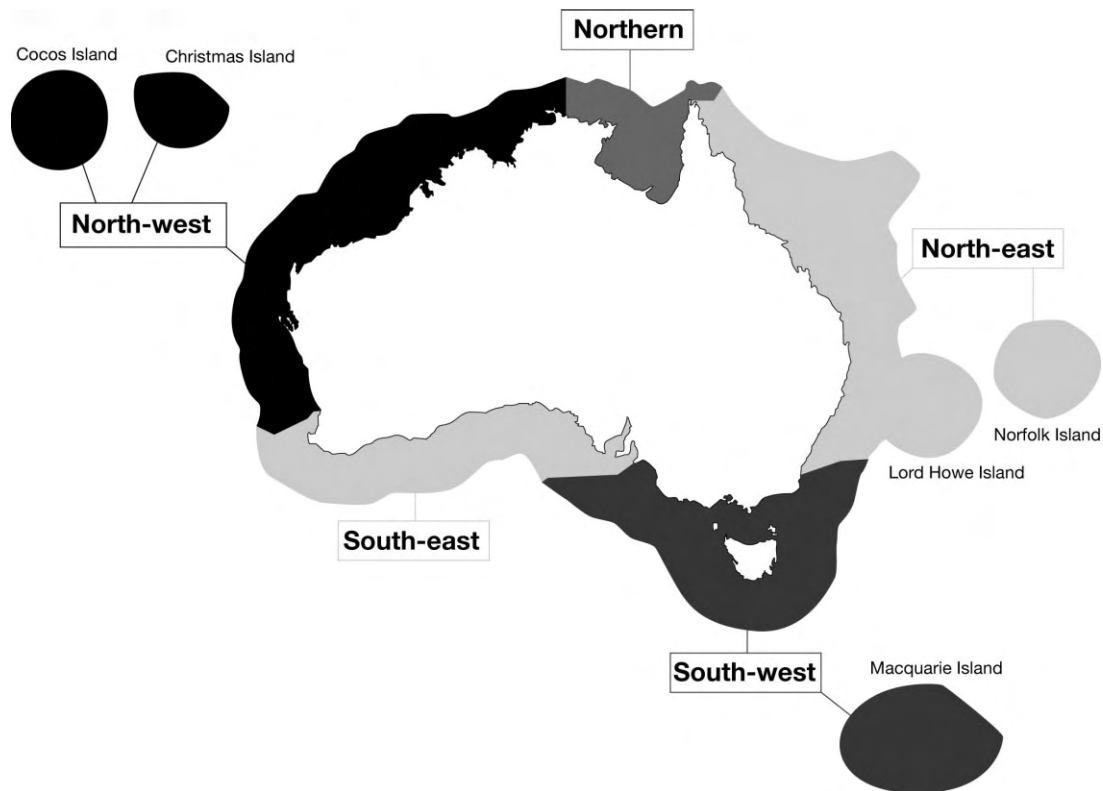


Figure 4: Key areas for regional marine planning established by the National Oceans Office (NOO).

5.1.3 Department of Environment and Heritage (DEH)

A National Representative System of Marine Protected Areas (NRSMPA) program is being coordinated by DEH. The primary goal of the NRSMPA is “to establish and manage a comprehensive, adequate and representative system of marine protected areas to contribute to the long-term ecological viability of marine and estuarine systems, to maintain ecological processes and systems, and to protect Australia's biological diversity at all levels” (DEH, 2004).

The planning framework for NRSMPA is based on the Interim Marine and Coastal Regionalisation for Australia (IMCRA) ecosystem classification.

In line with this objective, 60 bioregions have been identified to cover Australia’s waters, 16 of which are within Western Australia coastal waters. A bioregion is defined by a combination of biological, social and geographic criteria, rather than by geopolitical considerations and is generally, a system of related, interconnected ecosystems.

The intention is that each State would identify at least one marine protected area in each bioregion towards the development of the NRSMPA (DEH, 2004).

5.2 State Marine Planning

5.2.1 Marine Conservation Reserves

Multiple use Marine Conservation Reserves (MCR’s) may be created under the provisions of the *Conservation and Land Management Act 1984*. The lead agency for implementing this legislation is the Department of Conservation and Land Management (CALM). A key

element of this process is the establishment and management of a state wide system of multi use MCR's, which have the ability to restrict fishing activity to varying degrees in accordance with a zoning scheme outlined within the plan of management for a particular area.

Existing marine conservation reserves in WA include Hamlin Pool Marine Nature Reserve, Jurien Bay Marine Park, Marmion Marine Park, Ningaloo Marine Park, Rowley Shoals Marine Park, Shark Bay Marine Park, Shoalwater Islands Marine Park, and Swan Estuary Marine Park. Further marine conservation reserves are planned for The Capes, Montebello-Barrow Islands, Dampier Archipelago–Cape Preston, and Walpole-Nornalup Inlets (CALM, 2004).

5.2.2 Fish Habitat Protection Areas

There is provision to establish Fish Habitat Protection Areas (FHPA's) under the *Fish Resources Management Act 1994* to meet a number of objectives, some of which are non-fishery related (FWA, 2001).

FHPA's are most commonly community-initiated proposals to protect relatively small areas of the aquatic environment, and rely on community stewardship for on-going management. Fishing activities within FHPA may be restricted to varying degrees.

FHPA' currently exist at the Abrolhos islands, Cottesloe Reef, Lancelin Island Lagoon, Miaboolya and Pt Quobba.

5.2.3 Bioregional Marine Planning

The Department of Premier and Cabinet is currently coordinating a multi-sectoral approach to the marine planning process with a focus on a regional scale. This is anticipated to run independently of the existing CALM and Department of Fisheries marine planning exercises and address strategic rather than operational issues. It is intended to complement and facilitate existing state marine planning legislation.

5.3 Coastal development

Over 80% of the State's population lives within 30km of the coast (WAPC, 2003). The implications of this for coastal development are significant – residential sprawl and demand for coastal recreational facilities, which may in turn put pressure on available fishing grounds. For example, Mandurah quadrupled its population between 1976 and 2002 and Busselton is one of the fastest growing towns in Australia (Pederson, 2002). Although there is also demand for maintenance of some wilderness coastal areas, those areas may not be ones of significance to fishery ecosystems, such as breeding grounds or nursery areas.

The Western Australian Planning Commission (WAPC) administers the State Coastal Planning Policy, gazetted in June 2003, which is intended to provide an integrated approach to coastal planning.

5.4 Population growth

Australia's estimated resident population at June 2002 was 19.7 million. This is projected to grow to between 23.0 and 31.4 million by 2051 and to between 18.9⁷ and 37.7 million in 2101 (Australian Bureau of Statistics (ABS), 2003). This wide range allows for differing assumptions on birth and death rates and on migration.

The sustained low fertility evident in Australia's population is expected to continue, reinforcing the aging of Australia's population. A greater proportion of people will be over 65 (up to 30% of the population by 2051) and over 85 (up to 9% by 2051). The proportion of the population under 15 years is expected to fall from 20% to about 12-15% by 2051 (ABS, 2003).

Population prediction for Western Australia and Perth vary according to sources. The ABS predictions made in 2003, based on the census are shown in Table 2. Planning WA published a population report in 2000 (Planning WA, 2000) predicting by 2006, Perth's population would reach 1.5 million, with 2.330 to 2.824 people living in the whole of Western Australia. However, By the end of September 2003, Western Australia's population had reached 1.960 million people (Tourism WA, 2004) and at the end of 2004, the State's population has already passed 2 million, suggesting that growth exceeds the levels predicted by both State and Commonwealth authorities.

City/State	At 30 June 2002 (million)	Predicted range as at 30 June 2021	Predicted range as at 30 June 2051
Perth	1.414	1.664 – 1.932	1.809 – 2.752
WA	1.927	2.202 – 2.580	2.259 – 3.574

Table 2: Australian Bureau of Statistics' predictions for WA and Perth populations for 2021 and 2051.

Much of this rapid population growth is occurring along the coastal fringe. This continuing expansion is likely to bring with it public expectations on coastal access. In particular, that there is a resource allocation process in place which will accommodate social expectations regarding access to coastal waters. For example, fishing restrictions in high use recreational areas, and access to popular fishing spots. Social expectations are a significant driver in the political marine planning agenda.

5.5 The world economy

5.5.1 Exchange rates

An increase in the exchange rate for the \$A against foreign currencies (a strengthening of the Australian dollar) means that Australian exports cost more to overseas buyers. Given Australian seafood producers are price takers, the implications of this is that buyers will

⁷ The decrease in the lower end of this range is based on current trends that will result in deaths exceeding births in the future. This end of the range is based on the assumption that growth will decrease until it becomes negative – sometime between 2040 and 2070 (ABS, 2003).

either buy less or pay less for what they buy. In either case, exporters like rock lobster fishers and processors are likely to experience a drop in profits.

May to October 2004 saw one of the largest appreciations in exchange rate in Australian economic history (DHL 2004).

5.5.2 Price of oil

Price of oil has gone from around \$10 a barrel in 1999 and reached a peak of \$55 a barrel in October 2004.

It is predicted that oil prices will continue to rise because of political instability in the main oil-producing region and because those fields are currently pumped to capacity and supply cannot be increased. Demand for oil has exceeded predictions and new sites that were due to come on line this year did not produce the quantities expected (Dr I.i.A.A.Al Muhanna, 2004).

The world demand for oil is forecast to rise more than 50% by 2025, with China expected to import as much oil as the US does now; and there is doubt whether oil production capacity can meet this demand. This potential shortage would be exacerbated if Iraq's exports were continually interrupted (Azzam, 2004).

OPEC suggests these combined factors are contributing \$10-15/b to the price of crude oil (OPEC, 2004).

5.5.3 Impact on fisheries

Fuel comprises up to 35% of operating costs of a fishing vessel. The high price of crude, coupled with fuel taxes imposed within Australia, has a significant impact on the viability of commercial fishing operations. As price takers, there is limited ability for fishers to pass on rising costs to the consumer. If fuel costs continue to increase, the impacts will be at both the individual and fishery levels. Individual fishers may leave the industry; change the structure of their operations; or fish closer to shore - the latter option having implications for resource sharing conflict. Fishery-wide, management arrangements may need to change. The rock lobster fishery is currently reviewing the best management system for the rock lobster fishery.

The impact on recreational fishing is not likely to be as marked, especially in metropolitan areas. The recreational fishing impact will more likely be felt in regional tourist towns, such as Exmouth, Coral Bay, and Denham where the price of petrol may deter tourists from driving the distance to reach those towns. (However, these are not key rock lobster fishing locations.) Fishing businesses, such as charter operations, tackle shops etc, depend on tourists and hence would be significantly impacted if the drop in tourism were large.

5.5.4 Trade barriers

The Australian seafood industry is unprotected in terms of subsidies and tariff protections. US tariffs mainly apply to seafood that has undergone some value adding, with most fresh, frozen or chilled product tariff-free (ASIC, 2004). With one small exception, all lobster exports from Australia into the US are tariff-free.

Tariff barriers into China are still up to 40%, however these may be improved through the outcome of the free trade agreement being negotiated between Australia and China.

Until October 2003, WA lobster attracted a tariff of 12.5 per cent within the EU, compared with 6 per cent for comparable species from competitor countries such as the US and Canada, and 3 per cent for Mexico and Cuba. From October 2003 that tariff was reduced to six percent for 1,500 tonnes per annum of frozen rock lobster exported for further processing to European countries by December 31. In January 2004, this agreement was extended for 3 years. (J Paparo, pers.comm.).

5.6 National and International reporting requirements

5.6.1 *Environmental Protection and Biodiversity Conservation Act 1999*

The EPBC Act promotes the conservation of biodiversity by providing strong protection for listed species and communities in Commonwealth areas, Commonwealth waters and waters around our External Territories. Species and communities listed for protection include threatened species, marine species, migratory species and threatened ecological communities. There are two Parts under the EPBC Act that require a fishery management regime to be assessed against the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries* – Part 13 and Part 13A.

Under Part 13 of the EPBC Act it is an offence to kill, injure, take or trade a member of a listed species in a Commonwealth area. The Act specifies that certain actions are not offences. These include actions undertaken in accordance with an accredited management regime or in accordance with a permit under which the action is approved.

As a result any fishery, which operates in Commonwealth waters or has a licence area extending into Commonwealth waters must be accredited under Part 13. In order to be accredited under Part 13 of the EPBC Act, a fishery management regime must be assessed against the Guidelines. If the Minister for Environment and Heritage is satisfied that the fishery's management regime requires fishers to take all reasonable steps to avoid killing or injuring protected species and that the regime does not, or is not likely to adversely affect the survival or recovery in nature of a protected species, the Minister may accredit the management regime, thus exempting operators from requiring permits or prosecution under the Act.

Part 13A requires a fishery management regime to be assessed against the Guidelines to allow the fishery to continue exporting its product. Accreditation under Part 13A results in the product from a fishery being added to the Section 303DB list of species to be exempt from export regulations. If accreditation is not received under Part 13A a fishery may continue to operate but fishers would not be able to export catch.

The WCRLMF was assessed against Part 13 and Part 13A and received appropriate exemptions.

Information on EPBC can be found at www.environment.gov.au/epbc.

5.6.2 *Marine Stewardship Council (MSC)*

The MSC was established in February 1997 and is an independent, not for profit, international body.

Its aim is to work for sustainable marine fisheries by promoting responsible, environmentally appropriate, socially beneficial and economically viable fisheries practices, while

maintaining the biodiversity, productivity and ecological processes of the marine environment, through:

- Conserving marine fish populations and the ocean environment on which they depend
- Promoting responsible management of fisheries, ensuring the sustainability of global fish stocks and the general health of the marine ecosystem
- Establishing and promoting the application of a broad set of Principles and Criteria for Sustainable Fishing
- Providing certification and accreditation services

These objectives can only be achieved through a transparent consultation and communication process. This necessitates a governance structure that ensures that all stakeholders' views and opinions are heard and debated and where no single interest predominates.

In March 2000, the WCRLMF became the world's first fishery to receive MSC certification as a well-managed and sustainable fishery, and since then the management process has moved on to address the MSC's annual audit requirements. The initial certification was for a 5-year period and the fishery has sought recertification under the Marine Stewardship Certification process.

More information about the MSC can be found at www.msc.org.

5.6.3 National Competition Policy (NCP)

The method and level of restriction on commercial fisheries have an impact on the environment, the fishing industry and consumers.

The NCP legislation review process involves governments reviewing and where appropriate, reform of legislation that restricts competition. Governments may, however, retain restrictions, if they show that the restriction is in the public interest.

More information about NCP can be found at www.ncc.gov.au.

Section 6 Institutional Arrangements

6.1 Governing Legislation/Fishing Entitlement

Both commercial and recreational fishing is administered through the provisions of the *Fish Resource Management Act 1994 (FRMA)* and the *Fish Resource Management Regulations 1995 (FRMR)*. This legislation provides for the gazettal of management plans for fisheries and the issuing and management of entitlements to facilitate commercial and recreational fishing.

Commercial fishing for rock lobster is managed under the *West Coast Rock Lobster Management Plan 1993* (in conjunction with the Act and regulations), with fishers having to hold a West Coast Rock Lobster Managed Fishery Licence.

Recreational fishing for rock lobster requires either a rock lobster recreational fishing licence or an umbrella licence permitting access to all licensed recreational fishing activities. The number of these licences issued is unlimited. The rules governing recreational fishing are found in the FRMR.

In addition, both commercial and recreational sectors contribute financially towards the management of their respective fisheries.

The WCRLMF is fully cost recovered, that is, the licensees cover all of the Department's operating costs associated with the management of this fishery. In addition, licensees contribute to the Development and Better Interests Fund. The business rules for operation of this fund are derived from an industry/government agreement (called the "Cole/House" agreement) made in 1995 (Brayford, 2003).

The government funds the management of recreational fishing for rock lobster, although recreational fishers pay a user contribution through licence and administrative fees. These fees contribute to the research, management and compliance of the fishery.

6.2 Consultation Processes

The primary source of advice to the Minister on the management of rock lobster in Western Australia comes from the Rock Lobster Industry Advisory Committee (RLIAC). RLIAC is a multi-sector, expertise-based committee that regularly considers strategic management issues, along with other matters that affect the management of the State's rock lobster fisheries.

In consulting with stakeholders, RLIAC conducts an annual coastal tour, holds open forum meetings, and produces a newsletter. The Department of Fisheries also facilitates Department–industry meetings.

There is a recreational member on RLIAC who provides a recreational perspective on management direction in the WCRLMF. The Recreational Fishing Advisory Committee (RFAC), which is the committee appointed by the Minister to advise him on matters pertaining to recreational fishing, provides advice on the management of recreational rock lobster fishing.

Section 7 Research and Monitoring

7.1 Biological research and catch monitoring

Biological research and catch monitoring is undertaken through the Department of Fisheries' Research Division. Information is provided on future catch levels of rock lobster, the voluntary logbook system is promoted within industry, and modelling and stock assessment undertaken. Monitoring occurs on levels of puerulus settlement, of breeding stock levels, and of catches and fishing effort through fishers' and processors' compulsory returns. A summary of information from the 2003/04 State of the Fisheries Report is presented below, but the reader is referred to the full report.

With requirements to be met against Commonwealth environmental and biodiversity legislation, the Division also ensures that the rock lobster fishery meets its obligations in the context of the EPBC Act and, in partnership with industry, maintains the MSC certification.

7.1.1 Stock assessment

The stock remains fully exploited and under the current management arrangements introduced in 1993/94, which included an 18% pot reduction, the overall breeding stock remains at or above the target levels of the late 1970s and early 1980s (Figure 5).

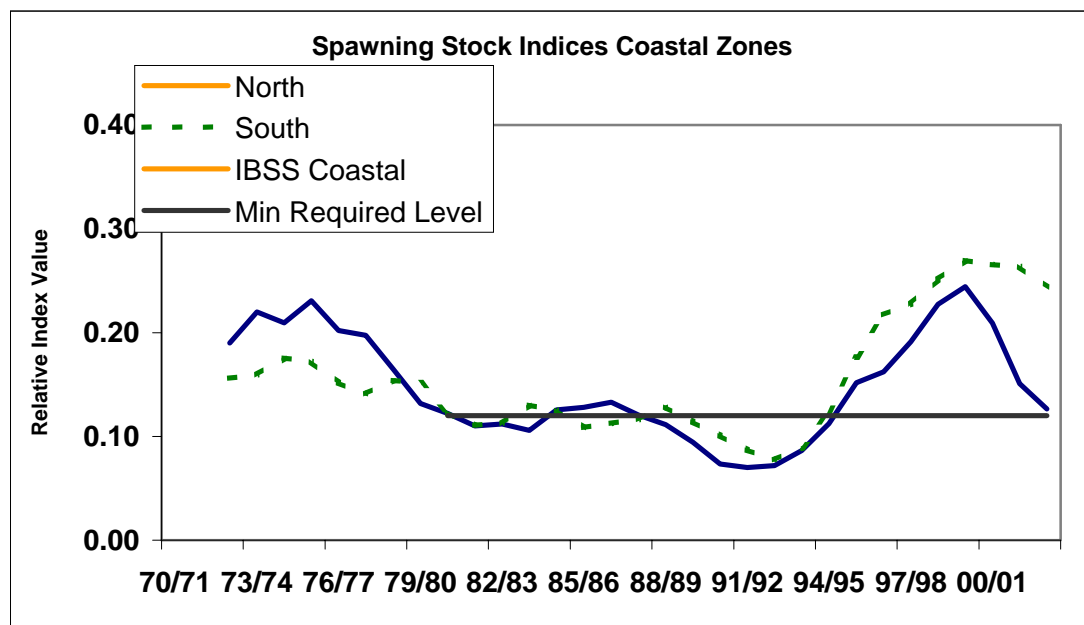


Figure 5: Time series of monitoring spawning stock index (an index of numbers of eggs per pot lift integrated over the whole season) for the north (Jurien and Dongara) and south (Fremantle and Lancelin) coastal regions and the independent breeding stock survey index of egg production adjusted to be equivalent to the 1992/93 average of the monitoring indices. Proportional adjustments to that point have been applied and all indices have been smoothed to reduce the large variation seen successive individual points caused by changes in catchability (moving average of three).

Post-larval recruitment to the fishery is monitored continuously. Annual indices of puerulus settlement for 2002/03 were below average at all sampling sites and improved in 2003/04 in

the northern sites (Figure 6). These lower settlements will first impact during the “reds” of 2005/06 and then as a poor “whites” throughout the fishery in 2006/07. The consensus forecast from international experts is for a possible return to El Nino in 2004; this may lead to average to slightly below average settlement within the next settlement period.

Annual indices of rock lobster puerulus settlement

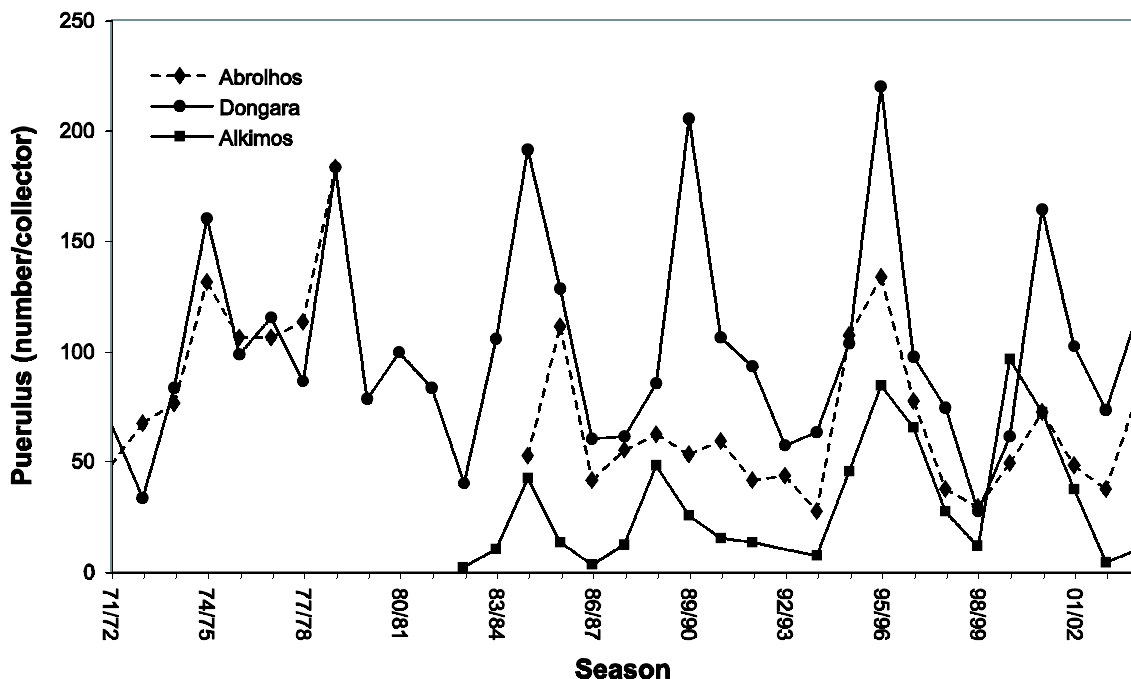


Figure 6: Annual indices of puerulus settlement for the Abrolhos (A Zone), Seven Mile Beach (Dongara) (B Zone) and Alkimos (C Zone) from 1971/72 to 2003/04.

Current breeding stock levels in the fishery (Figure 5) indicate that the combined commercial and recreational harvest rate currently in the fishery is generally sustainable, although some management action is being considered in zone B to ensure that the breeding stock remains above target levels.

The increases in breeding stock in the late 1990s reflect the previous high levels of recruitment and flow-on to the breeding stock; however, all of the indicators are currently trending down, reflecting the need for caution. In Zone B, where the indicators are approaching the minimum safe level and the commercial harvest rate is increasing within the fixed TAE due to efficiency increases, Government and industry are currently considering an adjustment to the TAE. At the 2004 Western Rock Lobster Fishery Coastal Tour, the Department of Fisheries announced the necessary reduction would be in the order of 15%.

7.1.2 Depletion models

To further validate these measures (and to assess harvest rates for setting of commercial TAEs), a series of ‘depletion-based’ lobster population estimates are used. These provide a direct estimate of the residual biomass (that is a reflection of spawning stock) in each zone at the end of each season. These estimates provide a direct estimate of commercial fishing harvest rate (Figure 7), which can be used to adjust each zone’s commercial TAE.

Analysis showed that exploitation rates in A Zone have reduced marginally since 1993/94. In B and C Zones, a reduction in exploitation was noted after 1993/94 but an upward trend has been re-established, particularly in B Zone where the exploitation rate has risen to the high levels of the early 1990s, mainly due to increases in efficiency of the fleet. Exploitation rates in the shallow (< 20 fathoms) and deeper (> 20 fathoms) waters are being investigated.

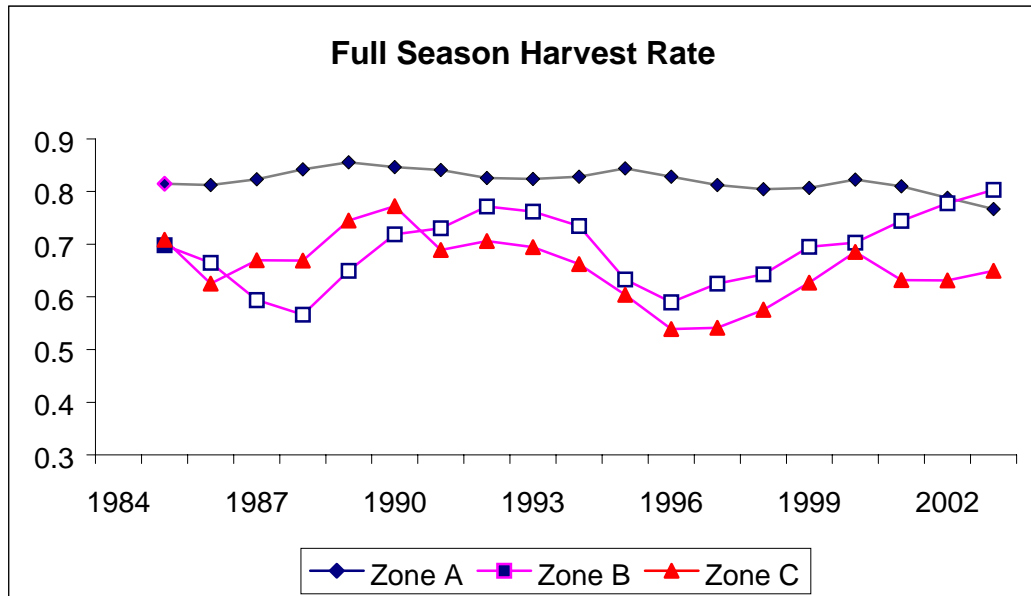


Figure 7: Smoothed estimates (3-year moving average) of harvest rate for Zones A, B and C standardised to reflect the changes in management changes introduced for the 1993/94 season such as protection of mature females.

7.1.3 Independent breeding stock survey

Although the breeding stock indices can vary by 60%–120% between successive years due to environmental conditions, the effects of these changing environmental conditions on the fishery-dependent indices are not as large because the monitoring data used in these calculations cover the entire season. Consequently, a three-year moving average (smoothing) is now used to show the underlying trends in the trajectory of the breeding stock indices rather than highlighting individual data points which can vary significantly (see Figures 5 and 8).

The introduction of the management arrangements in 1993/94 returned the egg production indices and breeding stock to target levels. Very high levels of recruitment provided a major boost to egg production during the early 2000s, although these levels have fallen in the northern zone over recent years (Figure 5). The Abrolhos Islands breeding index has also declined but is not considered problematic since approximately 70% of the egg production there comes from sub-legal-sized lobsters (Figure 8). Whilst the current levels of egg production are at the target levels set in 1993/94, the trend is still downwards and management options are now being considered to reverse this trend, particularly in the north coastal region.

Fishery-independent breeding stock surveys to assess the strength of egg production will continue to act as a calibration for indices derived from fishery data.

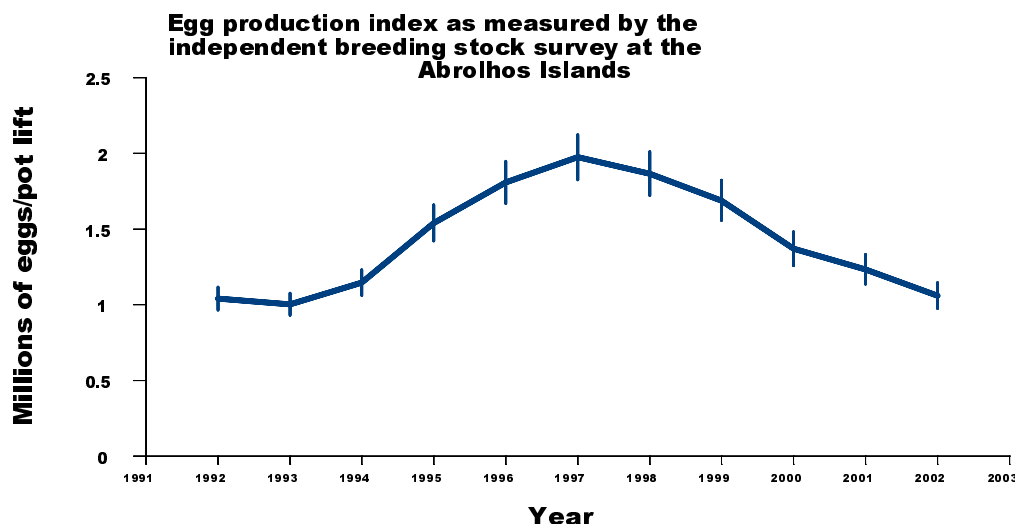


Figure 8: Egg production indices as measured by the independent breeding stock survey at the Abrolhos Islands smoothed by a moving average of three years, centred on the middle year.

7.2 Catch Prediction

This fishery has a well-developed catch prediction system based on the puerulus settlement index. The total catch predictions are made by summing the regional catch predictions from puerulus settlement at the Abrolhos Islands (Zone A), Seven Mile Beach (Dongara – Zone B), and Alkimos (Zone C). Zone C predictions also rely on combined settlement from a number of collection sites within Zone C.

YEAR	Zone A	BIG BANK	Zone B	Zone C	TOTAL
94/95	1 570 (1 703)		4 200 (3 936)	4 800* (5 153)	10 600 (10 792)
95/96	1 620 (1 900)	350 (91)	3 200 (3 390)	4 950* (4 403)	10 120 (9 784)
96/97	1 600 (1 789)	350 (71)	3 150 (3 545)	4 500* (4 495)	9 600 (9 902)
97/98	1 850 (1 792)	200 (158)	3 650 (3 424)	5 300*/4 650** (5104)	11 000*/10 350** (10 478)
98/99	1 950 (1 945)	350 (208)	4 200 (3 989)	7 750*/6 700** (6 867)	14 250*/13 200** (13 009)
99/00	1 900 (1 714)	200 (184)	4 050 (4 332)	7 700*/7 800** (8 203)	13 850*/13 950** (14 433)
00/01	1 800 (1 672)	150 (119)	3 650 (3 385)	6 800*/5 600** (6 089)	12 400*/11 200** (11 273)

YEAR	Zone A	BIG BANK	Zone B	Zone C	TOTAL
01/02	1750 (1634)	100 (50)	3150 (2765)	5350*/4550** (4517)	10 350*/9 550** (8 983)
02/03	1 600 (1713)	100 (19)	3 100 (3 235)	5 800*/6 900** (6 420)	10 600*/11 700** (11 387)
03/04	1 650 (1 884)	150 (188)	3 800 (3 332)	7 850*/8 150** (8 160)	13 450*/13 750** (13 564)
04/05	1 650	200	3 900	6 900*/7 100**	12 650*/12 850**
05/06	1 650	100	3 650	4 800*/5 100**	10 200*/10 500**
06/07	1 750	100	3 700	3 850*/4 300**	9 400*/9 850**

Table 3: Rock lobster commercial catches and catch predictions for the western rock lobster resource from 1994/95 to 2006/07. Actual catches are in brackets. Zone C prediction using Alkimos* and all sites.**

7.3 Independent/associated biological research

7.3.1 FRDC project 1998/302

Curtin University and the Department of Fisheries collaborated to study various aspects of puerulus collection. The desktop study was aimed, among other things, at estimating theoretical levels of puerulus that could be harvested from the fishery before having to compensate with a reduction in fishing effort. The study was taken based on available data in a small area of the fishery between Dongara and Geraldton. Further assessment would be required as part of any commercial venture undertaken.

Of interest to the management of western rock lobster is the natural mortality rate of pueruli found in this study area. The study found that “there is a very high level of mortality between the time of puerulus settlement in the coastal reefs and the time the lobsters move offshore and recruit into the fishery” (Phillips et al, 2003, p71). Depending on the assumption within the model used, estimates ranged from a low of 80% to a high of 97%.

7.3.2 CSIRO

CSIRO have undertaken an ecological study of different habitat types at Rottnest Island, with emphasis on rock lobster. A report on the results of this study is being prepared, however was not available for public release at the time this IFM report was finalised.

7.4 Socio-economic research

The Department of Fisheries, in conjunction with RLIAC, has commissioned Economic Research Associates (ERA) to conduct a review of the current commercial fisheries management regime to ascertain whether it is delivering the optimum mix of economic and social benefits. The review will examine alternative management strategies against a benchmark of the current regime with the aim of identifying which management approach would provide the best long-term socio-economic return to the state from the ecologically sustainable use of the western rock lobster resource. In addition to the existing arrangements,

the review will assess a system based on individually transferable effort units and one based on individually transferable quota.

The study does not include an investigation of the recreational fishing rules or the sharing of available catch between commercial and recreational fishers.

ERA is being assisted by the University of Western Australia, which is investigating the social impact of the rock lobster fleet on fleet-hosting communities in Western Australia. This research will establish a database of quantitative and qualitative indicators and develop a model to integrate social data with environmental and economic data in the prediction of wider effects of management changes on host communities.

7.5 Compliance and education

7.5.1 Compliance

A comprehensive compliance program is in place to ensure the long-term sustainability of the western rock lobster resource through enforcement of the FRMA and subsidiary legislation, and to promote equity between commercial fishers and other members of the fishing community. A major part of the management package involves making sure participants and community members understand, accept and adhere to the management rules.

The Regional Services Branch of the Department of Fisheries provides a range of at-sea and land-based compliance services in the west coast bioregion, with Fisheries Officers stationed in Denham, Geraldton, Dongara, Jurien, Lancelin, Fremantle, Mandurah, Bunbury and Busselton. Officers conduct offshore inspection work aboard the patrol vessels, aimed at ensuring compliance with zone and closed-water requirements, gear restrictions, biological controls and seasonal closures.

Fisheries Officers from the Serious Offences Unit also conduct targeted specialised operations related to suspected serious offences in the commercial rock lobster fishery, and may provide specialist operational support as required. Services provided by land-based officers include processing, landing and gear inspections, licence checks, wholesale/retail inspections and inshore sea-based patrols utilising vessels ranging in size from 5 to 12 m. They also provide support to the Department's larger seagoing vessels.

A rock lobster compliance risk assessment workshop is conducted bi-annually prior to the season opening and is attended by Departmental staff, including Fisheries Officers and managers; fishers; and processing factory representatives. The objectives for the workshop are to identify and evaluate compliance risks within the fishery, thereby allowing effective targeting of limited compliance resources. The major risks identified that continue to be of concern included illegal sale into the restaurant trade, interference with commercial fishing gear, over-potting, and holding of rock lobsters over 76 mm prior to the change in the minimum legal size.

Several across-region operations are also conducted; focusing on the illegal trade of rock lobster in restaurants throughout the metropolitan area, over-potting, and major roadside checkpoints targeting the transportation of illegally caught rock lobsters. Additionally, mobile factory patrols continued to operate throughout the season to ensure biological controls for protected fish are complied with; complementing increased time spent in field surveillance by district-based Fisheries Officers.

7.5.2 Education

Fisheries Officers conduct a wide variety of education and extension services, formally and informally, to commercial fishers, fishing organisations, schools and general community members.

Section 8 Catch and Effort

8.1 Commercial

8.1.1 Historical trends and current catch and effort

The commercial catch of rock lobster and the associated fishing effort has steadily increased since the recording of catch in the mid 1940s (see Figure 9⁸). This trend of increase (around natural stock variations) continued until the 1992/93 fishing season, when management arrangements were tightened significantly. Since that time, the catch of the fishery has averaged 11,300 tonnes, with an effort of 12 million pot pulls.

Following record catches of 13,000–14,000 t in 1998/99 and 1999/2000, the catch fell to around 9,000 t in 2001/02, but returned in 2002/03 to approximately 11,400 t and 13,600 t in 2003/04. Such variations in catch are not unusual, and largely reflect the level of puerulus settlement three and four years earlier, which is in turn dependent upon environmental factors such as the Leeuwin Current.

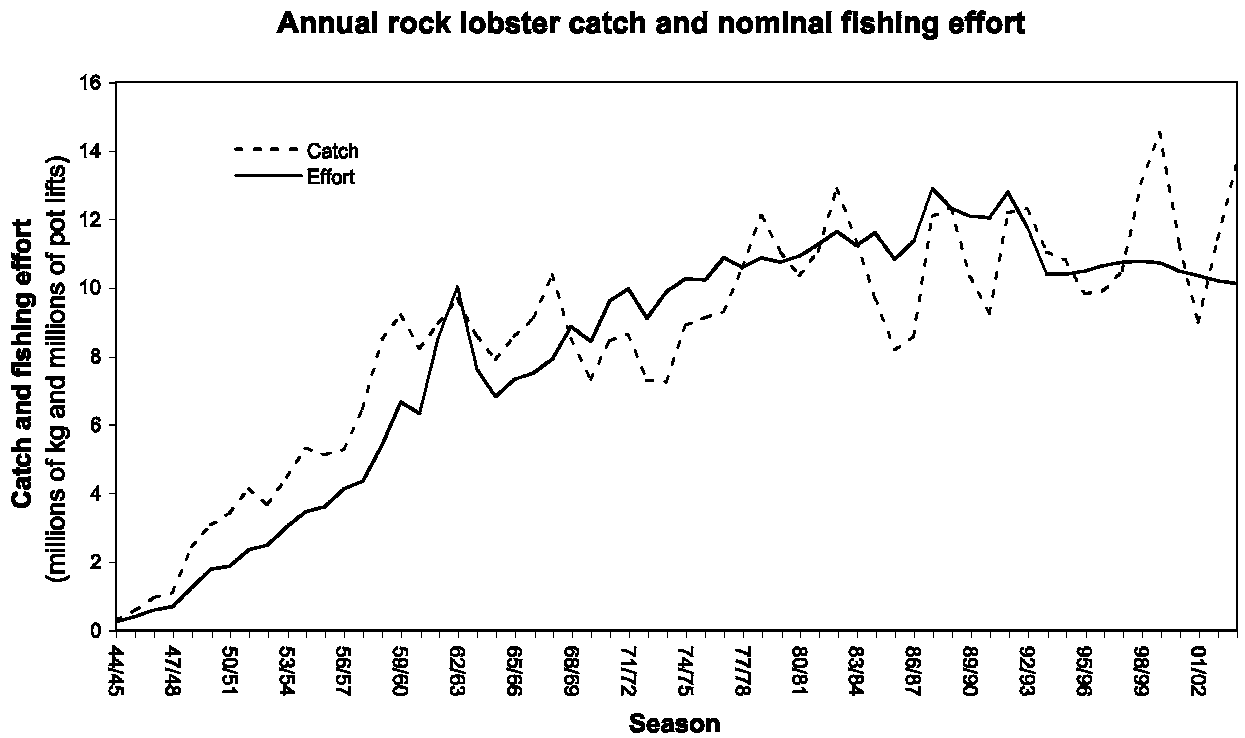


Figure 9: Annual catch and nominal fishing effort from fishers' compulsory monthly returns for the West Coast Rock Lobster Managed Fishery from 1944/45 to 2003/04.

⁸ Note two significant drops in fishing effort occurred through changes in management arrangements – the introduction of limited entry and a reduction in pot numbers in 1963 and another reduction in pot numbers in 1993/94.

8.1.2 Data by zone

A break down of commercial catches by zone is in Table 4. Graphical representation of catch and effort by zone is in Appendix 2, Figures 2.1 to 2.8.

The most recent status report for the WCRLMF (Caputi et al, 2004) provides the following summary breakdown of catch and effort by zone.

The fall in nominal fishing effort that resulted from management changes in the 1993/94 season was followed by a slight increase (Figure 9). Most of the decline in fishing effort in 1993/94 occurred in the 0-10 fm, particularly in zones A and B. Over the period 1989 to 2003, the proportion of effort in 0-10 fathoms has declined from 50-60% to around 50% in A and B zones while in C zone shallow water effort has remained stable at an average of about 55%. The proportion of effort in deeper water (20-30 fathoms) increased in the mid to late 1990s but absolute numbers of pot lifts have remained relatively stable since 1993/94. Previous studies have indicated significant increases in effective effort in deep water during the reds fishery due to the introduction of improved fishing technology such as GPS and colour echo sounders during the 1980's and early 1990's.

Total catch levels in A zone have remained relatively constant but with slight increases in the mid to late 1990s due to the slightly higher catches in water deeper than 10 fathoms. The 0-10 fathom depths now contribute about 50% to the Abrolhos catch whilst the 20-30 fathom depths yield about 20%. Apart from the record catch seasons of 1998/99 and 1999/00, catches in B zone have declined from about 4000 t to about 3500 t. This decline was echoed by a decline in the proportion of landings caught in the 0-10 fathom depth. C zone fluctuations in catch were large as usual with relatively stable contributions to the total over time by all depth categories.

These zonal breakdowns of catch and effort by depth are charted in Appendix 2, Figures 2.3 to 2.8.

Fishing year	Commercial				
	Zone A	Big Bank	Zone B	Zone C	Total
1997/98	1792	158	3424	5104	10478
1998/99	1945	208	3989	6867	13009
1999/00	1714	184	4332	8203	14433
2000/01	1672	119	3385	6089	11273
2001/02	1634	50	2765	4517	8983
2002/03	1713	19	3235	6420	11387
2003/04	1884	188	3332	8160	13564

Table 4: Commercial fishing catches, in tonnes, from each zone within the West Coast Rock Lobster Managed Fishery from 1997/98 to 2003/04.

8.2 Recreational

8.2.1 Different survey techniques

The longest-term database for recreational fishing of rock lobster has been obtained through an annual mail survey. This method involves sending a survey to a random sample of

recreational fishers who hold a recreational rock lobster licence at the end of the fishing year and asking them to complete it based on what they can recall over the season. This has two problems. Firstly it is based on recall of what the fisherman caught and where over a seven and a half month period. Secondly, there is an assumption that responses are representative of all licensees.

A modification on this survey was run in 2001/02. Still a recall survey, it was undertaken over the phone. This was seen to be more accurate as those who answered the phone usually did the survey (401 people), so although recall issues still existed, there were not representativeness issues.

Of all the survey methods, Departmental statisticians consider the phone diary survey most accurate as it overcomes both problems outlined above. In this survey, *a random sample of* licensees was rung and those who agreed to undertake the survey were issued with a diary. These participants were then contacted each month and data collected. Recall was one month rather than one season, and with the exception of 3 people, all 450 people who agreed to do the survey actually did it. The phone diary survey ran in 2000/01 and 2001/02. It did not run between 2002/03 and 2003/04, but is being run again in 2004/05.

A comparison of the results of these surveys over relevant years is at Table 5. Although the mail survey is considered by the Department's research scientists to greatly over-estimate the actual level of catch, the trend apparent through the results is thought to be accurate.

Year	Mail survey	Phone diary survey	Phone recall survey
2000/01	564 t	332 t	
2001/02	545 t	235 t	427 t

Table 5: Comparison between figures for recreational catch obtained under different survey methods.

8.2.2 Historical and current trends (excluding fishing tour)

Results of the recreational mail survey indicate an upward trend in the catch of rock lobster by recreational fishers (see Table 6). Catches from year to year may rise and fall according to abundance of rock lobster and the level of fishing participation, however the overall trend is upward (see Figure 10).

Fishing Year	Catch (tonnes)	Std error
1997/98	486	18
1998/99	626	21
1999/00	747	33
2000/01	564	27
2001/02	545	23
2002/03	890	33
2003/04	815	37

Table 6: Recreational fishing catches from 1997/98 to 2003/04 based on mail surveys.

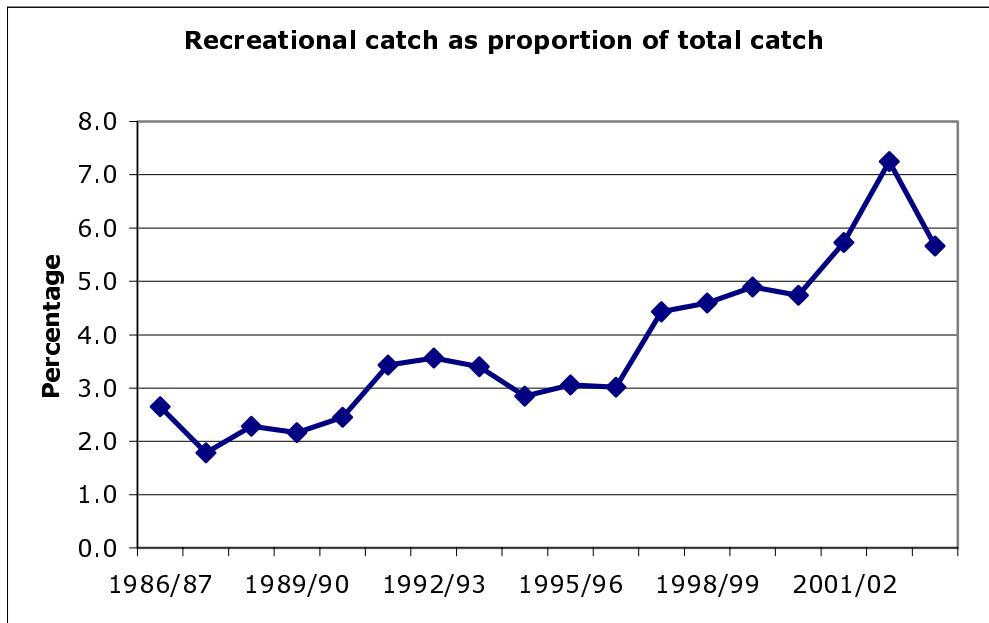


Figure 10: Recreational catch of western rock lobster as a proportion of the total catch of western rock lobster, 1986/87 to 2003/04.

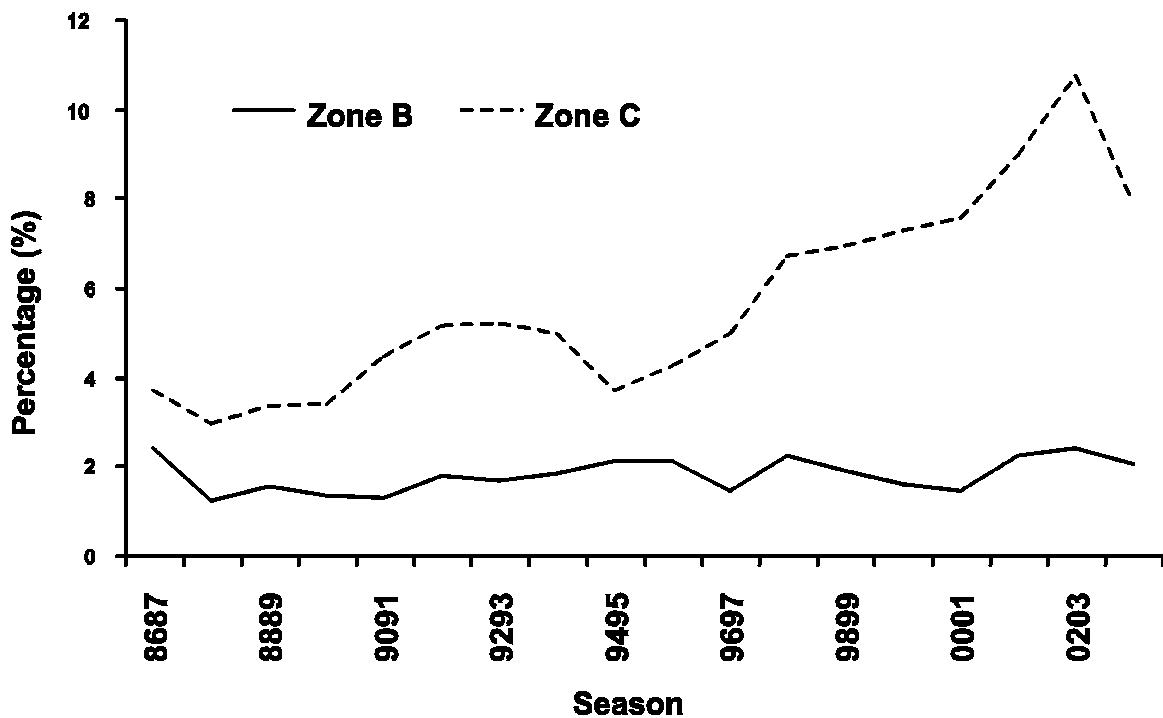


Figure 11: The percentage of total catch (commercial + recreational) taken by recreational fishers by zone. (zone B includes zone A).

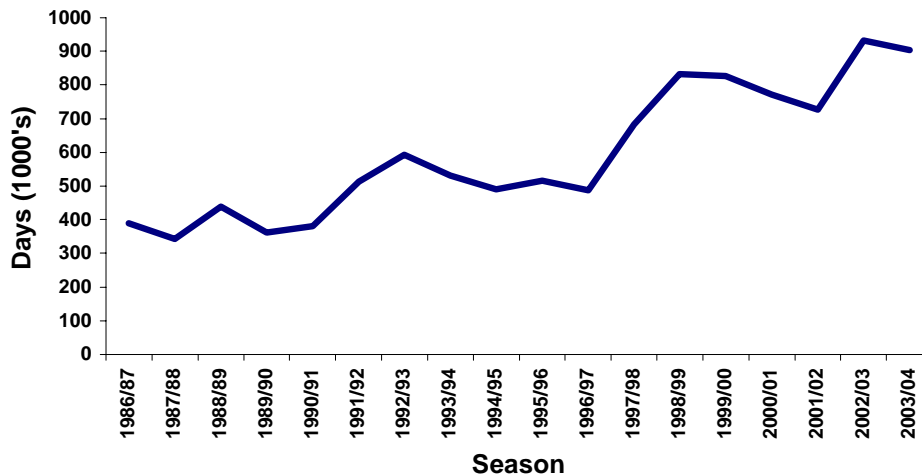


Figure 12: The estimated number of days spent by recreational fishers fishing for western rock lobster from 1986/87 to 2003/04.

The increase in recreational lobster catch over time is attributed to both the increased number of licences issued and the increased proportion of licensees who used those licences (Figure 12 shows the trend in fishing effort).

A total of 47,345 recreational licences were issued for rock lobster in 2003/04 (specific and umbrella licences), with about 71% being used to take rock lobster. This compares with 44,455 licences issued in 2002/03, with about 76% being used.

The average rates of usage by pot and diving fishers were similar in 2003/04 as to 2002/03 – 33 days for pot fishers and 11 days for divers. Catch rates declined slightly between 2003/04 compared to 2002/03. Pot catch rates were 1.5 compared to 1.7 in 2002/03 and dive catch rates were 2.8 compared to 2.9 lobsters per person. In tonnage this equated to 575 t by potting and 240 t by diving compared to 626 t and 265 t respectively in 2002/03.

Detailed analysis of the 2003/04 has not been completed for all data, so the following charts and discussion draw from the 2002/03 survey. Analysis of the 2002/03 mail survey provides indications of how often fishing is being undertaken and where. Figure 13 indicates that 60% of recreational dive fishers took 25% of the total catch over a period of 10 days. Twenty percent of divers fished for 10-20 days in the season and took 30% of the total catch. A smaller percentage of divers fished over more days for a smaller proportion of the catch. Overall, it indicates that 80% of rock lobster recreational dive fishers fish for under 20 days in the season and during that time take 55% of the total dive-catch. A breakdown of these catches by zone can be found in Appendix 3.

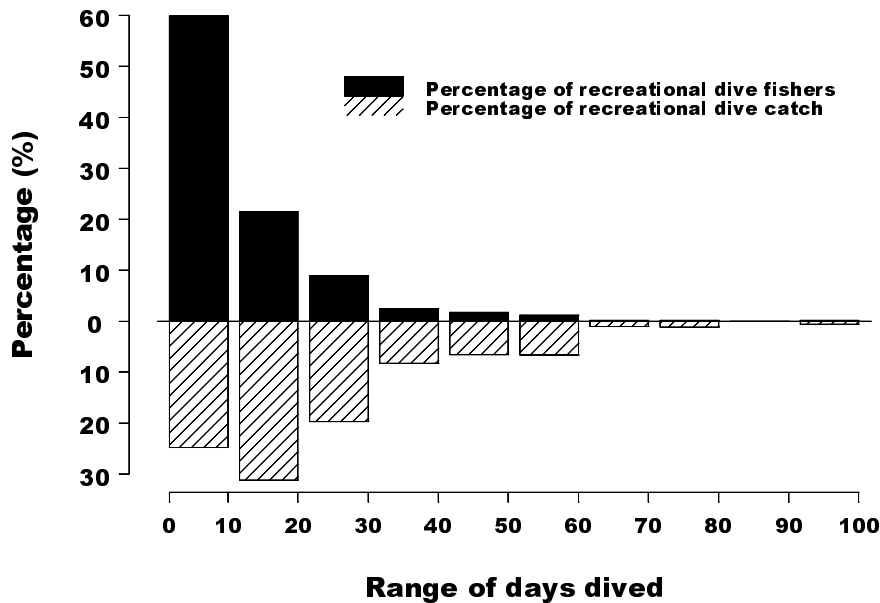


Figure 13: Constructed graph using returned surveys from the 2002/03 recreational western rock lobster annual mail survey showing what proportion of dive fishers fishing at different outing frequencies, take what proportion of the catch.

Figure 14 indicates a very different distribution for recreational pot fishers. Just under 30% of recreational pot fishers took about 5% of the total catch over a period of 10 days. Just over 20% of pot fishers fished for 10-20 days in the season and took about 12% of the total catch. About 18% fished 20-30 days for just under 20% of the catch. Up until about 60 days fishing, there are still significant numbers of fishers taking about 10% of the catch. Overall, just under 70% of rock lobster recreational pot fishers fish for under 30 days in the season and during that time take about 35% of the total pot-catch. A further 20% of fishers fish for 30-60 days of the season, accounting for about 30% of the catch. A breakdown of these catches by zone can also be found in Appendix 3.

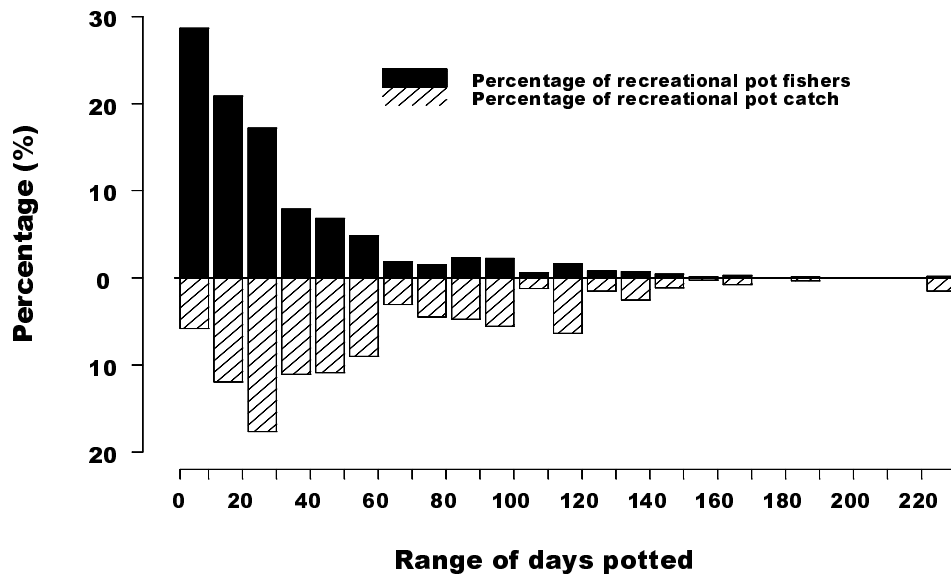


Figure 14: Constructed graphic using returned surveys from the 2002/03 recreational western rock lobster annual mail survey showing what proportion of pot fishers fishing at different outing frequencies, take what proportion of the catch.

Also of interest is the depth at which recreational fishing is occurring. Figures 15 and 16 indicate that over 95% of fishing time for both dive and pot caught rock lobster occurs within waters of less than 20m depth. Figure 16 also indicates that in the 2003/04 fishing year, pot fishers tended to concentrate more effort in waters under 10m (about 70% of time compares with about 55% in 2002/03). This did not appear to happen with dive fishers – if anything there was a slight shift to deeper waters.

The percentage catch and depth follows this effort pattern (Figure 17).

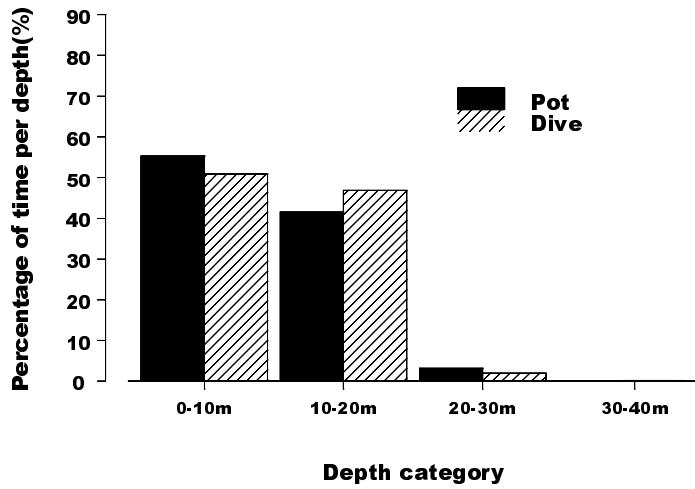


Figure 15: Distribution by depth of pot and dive fisher effort, using data from the 2003/3 mail survey.

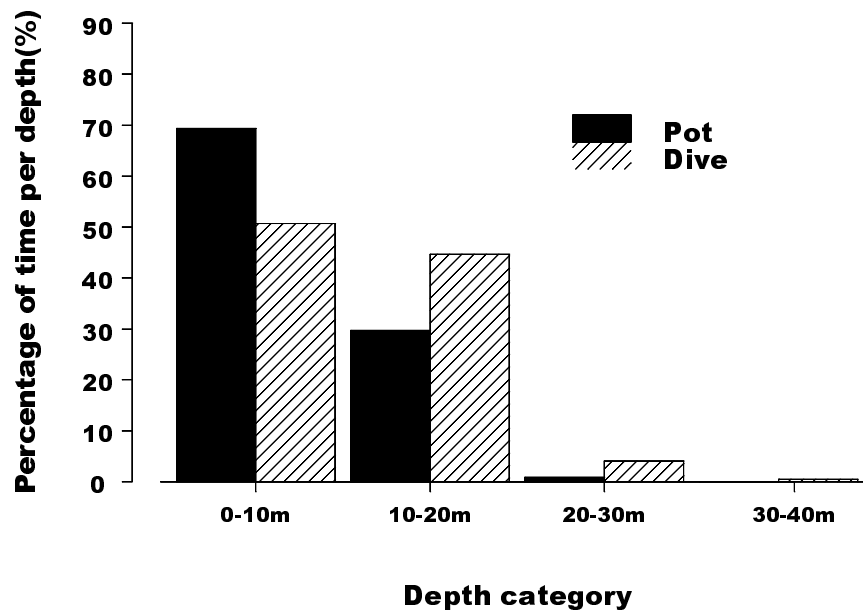


Figure 16: Distribution by depth of pot and dive fisher effort, using data from the 2002/03 mail survey.

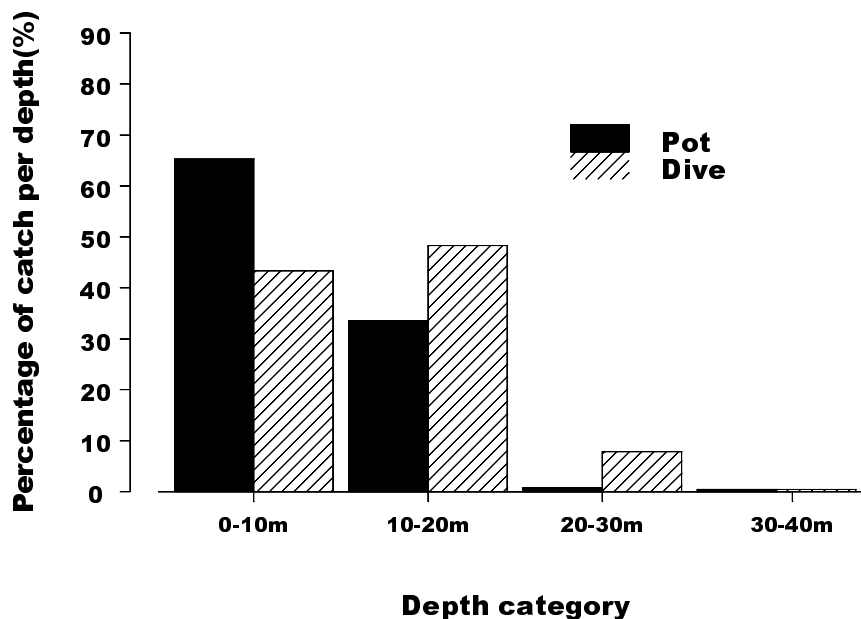


Figure 17: Distribution by depth of pot and dive fisher effort, using data from the 2003/04 mail survey.

8.2.3 Data by zone

The extensive analysis of the western rock lobster mail surveys from 1986/87 to 1998/99 that was published in 2000 (Melville-Smith and Anderton, 2000) has not been repeated for later years. However, scientists consider the patterns revealed for recreational fishing are likely to still exist today (R Melville-Smith, pers. comm.). These patterns present valuable information in terms of when and where recreational fishers fish (see Figure 18).

- 44% of rock lobster licence holders live in the Perth metropolitan area.
- High numbers of licence holders also lived close to the Perth metropolitan area, or in Geraldton, Bunbury and Mandurah.
- Where these fishers fished was highly dispersed between Busselton and Kalbarri, however there were favoured areas – Rottnest Island, greater Perth metro area, Jurien Bay and Geraldton (possibly holiday destinations).
- About 60% of diving and potting is done in depths of less than 10m, with less than 5% of time spent in depths over 20m.
- In the Perth metro and Rottnest areas, the recreational catch is approx. 25% of the commercial catch. This increases to 70% in waters shallower than 10 fathoms (18m).

Other important information from this survey analysis, which will have bearing on ongoing demographic changes and fishing efficiency, include –

- 90% of survey respondents were male.
- Pot fishers tended to be older than divers.
- Most either owned or had access to a boat (generally in the 3-6m size range)

- Nearly 55% owned an echo sounder and 30% owned a GPS.

The recreational catches along the coast will be similarly variable to those in the commercial sector. Current recreational catches over the past decade are estimated (from mail surveys) to be averaging about 100 t per year in Zones A⁹ and B, and between 200 and 800 t in Zone C. Recreational catches at these levels, in combination with the much larger commercial catches, are sustainable, noting that the breeding stock remaining after each season is currently above the required level in each zone.

The historical recreational catch range in Zone C has also been considered sustainable; however, the variations in catch reflect both natural cycles in recruitment and increasing fishing effort (Melville-Smith *et al.* 2004). Further increases in recreational fishing effort, and hence catch, will ultimately increase harvest rates and impact on residual breeding stock levels. This can be expected to affect primarily the metropolitan coastline (within Zone C), which generates the majority of the recreational catch and associated effort. Further expansion of regional holiday centres and marinas, particularly in Zone C, can be expected to replicate this effect in the future.

⁹ Note the offshore Zone A is not subject to significant recreational fishing and is treated as part of Zone B for sustainability purposes.

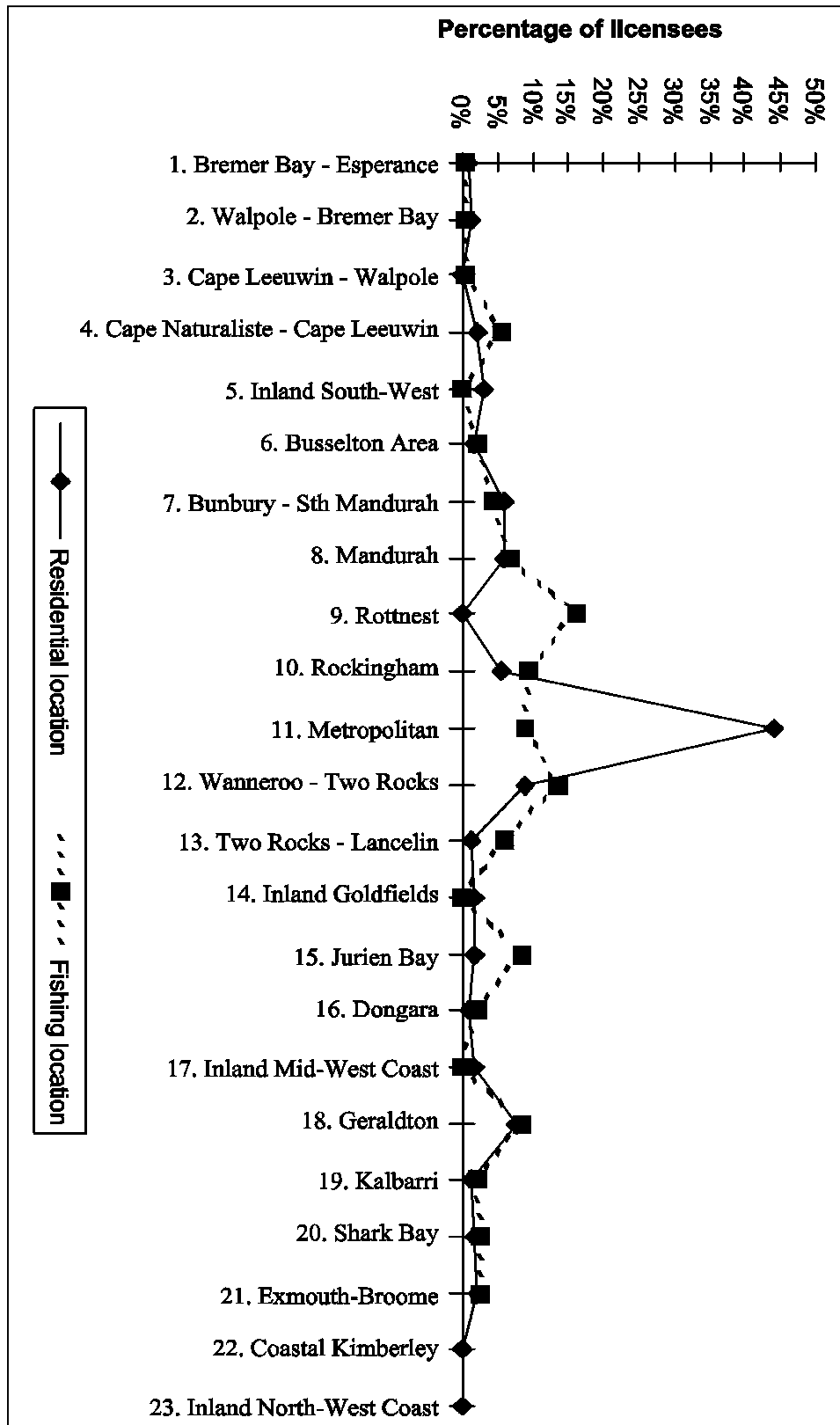


Figure 18: Geographical distribution of Western Australian recreational lobster licensees according to place of residence and recorded fishing.

8.2.4 Fishing tour catch and effort

There is limited data available on the catch and effort of rock lobster by fishing tour operators. Licence conditions introduced in 2001 require operators to submit catch and effort returns for each tour on a monthly basis. Available fishing tour data, which indicates an annual catch of about 1 tonne of western rock lobster, is incorporated into the estimates of total recreational fishing on rock lobster.

8.3 Indigenous (customary)

There are no records on the participation of indigenous people in customary fishing of rock lobster as a separate group of people, although anecdotally, there are reports that indigenous people have traditionally taken rock lobster for food and continue to do so. Recreational fishing surveys do not report on the cultural background of those surveyed (although future surveys will now do so) and the survey only involves fishers who hold a recreational fishing licence – which indigenous people are not required to do. There are no surveys or other formal data collection on customary fishing, with the exception of data collected from the Kimberley communities in conjunction with the national recreational and indigenous fishing survey.

Specific data collection and consultation is required statewide to better our understanding of indigenous fishing patterns. Until such data is collected, an estimate of indigenous fishing catch and effort can be made by extrapolating census data on proportions of indigenous to non-indigenous people and relating this proportion to recreational catch data for the areas of Western Australia within which western rock lobster occurs. There is no way of estimating the percentage of fishing that would be for customary purposes. Using these assumptions, the following estimates can be made.

Weighted percentage of indigenous people in the population in coastal areas from Kalbarri to Augusta = 1.7%. (2001 Census)

Indigenous fishing effort (and catch) at 1.7% of recreational fishing effort (and catch) in the area Kalbarri – Augusta would translate to the estimates of tonnage over recent years (including the baseline years 1997 to 2001), as shown in Table 7.

Fishing Year	Est. Recreational Catch (tonnes)	Est. Indigenous Catch (1.7%) (tonnes)
1997/98	486	8.3
1998/99	626	10.6
1999/2000	747	12.6
2000/01	564	9.6
2001/02	545	9.3
2002/03	890	15.1
2003/04	815	13.9

Table 7: Estimates of indigenous fishing catch based on 1.7% of recreational catch estimates.

Should a more restrictive policy position be adopted for management of customary requirements, as distinct from indigenous recreational fishing, these values are likely to

overestimate the estimates for truly customary take by indigenous people within their own country.

8.4 Illegal

The extent of illegal unreported catch of western rock lobster is unknown.

Fisheries compliance agencies nationally acknowledge the existence of black marketing or trafficking in high value fish species such as abalone, shark fin and lobster. Such activity has in some cases been linked to organised crime. Although in recent years in Australia, there have been major prosecutions of organised criminal groups involving significant quantities of high value fish; they only provide an insight and indication of black-market activity. Currently there is no scientific methodology being applied to measure the extent of this problem.

The Department is seeking FRDC funding to develop a methodology to assess the nature and extent of black markets in WA Dhufish, lobster and abalone.

In the 1960s there was reported wide spread non-compliance by the commercial and processing sectors with undersize and berried female lobsters supplying a significant black market. Improved compliance services and increased penalties including licence suspension and cancellation have significantly reduced non-compliance.

Anecdotal evidence and intelligence gathering suggests that there are still a core of licensed commercial and unlicensed operators trafficking illegal lobsters in most coastal towns abutting the lobster fishery. Inspection of processing, wholesale and retail premises indicate that there is not a significant volume of black market product on the market.

A DoF study distributed to fishers in 2002 estimated the consigned illegal catch from the commercial sector to be 16-24 tonnes in 2000/01 and 13-20 tonnes in 2001/02. McKinlay (2002) reports that factory inspections during 2000/01 found only 0.15% of total landed catch to be illegal. Inspections found variation in levels of illegal catch from boat to boat and analysis of the results showed an inverse relationship between the level of illegal catch and the expectation from fishers of higher inspection levels.

Compliance data indicates the trend for non-compliance with respect to commercial and recreational fishers taking illegal lobsters for their personal use has been stable at consistent but low levels.

8.5 Total mortality

Total fishing mortality is the sum of all sources of fishing mortality on the western rock lobster resource – legal fishing by all sectors targeting rock lobster, fishing mortality from target and incidental catch, and illegal fishing. The other source of mortality is natural mortality.

Rock lobster is of such economic and social value that all legal lobsters taken by any sector would be retained. The value of these fish also leads to illegal activity, little of which is quantified.

As described in section 10.1 of this report, there is a number of sources of fishing mortality associated with the commercial fishery. The extent of this mortality is not quantified, although it is thought to have been consistent over the years at a low level and has not affected the sustainability of the fishery.

Another source of fishing mortality is the demersal gillnet fishery. Lobsters can become entangled in gillnets; however there is no data to quantify this mortality as these fishers cannot keep lobster.

Fishing mortality of protected lobsters in the recreational fishery is also thought to be at a low level.

Total mortality of the western rock lobster resource is managed by the biological objective of maintaining breeding stock at a particular level. If breeding stock indices goes below the target level, regardless of the source of fishing mortality, management arrangements are tightened to facilitate an increase in breeding stock and a return to a sustainable exploitation rate.

8.6 Comparison between commercial and recreational catches

Figure 19 indicates that in the past 20 years, commercial catches have oscillated around a consistent mean, with catch variations relating to the natural variability associated with the rock lobster resource. (Although, as shown in Figure 9, there has been a consistent increase in catch over the past 60 years.)

Catch from the recreational fishery has also risen and fallen with stock availability, however the 20-year trend is upward.

A comparison of the total commercial and recreational catch (by mail and phone diary survey results) are in Table 8.

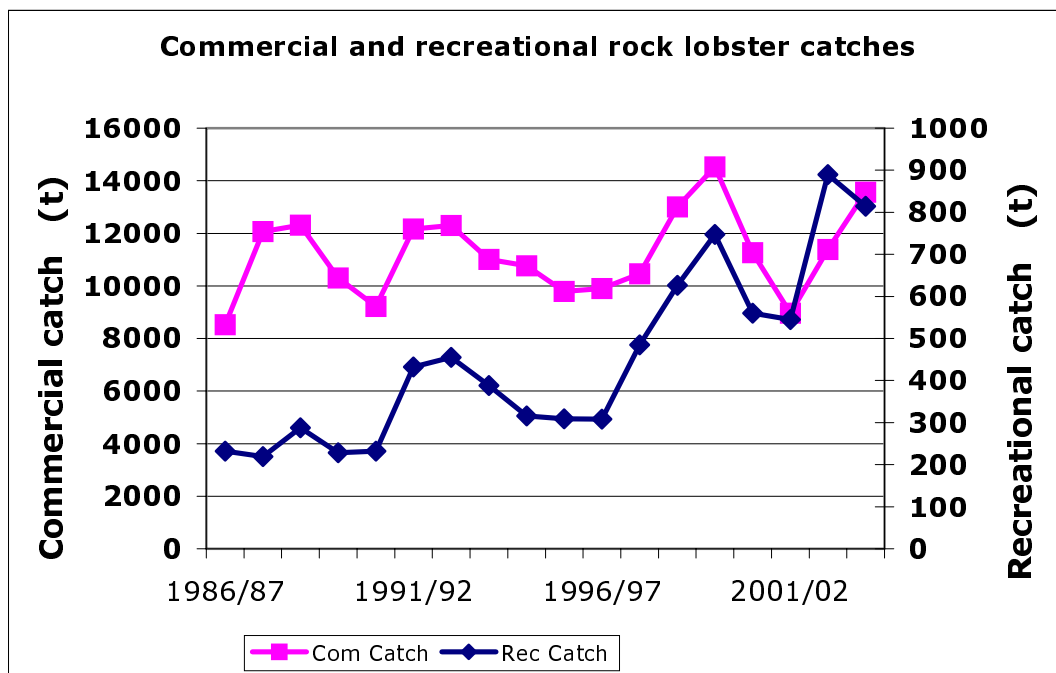


Figure 19: Catch trends for commercial and recreational western rock lobster fisheries from 1986/87 to 2003/04.

Fishing year	Total commercial	Rec mail survey	Total catch (1)	% Rec of total (1)	Rec Phone diary	Total catch (2)	% Rec of total (2)
1997/98	10478	486	10964	4	-	-	-
1998/99	13009	626	13635	5	-	-	-
1999/00	14433	747	15180	5	-	-	-
2000/01	11273	564	11837	5	332	11305	3
2001/02	8983	545	9528	6	235	9218	3
2002/03	11387	891	12278	8	-	-	-
2003/04	13564	815	14379	6	-	-	-

Table 8: WRLMF Catches in tonnes 1997/98 to 2002/03 – comparison between recreational and commercial catches, and comparing mail survey records and phone diary systems for collection of recreational data.

8.7 Sustainable harvest level for rock lobster

The sustainable harvest level is the total catch of a fish resource that can be taken sustainably by the combined sectors. For the western rock lobster resource, the sustainable harvest level is set as an acceptable catch range, which reflects natural variations in recruitment to the fishery. This catch range, under recent levels of recruitment and subject to the current management arrangements (1993/94 to the present) for the whole fishery (commercial and recreational) is about 9,500–15,000 tonnes.

The predicted catches (based on puerulus settlement 3-4 years previously) (Caputi *et al.* 2003) for the commercial fishery in each zone over the next three seasons (assuming constant TAEs and effort efficiency) indicate a decline in catches over the next three years, particularly in Zone C (Figure 20, Table 9). The 2004/05 season is expected to produce commercial catches of around 12,650–12,850 tonnes, resulting from above average puerulus settlement in 2000/01 (see Figure 6, section 8.1.1 of this paper). A decline in catch is forecast for the 2005/06 and 2006/07 seasons to about 10,300 and 9,600 tonnes respectively due to the lower puerulus settlement in recent years.

YEAR	Zone A	BIG BANK	Zone B	Zone C	TOTAL
04/05	1 650	200	3 900	6 900*/7 100	12 650*/12 850**
05/06	1 650	100	3 650	4 800*/5 100**	10 200*/10 500**
06/07	1 750	100	3 700	3 850*/4 300**	9 400*/9 850**

Table 9: Rock lobster commercial predictions for the western rock lobster resource from 2004/05 to 2006/07 by zone. Zone C prediction using Alkimos* and all sites.**

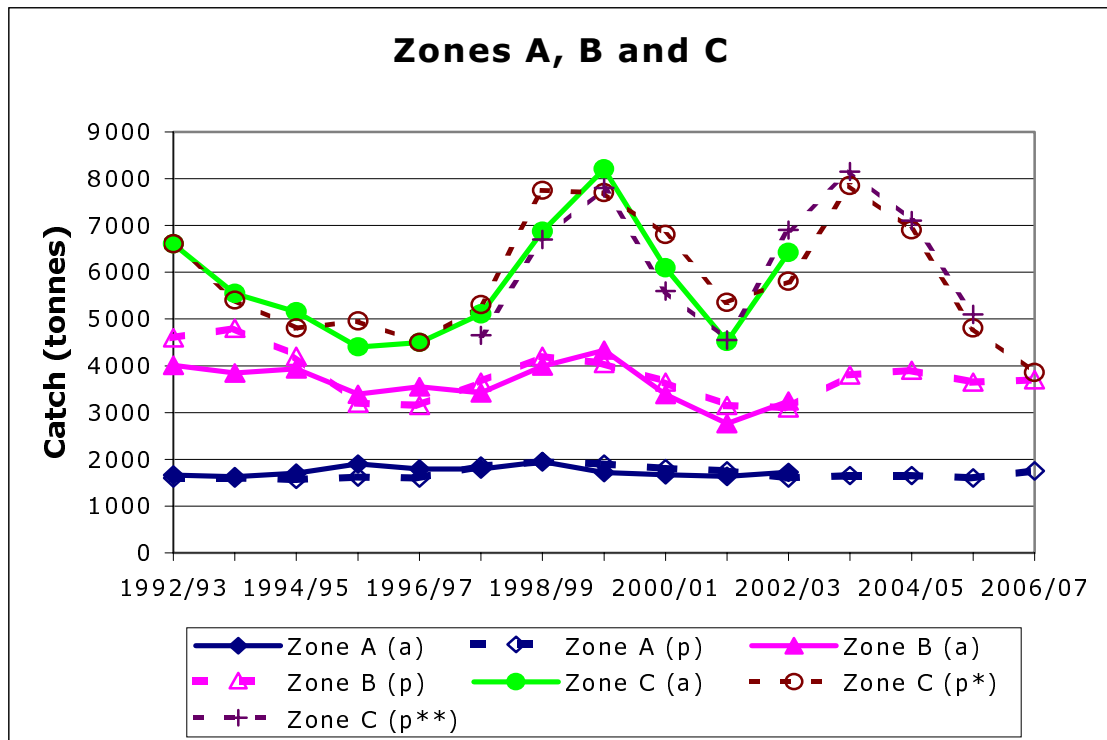


Figure 20: Predicted commercial catches of rock lobster by zone to 2006/07 for the Western Rock Lobster Fishery based on puerulus settlement three to four years earlier.

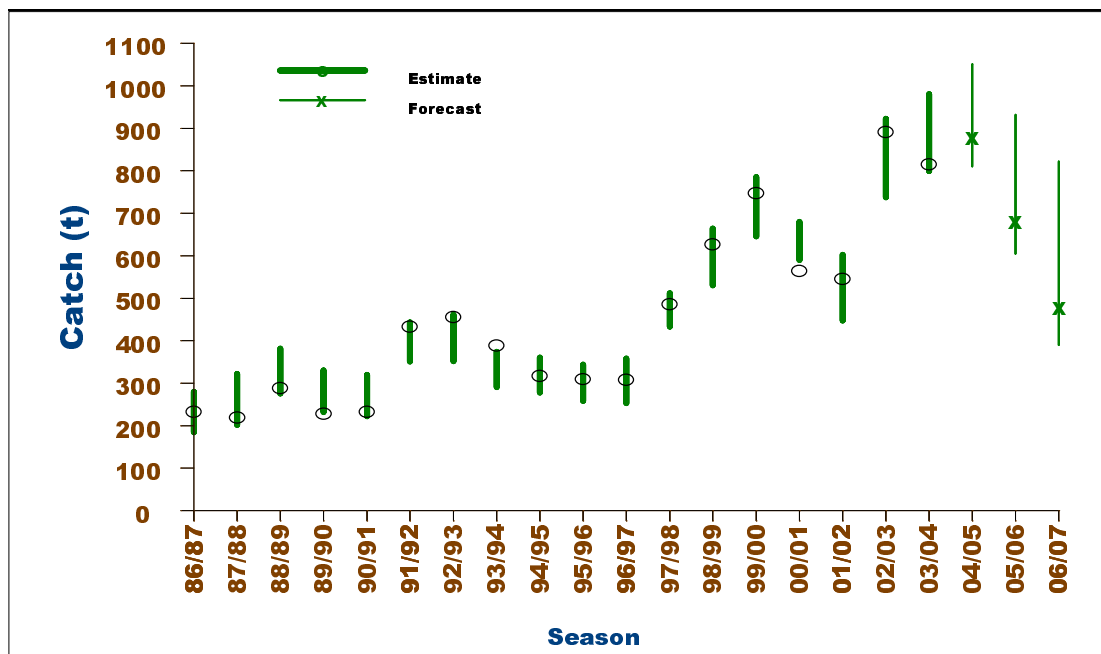


Figure 21: Estimates of the recreational rock lobster catch since 1986/87 using mail survey results, and model forecast of catches in 2004/05 based on puerulus settlement three to four years earlier and expected licence usage.

The predicted recreational catches, based on the natural variations in recruitment and projected recreational licence numbers over the next three years (Figure 21) are 900 t (2004/05), 700 t (2005/06) and 500 t (2006/07). Noting that the northern zones (A and B) are expected to continue at about 100 tonne per year, recreational fishers in the southern half of the fishery (Zone C), predominantly along the metropolitan coastline, can expect to catch 800 t, 600 t and 400 t over each of the next three years.

Based on predicted catches for recreational fishing, estimates could be made for the customary fishing sector as shown in Table 10.

Fishing Year	Predicted Total Recreational Catch (tonnes)		Predicted Indigenous Catch (1.7%) (tonnes)	
	Zone A/B	Zone C	Zone A/B	Zone C
2004/05	100	800	1.7	13.6
2005/06	100	600	1.7	10.2
2006/07	100	400	1.7	6.8

Table 10: Predictions of recreational and indigenous take of western rock lobster by zone for the years 2004/05 to 2005/06.

Given the sustainable harvest level ranges above, a 10-year average commercial catch of 11,400 tonnes, trends in recreational catches, known puerulus settlement and known rates of exploitation, it is possible to predict harvest levels for each sector and zone with approximately 95% confidence.

Summarised in tabular form, the best estimates of predicted harvest levels for the fishery by zone are as set out in Table 11.

	Zone A			Zone B			Zone C			Totals			
	Rec	Com	Total	Rec	Com	Total	Rec	Com	Total	Rec	Com	Total	
2000/01	Incl in B	1 672	1 672	100	3 504	3 604	464	6 089	6 553	564	11 265	11 829	
2001/02	Incl in B	1 634	1 634	100	2 815	2 915	445	4 517	4 962	545	8 966	9 511	
2002/03	Incl in B	1 713	1 713	100	3 254	3 354	791	6 420	7 211	891	11 387	12 278	
2003/04	Incl in B	1 884	1 884	100	3 520	3 620	715	8 160	8 875	815	13 564	14 379	
		Predicted harvest level			Predicted harvest level			Predicted harvest level			Predicted harvest levels		
2004/05	Incl in B	1 650	1 650	100	4 100	4 200	800	6 900*	7 610*	900	12 650*	13 550 *	
								7 100**	8 051**		12 850**	13 750**	
2005/06	Incl in B	1 650	1 650	100	3 750	3 850	600	4 800*	5 304*	700	10 200*	10 900*	
								5 100**	6 032**		10 500**	11 200**	
2006/07	Incl in B	1 750	1 750	100	3 800	3 900	400	3 850*	4 140*	500	9 400*	9 900*	
								4 300**	5 022**		9 850**	10 350**	

Table 11: Predicted Harvest Levels of Western Rock Lobster by Zone - recorded commercial and recreational catches for western rock lobster from 2000/01 to 2003/04 and predicted harvest level range 2004/05 to 2006/7.

Predicted catches based on sampling at Alkimos* and all sites **

Section 9 Impacts of Fishing

9.1 Ecological impacts

A full examination of the ecological impacts of the WRLMF can be found in the “Application to Environment Australia on the Western Rock Lobster Fishery” (October, 2001). A summary and update of that analysis follows.

9.1.1 On primary species

The ecological impacts of fishing on the western rock lobster itself are very low. Management measures are in place to maintain the breeding stock at or above 20% of the unfished parental biomass. Based on a preliminary assessment of available data in the Dongara region, the total biomass of lobsters in this region is estimated to be at least 80% of unfished levels due to the high abundance undersize and protected mature females (Phillips et al, 2003).

The fishery, comprising 76mm to 105mm sized animals north of 30 degrees and 76mm to 115mm sized animals south of 30 degrees, as a whole targets only a small percentage of the total number of lobsters that live in the area of the fishery. In fact, with controls on taking breeding females, etc, the fishers only keep about 70-80% of the lobsters available within the size range of the commercial fishery. The result is that the commercial fishery takes only about 10-20% of the total biomass of lobsters in the water (the model assumes mean weights for each size class, allowing conversion of numbers to weight, or biomass). There are a large number of lobsters under 76mm that are protected and a smaller number over 105/115mm also protected. Together this number remaining would be at least 80% of the total number of lobsters living in the area of the fishery.

Sources of fishing mortality on rock lobster include fishers not returning protected lobsters to the water quickly enough after capture; leg loss of protected lobster (which increases the chance of mortality and reduces their ability to breed and reduced growth); and consumption of returned lobsters by seals and sharks (which follow the fishing boats).

9.1.2 On byproduct species

The main byproduct species are octopus, finfish and sharks in pots, and deep sea crabs.

Octopus is a predator of lobster and hence is attracted to the pots holding the lobsters. Once used for bait or discarded, a market has developed and interest in octopus fishing has increased by both recreational and commercial fishers. Although catches are being monitored to ensure numbers of octopus being taken does not rise substantially, it is unlikely this fishing activity will impact greatly on the overall sustainability of octopus stocks. This is based on the short lifecycle of the octopus and the limited range of fishing compared to the extensive range of the species.

There is no record of the finfish and sharks taken in pots as these are given to the crew, eaten, sold (and recorded with wetline catch) or used as bait. The introduction of escape gaps in the 1960s will have reduced the number of fish caught, although fish will continue to be attracted to the pots by the bait. Anecdotally, the percentage of fish in the total catch is small; and retention of fish by rock lobster fishers will be addressed as part of the review of wetline fishery.

Deep sea crab species taken by rock lobster fishers include spiny crab, king crab and snow crab. The core populations of these generally live in water deeper than that in which the rock lobster fishery operates, however some crabs are taken and, in times of low lobster catches, have been targeted. There is no limit on the numbers of deep sea crabs that rock lobster fishers can take however a trip limit of 12 deep sea crabs has been approved by the Minister and will take effect once legislated.

9.1.3 On non-retained species

Non-retained species include those captured in the pots and those impacted by the fishing activity. The main species identified as being at risk from capture are seals and sea lions and moray eels. Entanglement in pot rope and floats is occasionally recorded in relation to leatherback turtles, whales and dolphins, and mantra rays.

The main interactions with seals and sea lions would be pups being caught and drowned in pots whilst trying to take bait and lobsters; and the snaring of sea lions by discarded plastic bands from bait boxes. The first only occurs when pots are set in depths of less than 20m within about 15 km of islands where sea lions breed and is being monitored. Modifications to pots are being tested by industry to eliminate pups from entering the pots. The latter is being addressed through ongoing research and education.

Moray eels are captured by pots on a regular basis and are returned live to the water.

Leatherback turtles become entangled in rock lobster pot ropes or are struck by the fishing boats, consistently but in low numbers (1-2 cases a year). Similarly entanglement of whales in rock lobster ropes has been recorded. Dolphins are at risk of injury from boats and gear as they follow boats hoping for discarded bait. Mantra rays have also known to become entangled in ropes; however there have been no recorded deaths from this entanglement. Monitoring and recording of incidents for all these species now occurs regularly and any increase would trigger further management action.

9.1.4 On the general environment

The general environmental impacts and associated risk assessments, developed through the ESD risk assessment process for the rock lobster fishery, are summarised in Table 12.

ISSUE	RISK	SUMMARY JUSTIFICATION
Trophic structure (both higher and lower) affects	LOW	The total biomass of lobsters <i>in inshore areas</i> remains >80% of unfished levels. There are no identified, nor suspected, strong trophic interactions associated with rock lobsters in WA ¹⁰ .
Ghost fishing	LOW	Pots have escape gaps, designed to disintegrate if left for long periods Surveys have found no lobsters in lost pots.
Impacts on benthic communities types:		
Coral reefs	MOD	Assessment of potting activities indicates only a low level of potting in highly sensitive areas.
Limestone reefs	LOW	Less than 1 in 10000 chance of an area of reef even being hit by any pot per year.
Seagrass	LOW	Pots will not impact seagrass using overnight sets
Impacts of bait usage	LOW	Previous assessment (Jones and Gibson 1997) found this risk to be low
Impacts on bird and dolphin behaviour	LOW	Dolphin feeding is now illegal; birds are only present part of season.
General impacts on air and water quality	LOW	Fuel-efficient boats are used, code of conduct re handling of waste in use.
Impacts from camping on Abrolhos Islands	LOW	Future action as partnership between industry and government will eliminate most waste disposal issues.

Table 12: Summary of risk assessment outcomes for environmental issues related to the WRL fishery.

9.2 Socio-economic impacts

9.2.1 *The commercial fishery*

A socially sustainable community needs economic security. One of the problems with achieving this social outcome is that economically efficient outcomes are achieved within a market that discounts the future. This means today's decisions show preference to today's markets and hence future generations and all other species are crucially affected by the choices fishers make today (Lowe, 2002).

¹⁰ The risk of the ecological effect of fishing is being re-evaluated with further information to be obtained through a FRDC funded project, currently underway.

Like most agricultural produce, rock lobster is subject to a long-term cost price squeeze as costs increase at a greater rate than prices obtained on the commodity market. This squeeze will force the industry to continue rationalization of the fleet.

The trend of decreasing fleet size and therefore increased numbers of pots on vessels has prevailed over an extended period of time. This trend has and may continue to impact on regional coastal communities through reduced employment and other flow on effects that are associated with regional communities.

There has been a considerable increase in the value of fishery entitlements over an extended period of time (although more recently the short term trend has been stable or decreasing). Increased capital wealth and reasonable return on investment from the capital have resulted in the development of many regional coastal communities build on lobster fishing.

9.2.2 The recreational fishery

The Western Australia population is both increasing and aging. There is increased leisure time and spending on leisure activities and coastal development is spreading the population. The number of recreational rock lobster licences bought is increasing each year.

The result is increasing fishing pressure on the available rock lobster resource, mainly in the metropolitan area and surrounding regional holiday destinations.

9.3 Social impacts

With population increasing in Western Australia, more people are becoming involved in recreational fishing. Management of fisheries within specific allocations is likely to have a number of social implications.

As recreational fishers tend to fish either close to home or to a tourist destination, fishing-based tourism may become more localised. This is even more likely to be the case if oil prices continue to rise and people respond by holidaying at home rather than in the regions.

From a commercial fishery perspective, rationalisation of the commercial fleet is likely to have significant social implications given that there are major regional towns built on the back of the rock lobster industry.

Should these happen, regional coastal towns may require a shift in economic base, as did logging towns with decrease in forestry activity.

Finally, there is a trend nationally and internationally to stronger conservation values in the community and this is likely to impact on fishing activities, especially inshore fishing that occurs within the view of the general public.

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Appendix 1: Chronology of Management for the WRLMF

- 1897 Legal minimum size (2 3/4 inches from rear of rostral horns to rear of carapace)
- 1899 Prohibition on landing berried females (females carrying eggs)
- 1960 Introduction of zones (28°-30°S), (30°S-33°S), Abrolhos (28°S 113°E to 28°S 113°50'E to 30°S 114°40'E to 30°S 113°E), freezer-boats restricted to north of 28°S and south of 33°S
- 1960 Seasons were Abrolhos March 1-August 14; 26°-30°S open all year; 30°- 33°S November 15 -August 31.
- 1961 Seasons were the same except for 26°-30°S September 15 -August 14
- 1961 Legal minimum size (3 inches front of ridge joining horns to rear of carapace)
Legal minimum length for detached tail (5 3/4 inches) and legal minimum weight for detached tail (5 oz)
- 1962 Abrolhos zone northern and southern boundary shifted half a degree north now 27°30'S 113°E to 27°30'S 113°37'E to 29°30'S 114°30'E to 29°30'S 113°E
- 1963 Limited entry introduced, which limited the number of vessels operating between 24°S and 34°S and restricted the number of pots to 3 per foot length of registered length with a maximum of 200 pots.
Season for waters between 24° and 34°S November 15 -August 14 commencing 1963/64.
- 1964 Introduction of an amateur fisherman's licence
- 1965 Introduction of a boat replacement policy where boats larger than 25 feet to be replaced by a vessel of the same surveyed size,
- 1965 Introduction of a single escape gap not less than 12 inches in length and 2 inches in width
- 1969 Introduction of a mile limit from the main land from 5 miles north of Green Head extending to 22 miles south of Cape Bouvard in which the taking of lobsters by any means banned from January 1 - November 14.
- 1971 Pot redistribution alterations removed 14 freezer boats from the industry.
- 1972 Creation of a zone south of 33°S with historical access only.
Closed season (for all rock lobster species) between August 15 and November 14 extended to all waters of W A (previously related to area between 24°S and 34°S).
The rock lobster fishery area defined as between 21°44'S to 34°24'S
ESCAPE GAP width increased from 2 inches (51 mm) to 54 mm and required compliance with construction specifications.
- 1973 The mile limit rescinded.
Change to metric system.
Taking of lobsters by commercial fishers in Rottnest closed area extended from November 15 to December 31 to November 15 to January 15.
- 1974 Rottnest closed area closed to all commercial rock lobster fishing, 1978 Season shortened by 6 weeks commencing 1977/78.
Fishing season from November 15 to June 30 (Abrolhos March 15 to June 30).

1979 Boat replacement policy altered by introduction of a formula to establish a minimum and maximum overall length for replacement vessels based on pot entitlement.

1981 Baited rock lobster pots may not be set before 0600 hours on March 14.

In Coastal waters, Abrolhos fishers required to fish deeper than 20 fathoms during March 1-14.

New regulations controlling the size and design of rock lobster pots (maximum internal length or diameter 1 metre and one entrance on upper surface of pot).

1985 Alteration to size and design of pot-length of batten pot 915 mm, width at base max. 800 mm width at top max 540 mm and max height. 420 mm; diameter of beehive pot 925 mm, and pot height max. 420 mm.

All illegal lobsters to be returned to the sea within 5 minutes of being brought aboard to reduce mortality of these lobsters particularly undersize.

1986 Temporary 10% pot reduction for 1986/87 season.

Boat replacement policy altered so that replacing a vessel less than 6 years old would attract a 5% reduction in pot allocation.

Pots required to be fitted with three or four escape gaps (54 mm x 305 mm each) commencing 1986/87.

1987 Offshore Constitutional. Settlement saw management responsibility for the rock lobster fishery in Commonwealth waters to the 200 mile limit transferred from the Commonwealth to the State.

Permanent pot reduction of 2% per year for 5 years commenced (final reduction in 1991/92).

Southern boundary of western rock lobster fishery amended to a line due south of Cape Leeuwin to 34°24'S.

1990 The southern boundary of C zone at 33°S was removed and extended to the southern boundary of the fishery. The remaining zone D and E fishers were issued with C zone licences

Foreign ownership in the rock lobster processing sector limited to a maximum of 20%.

1991 Big bank area closed from 1200 hours January 1 to 1200 hours on February 10 next.

1992 For reasons of breeding stock conservation – a new package of rules. Both north and south of 30°S latitude there was a prohibition on the retention of female western rock lobsters greater than 115 mm carapace length; prohibition of setose and tar-spot lobsters from November 15 to February 28 inclusive; night restriction on pulling of pots in winter 1800 - 0600 and in summer 1800 - 0430. In addition, A and B zone boats had a summer closure from January 10 to February 9 inclusive while C zone boats nominated a "landing zone",

Boats nominate to fish in the BIG BANK region.

1993 Change of government and another new package of rules where full protection of setose and tar-spot lobsters was enforced all season; a temporary 18% pot reduction in all zones; the minimum legal size was increased from 76 mm to 77 mm for the period November 15 to January 31 thereafter it reverted to 76 mm; the taking of female rock lobsters greater than 115 mm south of Wedge Island and 105 mm north of Wedge Island was prohibited; summer night pulling restrictions eased to 1930-0430.

1995 *Fisheries Act 1905* repealed and replaced with *Fish Resources Management Act 1994*.

Boat replacement policy 5% loss of pots with a replacement of a vessel less than 6 years old was repealed.

1997 The boat replacement policy was altered to remove the “7 and 10 rule”. This rule established the minimum and maximum overall length of a replacement vessel based on pot entitlement.

The maximum size rule was altered to implement a prohibition on the retention of all female rock lobsters greater than 105 mm and greater than 115 mm respectively north and south of 30°S.

2000 “Licence creation” and “retirement” provisions introduced. Licence creation allows new MFLs to be issued to fishers who the minimum required number of pots and an FBL. Retirement allows fishers to retain an inactive MFL and FBL package with less than the minimum requirement, ie it must have between one and 62 pots.

2001 The use of bait with hair or fur prohibited.

The taking of oversize, non-setose female rock lobsters allowed for the 2001/02 season only, then re-instated.

2003 The maximum pot allocation of 150 repealed

Appendix 2: Commercial catch and effort figures

Figure 2.1: Commercial catch of western rock lobster by zone 1980/81 to 2003/04

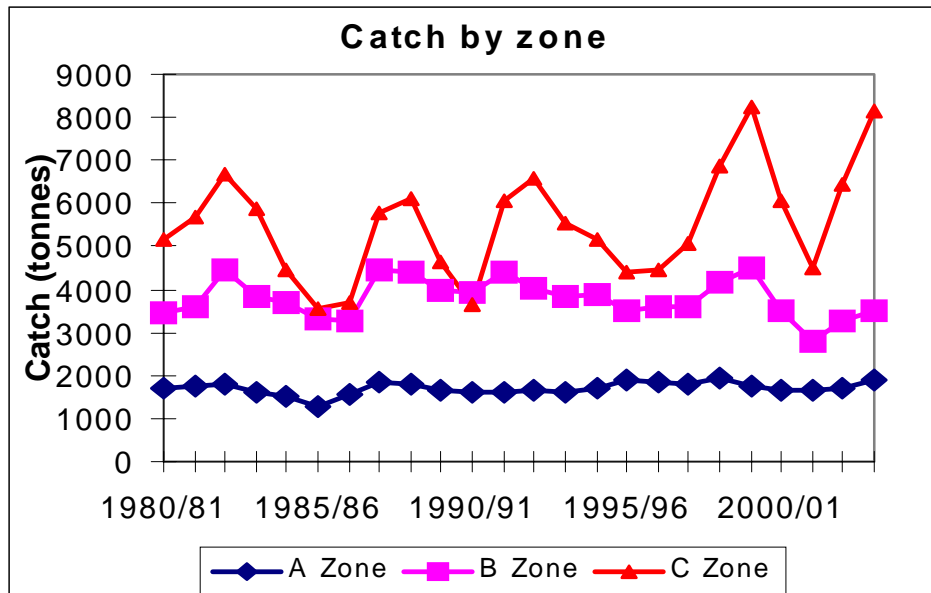
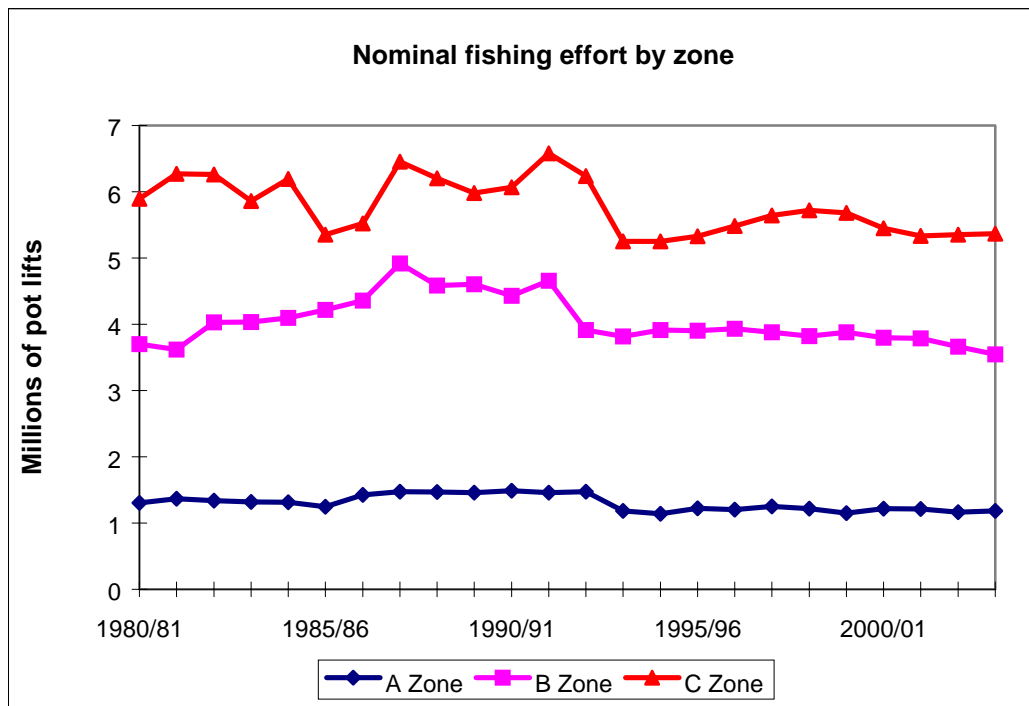


Figure 2.2: Nominal commercial fishing effort on western rock lobster by zone



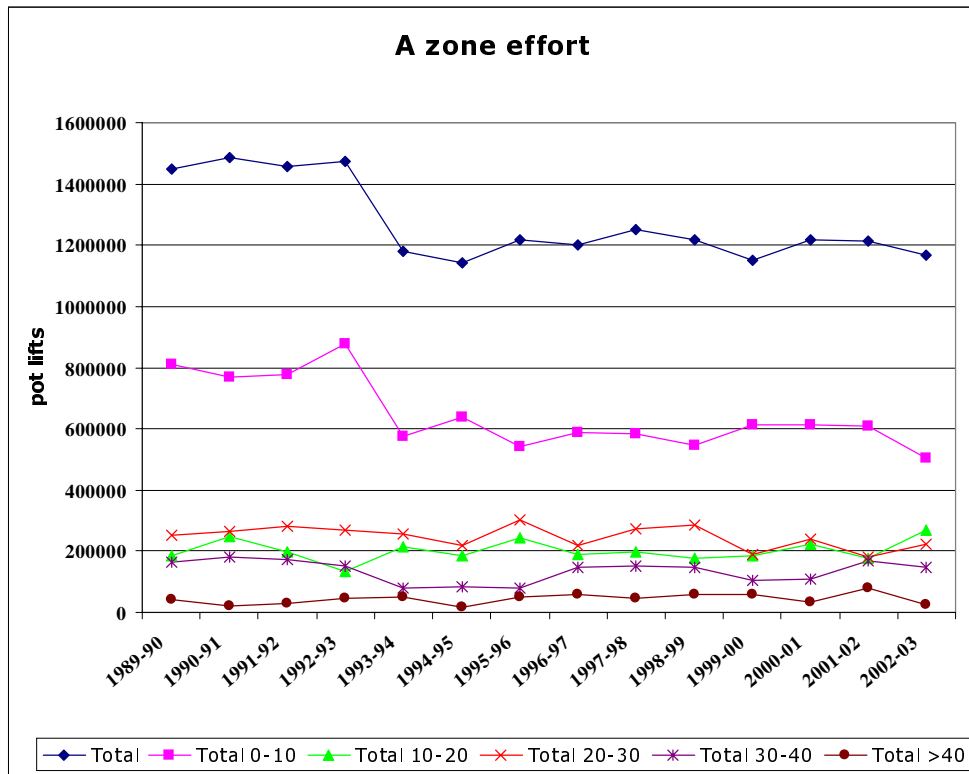


Figure 2.3: Number of pot lifts by depth (fathoms) for Zone A in the Western Rock Lobster Fishery, 1989/90 to 2002/03.

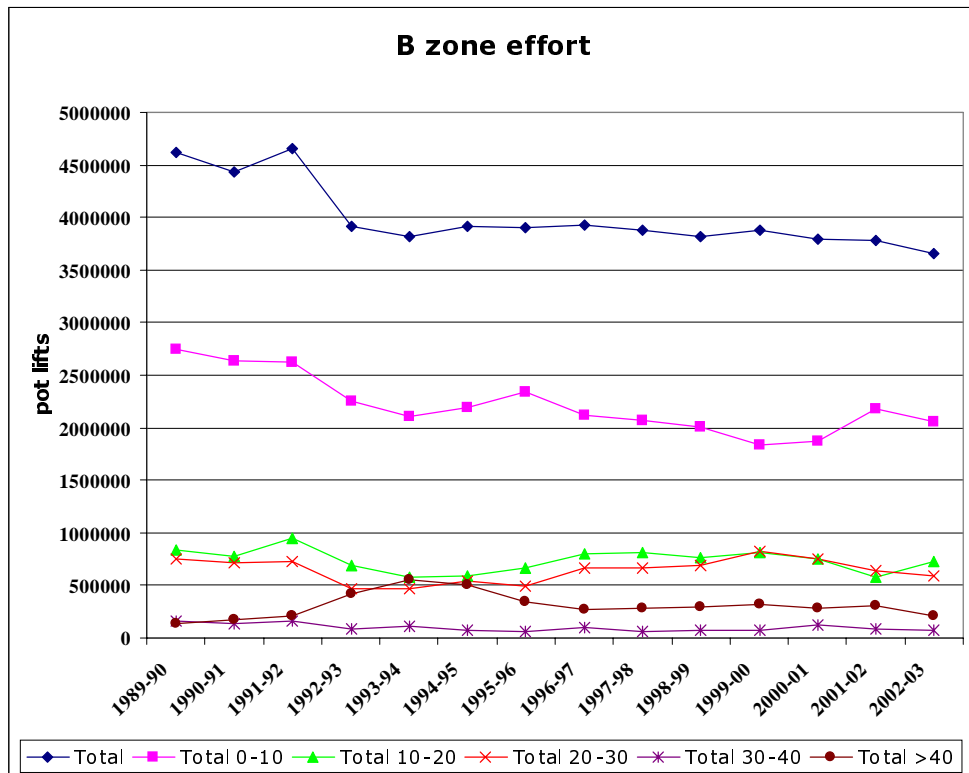


Figure 2.4: Number of pot lifts by depth (fathoms) for Zone B in the Western Rock Lobster Fishery, 1989/90 to 2002/03.

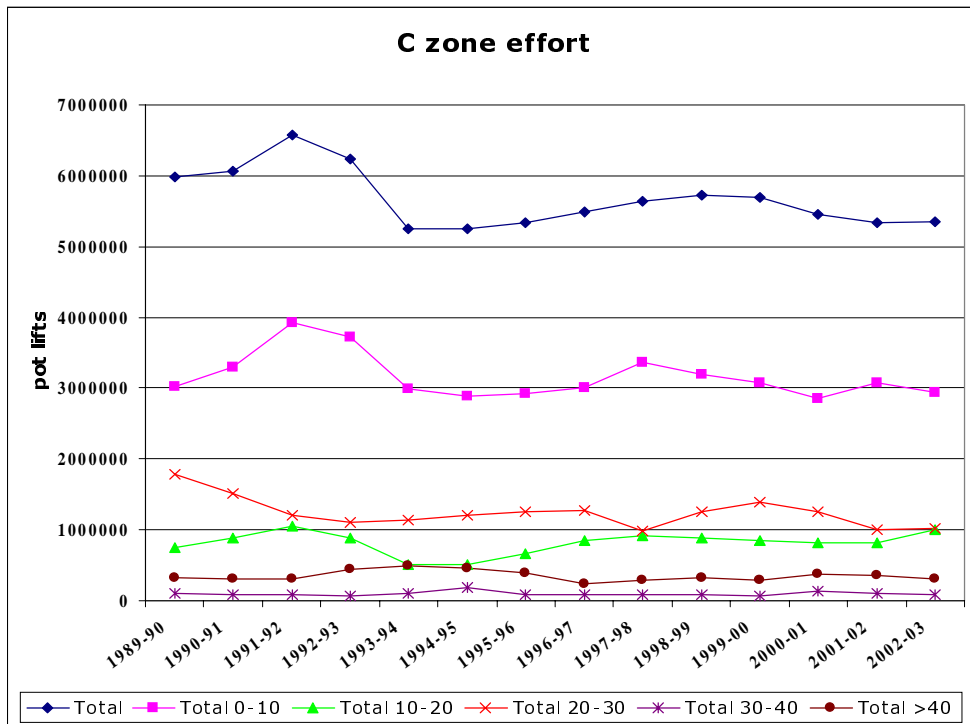


Figure 2.5: Number of pot lifts by depth (fathoms) for Zone C in the Western Rock Lobster Fishery, 1989/90 to 2002/03.

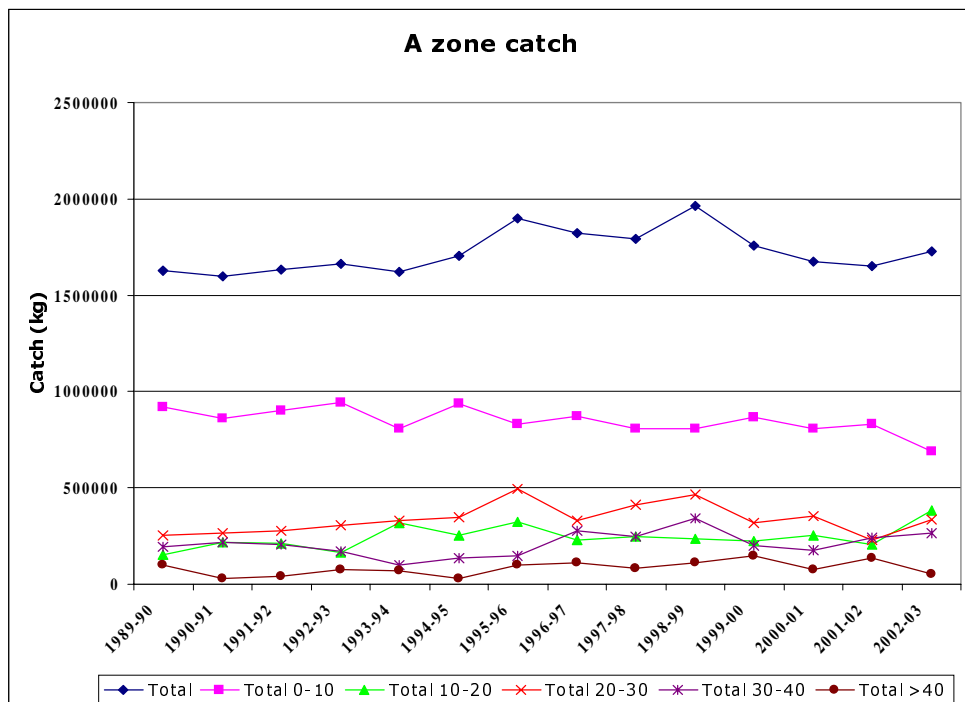


Figure 2.6: Catch (kgs) by depth (fathoms) for Zone A in the Western Rock Lobster Fishery, 1989/90 to 2002/03.

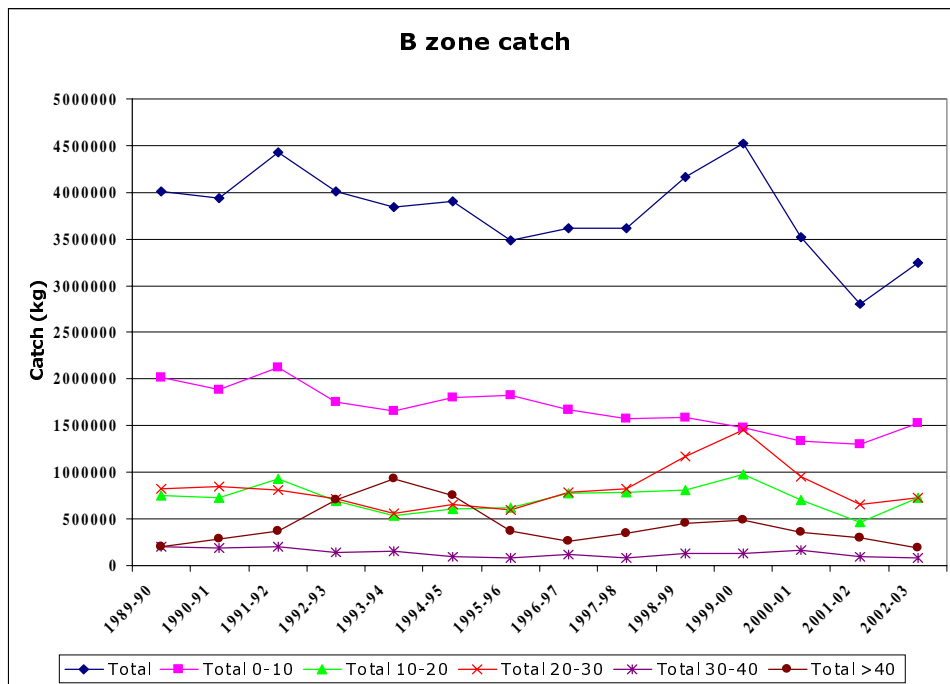


Figure 2.7: Catch (kgs) by depth (fathoms) for Zone B in the Western Rock Lobster Fishery, 1989/90 to 2002/03.

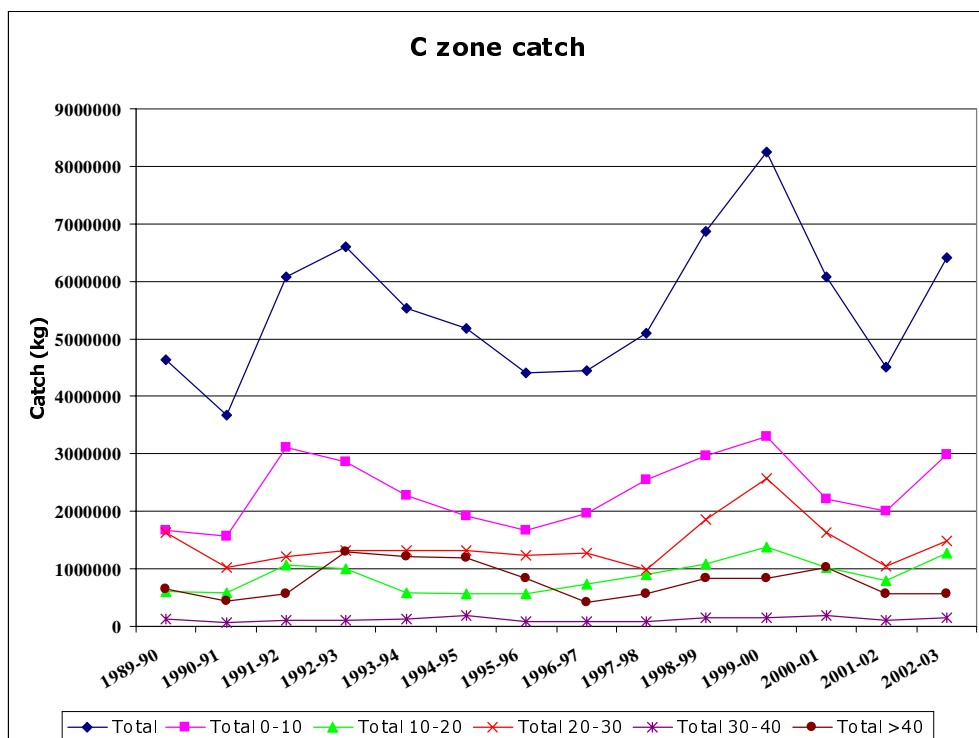


Figure 2.8: Catch (kgs) by depth (fathoms) for Zone C in the Western Rock Lobster Fishery, 1989/90 to 2002/03.

Appendix 3: Recreational fishing catch and effort data

Figure 3.1: The percentage of recreational dive fishers who fish for rock lobster across various numbers of days and the amount of the total dive catch from the fishery taken during those number of days for the total Western Rock Lobster fishery, using returned surveys from the 2002/03 recreational western rock lobster annual mail survey

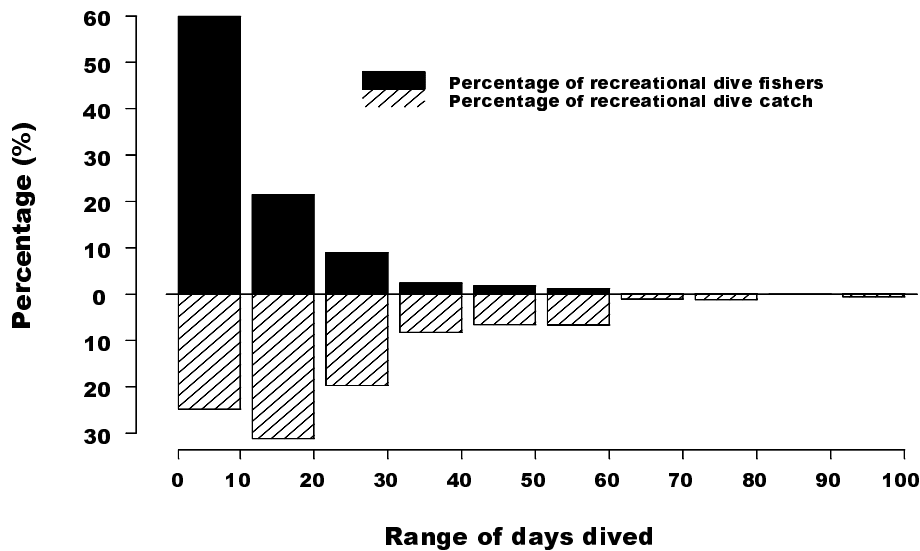
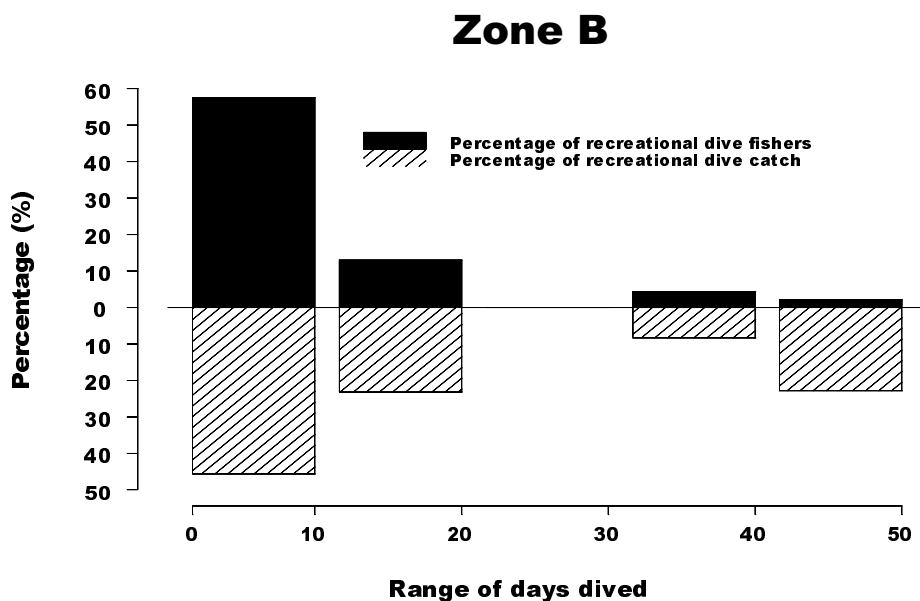


Figure 3.2: The percentage of recreational dive fishers in Zone B who fish for rock lobster across various numbers of days and the amount of the total dive catch from Zone B taken during those number of days, using returned surveys from the 2002/03 recreational western rock lobster annual mail survey.



Zone C

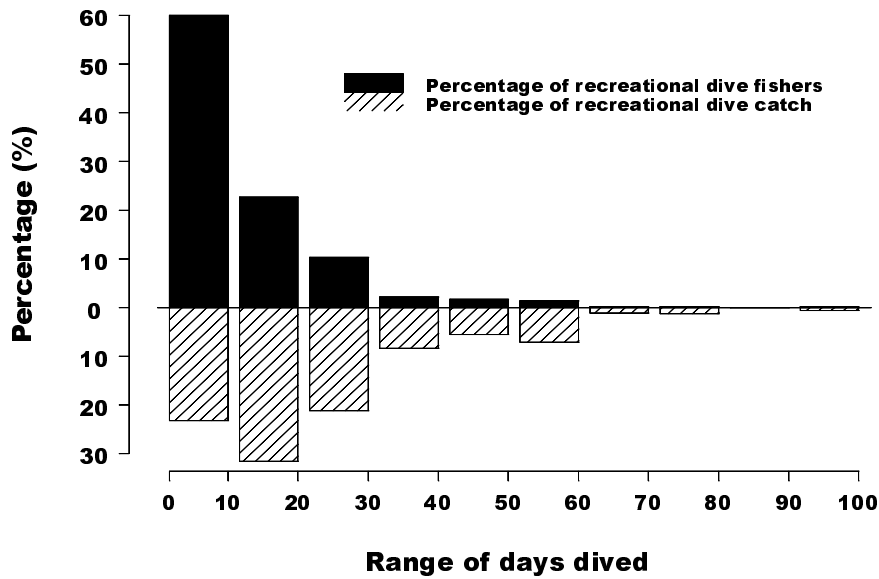


Figure 3.3: The percentage of recreational dive fishers in Zone C who fish for rock lobster across various numbers of days and the amount of the total dive catch from Zone C taken during those number of days, using returned surveys from the 2002/03 recreational western rock lobster annual mail survey.

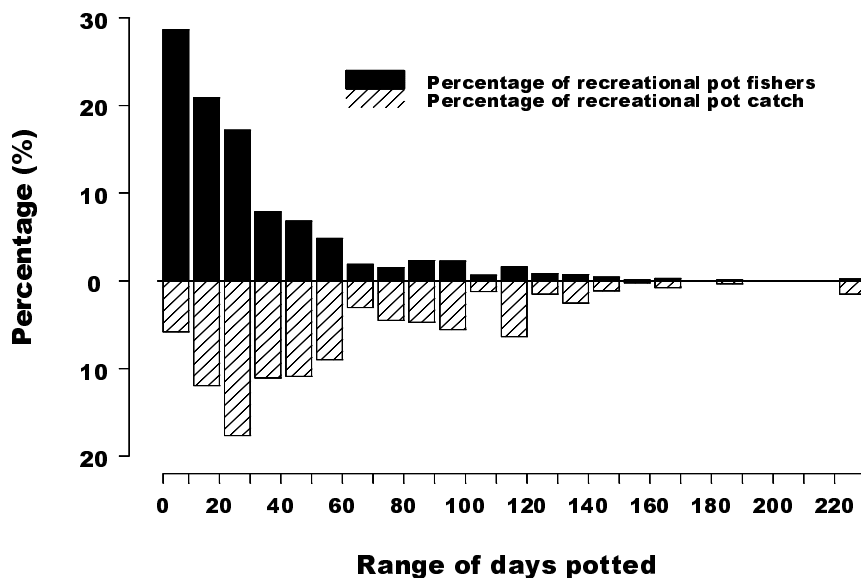


Figure 3.4: The percentage of recreational pot fishers who fish for rock lobster across various numbers of days and the amount of the total pot catch from the fishery taken during those number of days for the total Western Rock Lobster fishery, using returned surveys from the 2002/03 recreational western rock lobster annual mail survey

Zone B

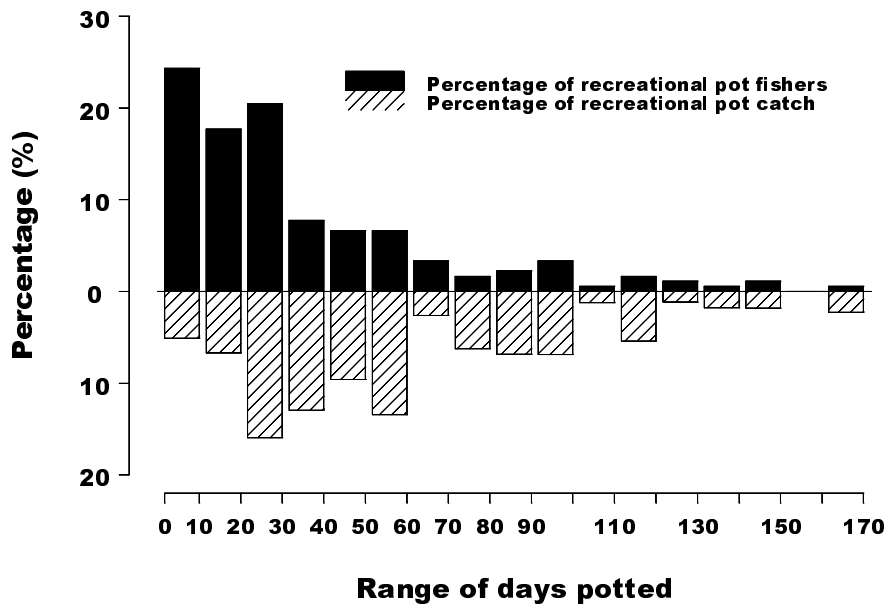


Figure 3.5: The percentage of recreational pot fishers in Zone B who fish for rock lobster across various numbers of days and the amount of the total pot catch from Zone B taken during those number of days, using returned surveys from the 2002/03 recreational western rock lobster annual mail survey.

Zone C

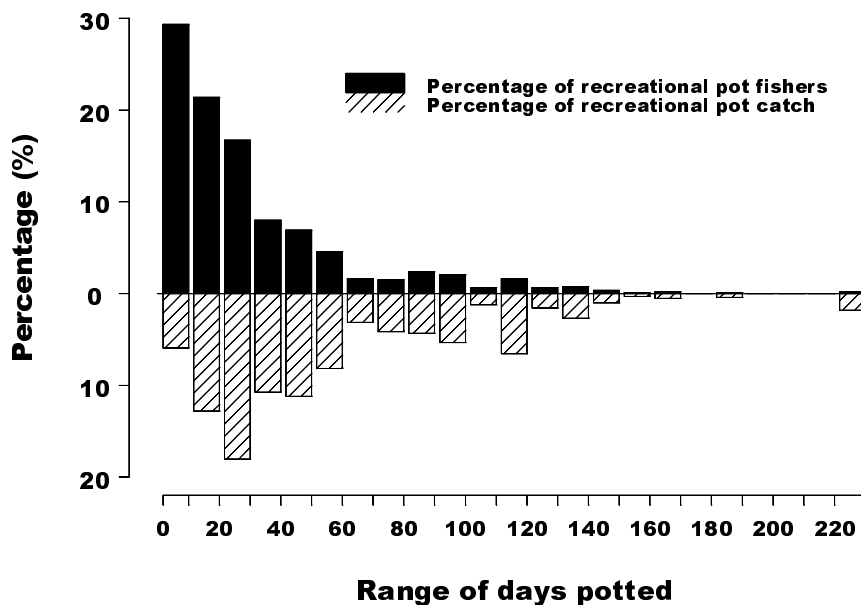


Figure 3.6: The percentage of recreational pot fishers in Zone C who fish for rock lobster across various numbers of days and the amount of the total pot catch from Zone C taken during those number of days, using returned surveys from the 2002/03 recreational western rock lobster annual mail survey.

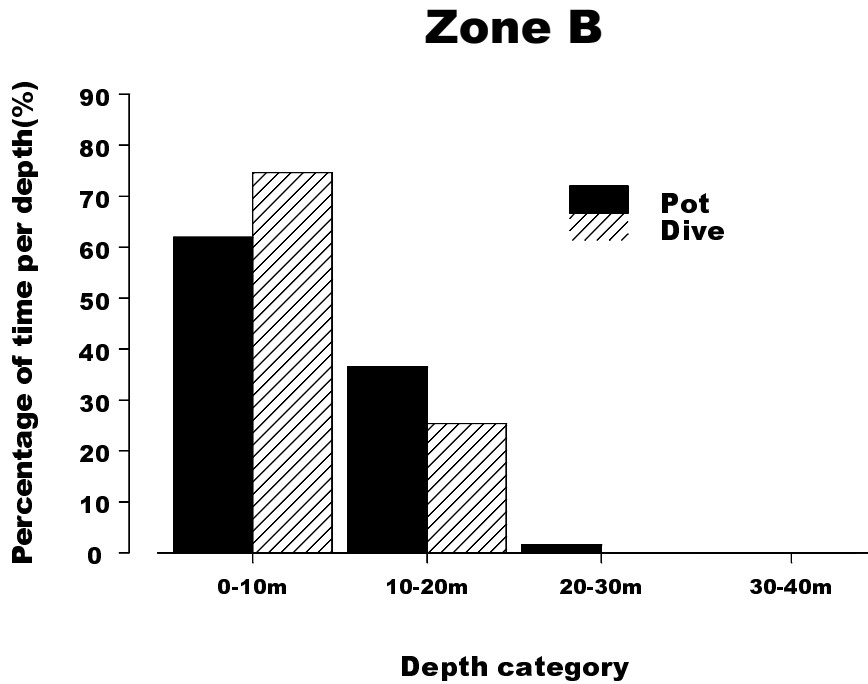


Figure 3.7: The percentage of time that recreational pot and dive fishers who fish for rock lobster in Zone B spend at each depth range, using returned surveys from the 2002/03 recreational western rock lobster annual mail survey

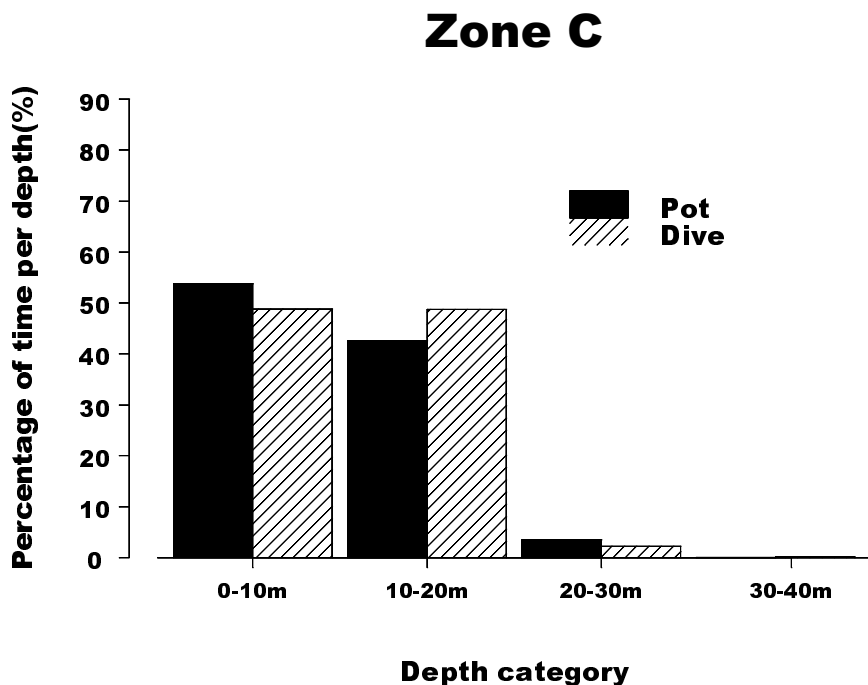


Figure 3.8: The percentage of time that recreational pot and dive fishers who fish for rock lobster in Zone C spend at each depth range, using returned surveys from the 2002/03 recreational western rock lobster annual mail survey.

Figure 3.9: The percentage of time that recreational pot and dive fishers who fish for rock lobster in Zone B spend at each depth range, using returned surveys from the 2003/04 recreational western rock lobster annual mail survey

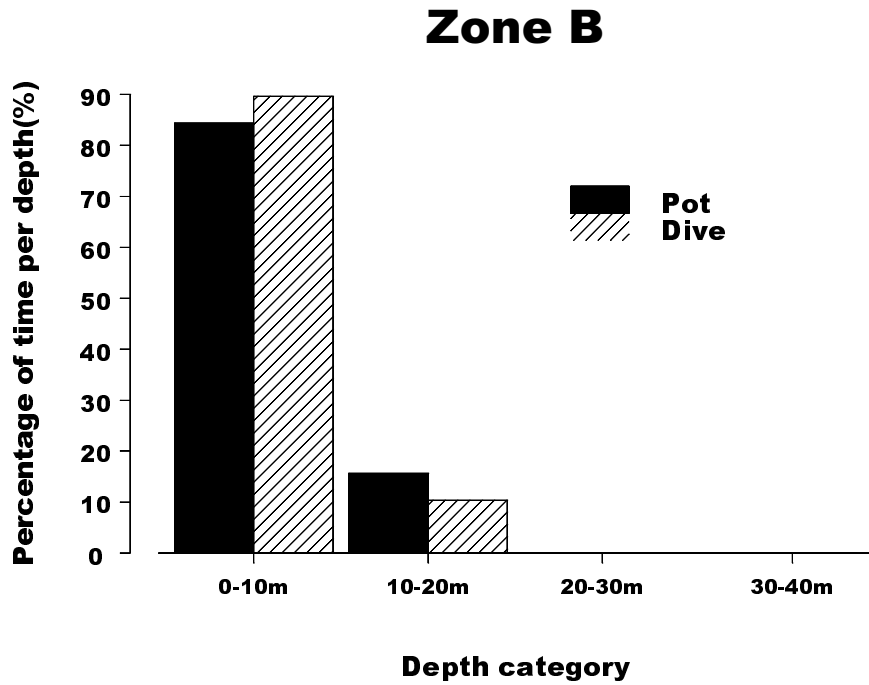


Figure 3.10: The percentage of time that recreational pot and dive fishers who fish for rock lobster in Zone C spend at each depth range, using returned surveys from the 2003/04 recreational western rock lobster annual mail survey

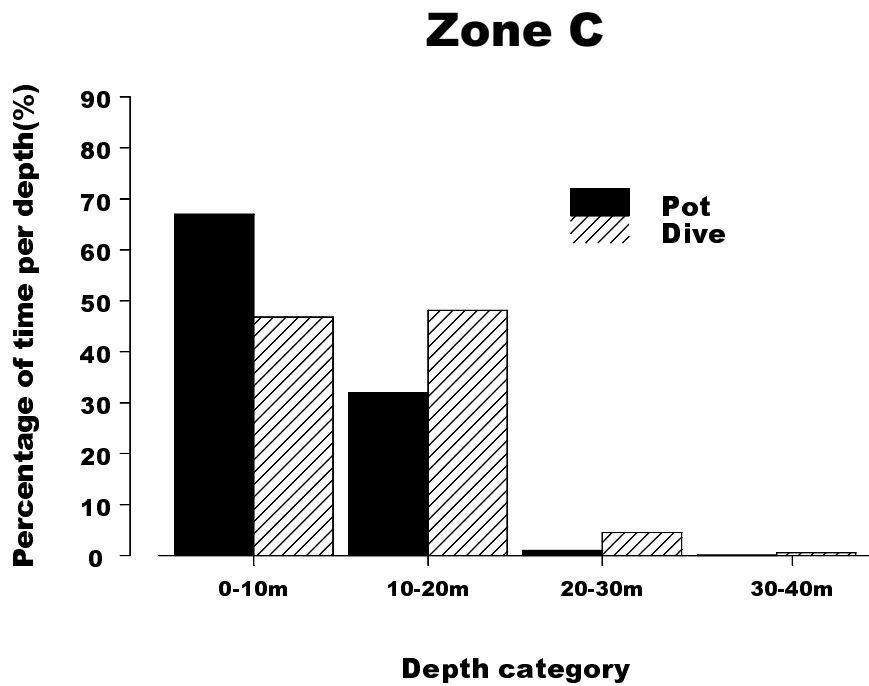


Figure 3.11: The percentage of recreational western rock lobster catch taken at each depth category for zone B during the season 2003/04.

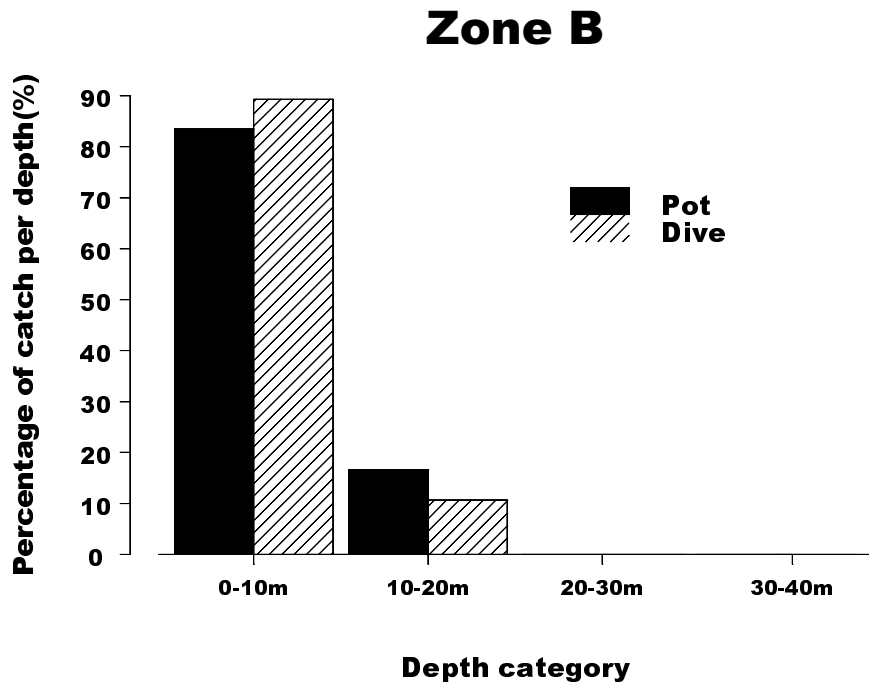
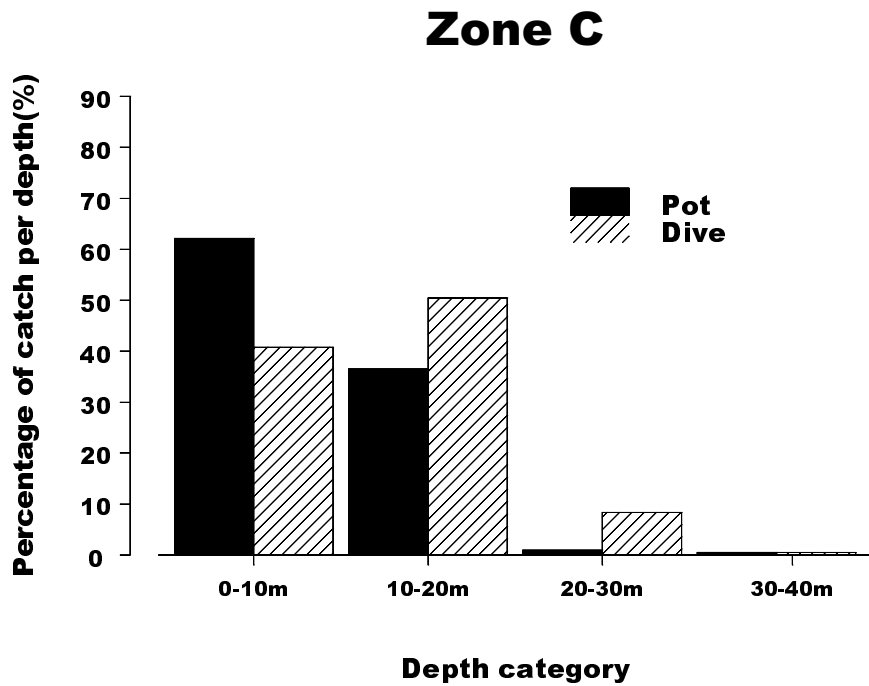


Figure 3.12: The percentage of recreational western rock lobster catch taken at each depth category for zone C during the season 2003/04.



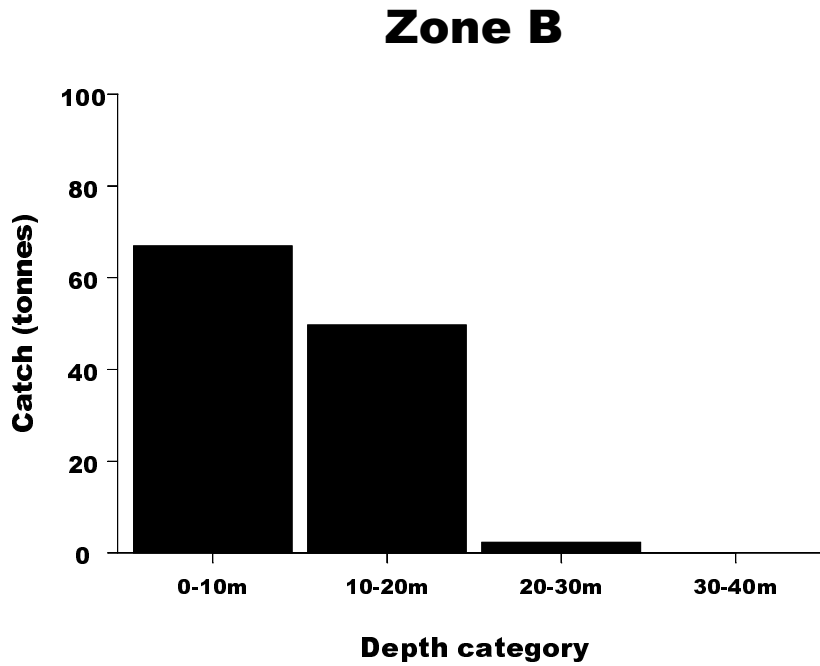


Figure 3.13: Recreational catch (tonnes) estimates for the 2002/03 season, by depth, for zone B, using returned surveys from the 2002/03 recreational western rock lobster annual mail survey.

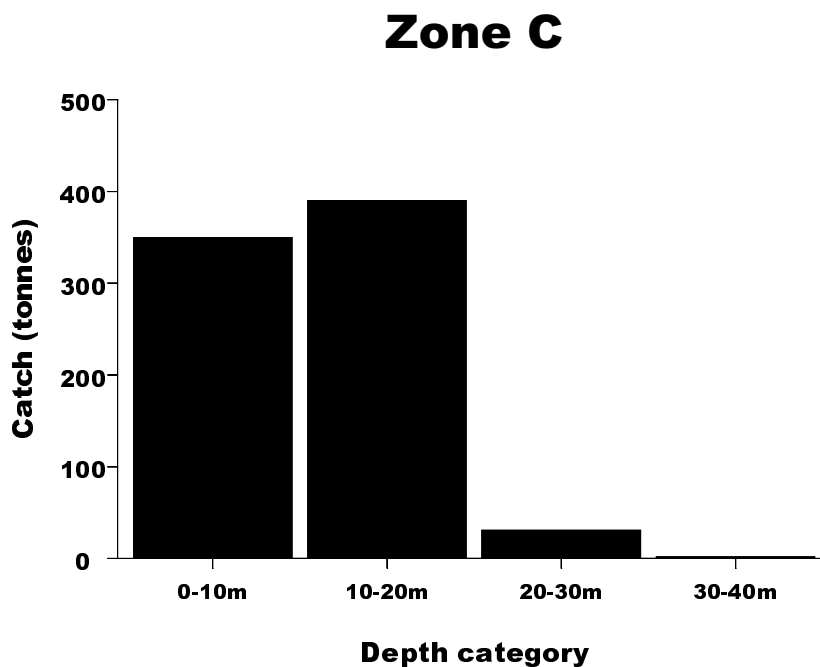


Figure 3.14: Recreational catch (tonnes) estimates for the 2002/03 season, by depth, for zone C, using returned surveys from the 2002/03 recreational western rock lobster annual mail survey.

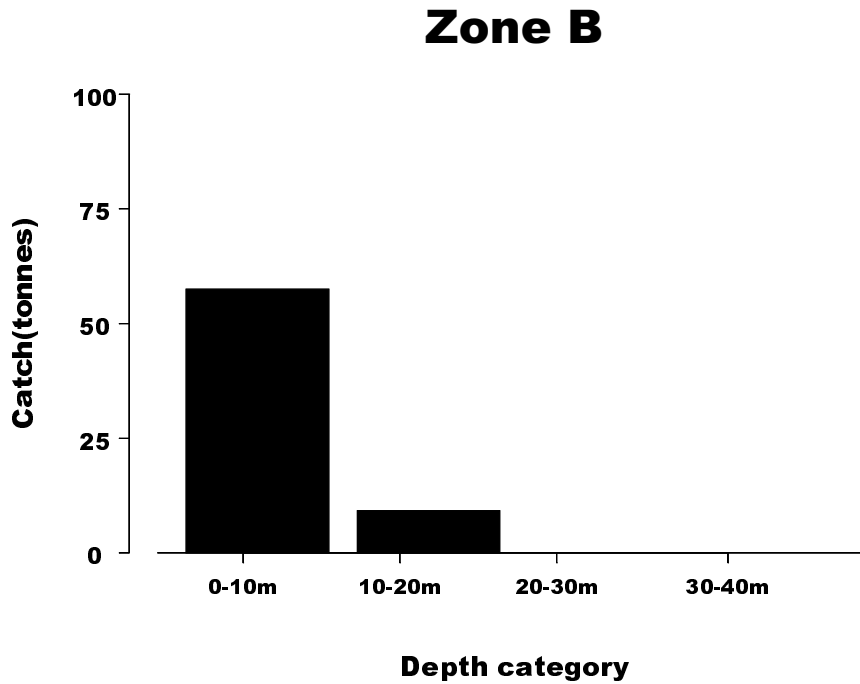


Figure 3.15: Recreational catch (tonnes) estimates for the 2003/04 season, by depth, for zone B, using returned surveys from the 2003/04 recreational western rock lobster annual mail survey.

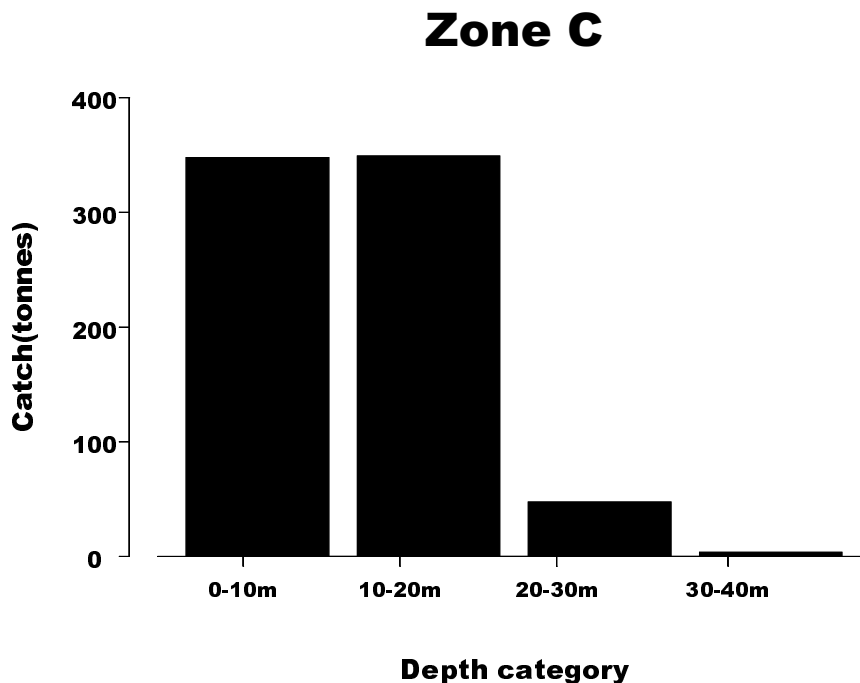


Figure 3.16: Recreational catch (tonnes) estimates for the 2003/04 season, by depth, for zone C, using returned surveys from the 2003/04 recreational western rock lobster annual mail survey.

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- No. 2** The Report of the Fish Farming Legislative Review Committee. Chairman P. Rogers (1986)
- No. 3** Management Measures for the Shark Bay Snapper 1987 Season. P. Millington (1986)
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- No. 5** The Windy Harbour - Augusta Rock Lobster Working Group. Interim Report by the Chairman A. Pallot (1986)
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