PROTECTING AND SHARING WESTERN AUSTRALIA'S COASTAL FISH RESOURCES

The path to integrated management

Issues and Proposals for Community Discussion

Fisheries Management Paper No. 135

FEBRUARY 2000

Protecting and Sharing
Western Australia's
Coastal Fish Resources

Final version: February 2000

Fisheries Management Paper No. 135
ISSN 0819-4327

Cover picture:

Sea surface temperature image courtesy
of Satellite Remote Sensing Services,
Department of Land Administration.

WA dhufish pictures by Fisheries WA.

FISHERIES WESTERN AUSTRALIA
3rd floor, SGIO Atrium
168 St George's Tce, Perth WA 6000

Contents

Contents

Executive Summary

Fisheries WA believes that the time has come to work towards integrated management of the State's precious coastal and estuarine fish stocks, and consider the broader issue of how these resources can be best managed and shared between competing users.

The principal objective of our charter – that we *conserve, develop and share the fish resources of the State for the benefit of present and future generations* – demands that we act now to develop a clear fisheries management framework to lead Western Australia into the 21st Century.

WA's rich and diverse marine fish stocks are still in good condition by world standards, but that fortunate situation will change over time if we fail to establish an effective basis for management which can meet the challenges of the next few decades.

The fisheries management framework of the 21st Century must not only be able to manage the level of exploitation by commercial and recreational fisheries, but also provide an agreed basis and process for changes in the way fish and aquatic resources are used and shared by this community.

There is a clear need to counter inevitable pressure on stocks from the impact of a growing population, increasing coastal development and the demands of various key user groups.

Unless we are proactive in dealing with the growing exploitation of fisheries along our State's vast 12,000km coastline, it will be difficult to sustain them for the future.

Future fisheries management must enable a big variety of interest groups – commercial, recreational, conservationist, Aboriginal and the wider community – to plan for the future.

How to protect *and* share fish stocks and other aquatic resources at the same time is a complex balancing act, with stakeholders demanding to be better informed and more involved in management.

There are also key questions which revolve around the extent to which government intervenes on behalf of the public, and the extent to which the public takes responsibilities for its own activities.

When intervention has been necessary, successive governments have done so with the primary objective of ensuring the sustainability of fisheries in the interests of the whole community, rather than particular groups or sectors.

The direction we take must lead to a fair and equitable allocation of the resource to all major users, and the best way to achieve this could well be to integrate management of the State's coastal fish stocks within one agreed framework.

It would be central to such a strategy to establish target catch shares for the commercial and recreational fishing sectors, and integrate the management of all interest groups.

Fisheries WA aims to lead the way towards this resource sharing and management goal, and recognises that it will not be a short journey.

Executive Summary

At this early stage our prime concern is to involve the public who, after all, must have a pivotal say in issues of such magnitude, given that our fish stocks are a common property resource. No individual owns them, everybody has a right to feel proprietary about their welfare and use, and the State looks after them on behalf of the community.

So public opinion and debate must be paramount in any new management approach, and Fisheries WA has undertaken this major review to encourage community discussion on a wide range of important proposals and strategies.

This discussion paper – ***Protecting and Sharing Western Australia's Coastal Fish Resources – the Path to Integrated Management*** – is bound to attract wide interest from all sectors involved in the use of our marine and estuarine fish stocks.

The discussion paper is intended to provide the historical, social and legal context in which any debate about the allocation of fish resources must occur, and also puts forward a range of proposals on the key issues associated with resource sharing that must be considered in the debate.

Catch sharing and resource allocation issues are examined in detail, and a series of important proposals are flagged along the way. These include managing fish stocks on the basis of six major biogeographic regions – four marine and two inland – covering the State; and establishing a peak Fish Resources Council to set long-term management direction and decide on catch shares and access entitlements.

Funding, too, is a key topic for discussion. Management changes of such dimension cannot be funded from within existing structures, and fresh ideas on alternative financial strategies and new funding sources will be welcome.

Our review puts WA's commercial and recreational fisheries under the microscope and examines how and where they operate. It charts their growth and contribution to the State's economy, and puts in perspective their increasing value and importance, as well as their impact on fish stocks.

The discussion paper also looks at issues such as the effects of population growth; the impact of fishing technology; marine planning and the expansion of marine reserves; fish stocks at risk; and important new marine activities such as aquaculture and charter fishing.

It is crucial for the public to realise that our coastal fish stocks will diminish and the fishing community – both commercial and recreational – will be the big losers if we do not tread the path to a new, integrated style of management.

Without management of the total catch by all sectors, and adequate provision for the conservation of breeding stocks, conflict between user groups over resource shares and access will escalate as the productivity of WA's fisheries decreases.

This discussion paper is presented for public comment and provides an important opportunity for community involvement in the future management and use of our valuable coastal fish resources.

Section 1 Why We Need a Direction

The need for this review has arisen from increasing concern within the community and Fisheries WA that the directions for fisheries and aquatic resource management need further development, and that a new management framework will be required to meet the challenges of the 21st Century.

The impact of a growing population, increasing coastal development, and greater demands from a variety of community groups for shares of WA's aquatic and fish resources, as those resources reach the point of maximum sustainable exploitation, are key factors driving the need for a new approach to management.

If these challenges are to be met, and WA's fish resources are to remain sustainable, it is imperative that the impact and needs of all resource users are taken into account in the process of fisheries and marine resource management.

It is also imperative that fisheries management clearly recognises and takes into account the impact of all fishing – commercial, recreational and Aboriginal – and the impact of aquaculture development on the marine ecosystem.

In the specific context of fish resources, early management action to regulate the total catch by all sectors is the only guarantee of sustaining our valuable coastal fisheries for the future.

During the past decade, fisheries management has become increasingly complex. The management of commercial fisheries has in the main been highly successful in ensuring the sustainability of specific fish stocks, and establishing a firm basis for a sustainable and profitable commercial fishing industry.

In the case of recreational fisheries, the development of management since 1990 has been based largely on a precautionary approach and regulation to establish socially acceptable limits on individual catches.

However increasingly the interaction between commercial and recreational fisheries, and the growth in exploitation, particularly of finfish, has lead to growing community conflict.

This conflict has also led to increasing resistance by both commercial and recreational fishing sectors to accept either a precautionary approach or further regulation without strong supporting scientific data on the relative catch shares and the impact of management on catch shares.

Clearly an integrated, systematic and transparent approach to fisheries management is required, to enable all interest groups to plan for the future.

The proposals outlined in this paper build on an already established and successful series of frameworks for management of the State's fisheries.

The paper examines ways of integrating management within one agreed framework, with the purpose of establishing specific catch sharing arrangements for commercial and recreational fishing.

Most Western Australian fisheries are in good condition, but this situation will inevitably deteriorate. New and adequate financial resources for management are needed, as well as a clear new direction which

encompasses the impact of all user groups on fish populations and provides a means of resolving disputes over access to fish stocks.

This paper provides an opportunity for public debate on key issues for the management of the State's fish resources – particularly coastal finfish stocks. A summary paper has also been prepared to generate public discussion on the directions and proposals outlined.

This major review aims to:

- Encourage community involvement in setting the future direction for the sustainable use of the State's coastal fish resources.
- Promote better community understanding of the current management framework for coastal fish resources and smaller regional commercial fisheries.
- Generate ideas on integrating the management of coastal fish resources which are feeling the persistent impact of a complex range of users with competing interests.
- Find ways to ensure that the significant and increasing costs incurred in managing the State's commercial and recreational finfish fisheries are kept at acceptable levels.
- Promote discussion on how to deal with an inevitable growth in recreational fishing pressure in order to meet resource sustainability objectives under the *Fish Resources Management Act 1994*, and the directions for resource management outlined in *Australia's Oceans Policy*.
- Establish a new management direction which can integrate the varying and often conflicting objectives of management for different user groups. It must accommodate the legitimate needs and priorities of conservation, commercial, recreational, charter and Aboriginal use to meet the resource management expectations of the community for the next decade and beyond.

The objective above builds upon the implementation of key initiatives arising from a limit being placed on commercial licensing arrangements which flowed from management action in 1983 and 1985 (Fisheries and Wildlife 1983, Fisheries Department of WA 1985) for commercial fisheries, the Recreational Fishing Review of the early 1990s (Fisheries Dept 1991), and recommendations for management of the fishing charter and eco-tourism industry put forward by the Tour Operators Fishing Working Group in 1998.

Stocks of the most significant finfish and shellfish species now fall within the scope of management plans, or some other form of resource access control.

Now that we have commercial, recreational and charter sectors under separate management systems, it is time to take stock and develop an integrated strategy for coastal fish stocks, which include the State's major recreational fisheries and the regionally-based commercial fisheries, and fully considers the requirements of conservation in a holistic fashion.

1.1 Scope and context of this review

This paper focuses primarily on future management of the State's coastal fish stocks with a specific emphasis on finfish species, but also has implications for coastal shellfish and crustacean resources.

The review needs to be considered in the context of a range of other fish and marine resource use planning processes undertaken by the State Government for specific sectoral interests, and also in the context of ecologically sustainable development and management by biogeographic region outlined in *Australia's Oceans Policy* (Commonwealth of Australia 1998).

These planning processes include existing management plans or access controls for the majority of the State's commercial fisheries; the work of the Tour Operators Fishing Working Group on aquatic tour industry management (Fisheries WA 1998); the development of regional recreational fisheries management strategies (Fisheries WA 2000b); the State Government's Resource Sharing Initiative; various Fisheries Adjustment Schemes and their legislative framework; the study into wetline fishing announced on 3 November 1997 by Fisheries WA (Crowe, F. 1999), and marine reserves planning processes conducted under the auspices of the Marine Parks and Reserves Authority (CALM, 1998).

Five supporting papers published by Fisheries WA also provide essential information on longer term management directions for the State's commercial coastal and estuarine finfish fisheries south of Shark Bay, and the State's recreational fisheries.

These are:

- A study into WA's open access and wetline fisheries (Crowe, F. 1999). Fisheries Research Report No. 118.
- A 12-month survey of coastal recreational boat-fishing between Augusta and Kalbarri on the west coast of WA during 1996/97 (Sumner, N. *et al* 1999). Fisheries Research Report No. 117.
- Management directions for WA's coastal open access commercial finfish fisheries (Fisheries WA, 2000). Fisheries Management Paper No. 134.
- Management directions for WA's estuarine and embayment fisheries (Fisheries WA, 1999). Fisheries Management Paper No. 131.
- Management directions for WA's recreational fisheries (Fisheries WA, 1999). Fisheries Management Paper No. 136.

1.2 Consultation process and timetable

This discussion paper, along with the findings of the study into the State's commercial open access fisheries (Crowe, F. 1999), the 12-month boat survey on recreational catches on the west coast (Sumner *et al* 1999) and the three papers that describe management directions for the State's finfish fisheries, is to be used as a basis for public discussion on management of fish resources across all user groups.

Consultation will focus initially on providing information, through printed documentation, public meetings and presentations to peak community and industry bodies such as the commercial WA Fishing Industry Council (WAFIC) and the recreational fishing peak body Recfishwest.

Community consultation on this issue will occur as follows:

March 2000 – brief the peak industry and recreational fishing organisations on the consultation process, the content of the papers on management directions for coastal finfish fisheries and the options presented in this paper for public discussion. Appoint an independent review committee to undertake the review and establish a larger reference group comprising key stakeholders to provide detailed advice and feedback to the committee. Release of this paper, and the supporting papers on open access finfish fisheries, to all commercial fishing boat licence holders, key recreational fishing bodies, the recreational charter fishing industry, other stakeholders and interest groups for broad public debate.

March - May 2000 – hold public meetings around the State to brief stakeholders on the discussion paper, key issues, and the consultation process for developing new management directions.

August 2000 – public submissions close.

Early 2001 – hold a two-day workshop to discuss key issues arising from public submissions, and develop a strategy to integrate management of the State's finfish fisheries and establish longer-term directions for resource sharing and management.

Late 2001 – Recommendations to the Minister on the future management of the coastal fish resource sector and longer term arrangements for the resolution of resource sharing issues.

The result of this extensive consultation process will be a policy and legislated framework for the future use and management of coastal fish resources. There must also be a long-term strategy to manage 'acceptable changes' in fish resource use and the adjustment of access and use between competing interest groups.

1.3 How to use this document

This discussion paper and its five supporting documents provide the background and context for public consideration of the best way to integrate management and share fish resources between user groups. A summary document which briefly outlines the key elements is also available.

In this discussion paper:

Chapter 1 describes the rationale and scope of the review, and sets out a timetable for community discussion and debate on all the issues.

Chapter 2 chronicles the development of commercial and recreational fisheries management in WA to the present day, and provides detail on how current management policies operate. It briefly describes the level of activity and catches in commercial and recreational fisheries, and looks at the marine planning and business environment in which Fisheries WA must now operate.

Chapter 3 outlines key issues for fisheries resource management, including the impact of population growth, fish stocks at risk, the cost of management, the nature of property or access rights in commercial fisheries, and the demands and needs expressed by many key groups who use fish resources and the marine environment.

Chapter 4 is intended to stimulate vigorous public discussion on the future direction for sharing and integrating the management of fish resources. It sets out a possible framework and principles and puts forward a series of detailed proposals on a process for allocating resource shares, principally between commercial and recreational sectors, once a baseline for commercial fishing capacity in the State's inshore and estuarine fisheries has been established.

Chapter 5 poses the question: 'How can effective integrated management for coastal fisheries be funded?' Many of these fisheries have a very high value for recreation, but often produce low returns to commercial fisherman, and management has so far been funded almost entirely through tax revenue. In an economic climate of reducing government expenditure, what are the options for meeting future funding requirements?

Section 2 WA's Coastal Marine Resources in Profile

2.1 The aims of fisheries legislation

Western Australian fisheries are managed in accordance with the provisions of the *Fish Resources Management Act 1994*.

The Act states:

The principal object is to conserve, develop and share the fish resources of the State for the benefit of present and future generations.

In particular, the Act has the following objectives:

(a) to conserve fish and to protect their environment;

(b) to ensure that the exploitation of fish resources is carried out in a sustainable manner;

(c) to enable the management of fishing, aquaculture and associated industries and aquatic eco-tourism;

(d) to foster the development of commercial and recreational fishing and aquaculture;

(e) to achieve the optimum economic, social and other benefits from the use of fish resources; and

(f) to enable the allocation of fish resources between users of those resources.

2.2 Commercial fisheries management

Before September 1983, there was no constraint on the issue of commercial Fishing Boat Licences (FBLs). Any person submitting a competent application was granted a new licence. It gave the holder an entitlement to take any fish for commercial sale, unless there was an existing constraint under fisheries legislation preventing the licence holder from operating within a managed fishery, a specific area or taking a specific fish species.

At that time, the largest commercial fisheries – principally western rock lobster, Shark Bay prawns, Exmouth Gulf prawns, abalone, Shark Bay scallops, pearling, and salmon and herring trapping – were already subject to management arrangements. Access to the estuarine fisheries for commercial fishing was also constrained by a limited number of owner-operator licences. These estuarine licences have restrictions on their transferability.

On 5 September 1983 the then Minister for Fisheries announced an immediate freeze on all new applications to enter the fishing industry via a FBL. Even at this time, the Minister indicated that "the government and industry are increasingly being faced with the consequences of excess fishing capacity in areas such as… the inshore fisheries on shark, dhufish and other reef fish species…".

He also stated that "the estuarine fisheries and the close inshore net fisheries on species such as herring, salmon, mullet, whiting, etc. appear to be fished to optimum utilisation and in some instances are in danger of excessive exploitation." (Fisheries and Wildlife 1983).

In December 1983 the Department of Fisheries and Wildlife released a discussion paper, 'Future management of Western Australian developed and under-exploited fisheries' (Fisheries and Wildlife 1983). This outlined a series of policy proposals for the future management of the commercial licensed fleet.

Ultimately this led to the 'Ministerial Policy Guidelines for Entry into the Western Australian Fishing Fleet' being adopted in 1984. The main thrust of the guidelines was a permanent cap on the total number of registered fishing boats in the WA fishing fleet (Fisheries Department of WA 1985).

Thus from 1984 onwards, people wishing to enter into the commercial fishing industry could only do so by purchasing an existing FBL.

Commercial industry leaders and Fisheries Department officers met in Mandurah in 1986, where consensus on a future management strategy for the commercial fishing fleet was reached.

An urgent push from both commercial fishers and fishery managers to reap the benefits of controlled access among commercial fisheries also led to a rush of management arrangements for the State's smaller commercial fisheries. This was in part driven by the need for sustainability, and in part by the fishing industry itself seeking resource security, with the 'goodwill' values tied to licences generating improved investment capacity.

In 1986 this fishing industry working group formally sought and gained ministerial approval for an increase in the number of commercial fisheries under management and the introduction of a government/industry-funded buy-back scheme to reduce the number of commercial FBLs.

This scheme continued to operate until June 1999, and mainly targeted the 'open access' finfish fishery and estuarine/inshore embayment fisheries. A further government scheme in 1996 provided $8 million to directly fund voluntary surrender of commercial fishing licences in areas where there was community demand for greater recreational fishing opportunities.

These policy directions saw the emergence of a large number of newly managed fisheries, as well as a long-term trend towards reduction in the fishing fleet size. Controlling and reducing fishing capacity, with the principal aim of achieving resource sustainability, but with the secondary effect of improving efficiency and profitability, has been a dominant feature of the State's commercial fisheries management. Various Management Advisory Committees (MACs), which included industry representatives, played a key role by advising the Minister on policy and access criteria.

By the mid-1980s, a significant number of commercial finfish and shellfish stocks had been brought under management plans including Shark Bay snapper, the southern shark stocks, two small rock lobster stocks on WA's south coast and the south-west scallop and prawn stocks. One result of these management changes was the concentration of the remaining commercial fleet onto stocks in areas where fishing access was still unrestricted.

The rationalisation of the Western Australian southern bluefin tuna (SBT) fleet (as a result of Commonwealth fisheries changes) in this period also resulted in a significant number of previous SBT fishing vessels moving into unrestricted State fisheries. However, by the mid 1990s, most significant commercially-fished stocks had been protected by specific management plans.

The process of protecting the State's major fish resources through management plans was also assisted by the introduction of Offshore Constitutional Settlement (OCS) arrangements (Fisheries WA 1988) in 1988 and 1995 which transferred legal responsibilities for the management of most major fish stocks from the Commonwealth to Western Australia (Fisheries WA 1995) and allowed unified management arrangements.

The combined impact of these management changes over the past 16 years (1983 – 1999) has been to reduce the impact of the catch by fishing boats without access to managed fish stocks. As more and more commercial management plans came into place, fewer 'open access' fisheries or fishing opportunities have remained for boats with just FBLs.

2.2.1 How commercial fisheries plans operate

Commercial fishery management plans are tailored to accommodate the nature of the species being exploited, the fishing technology involved and, the historical structure of the industry. Plans also take into account the particular requirements for research, compliance, industry reporting, and the specific need for breeding stock and juvenile (undersize) fish protection.

Controls to keep commercial exploitation at sustainable levels are achieved by two basic varieties of tools: setting total allowable catches (TACs) or 'output' controls, often administered as individual quotas; or 'input' controls, i.e. limits on gear used, fishing times or seasons, or some combination of these. Single species fisheries (e.g. rock lobster) are relatively easier to manage than those exploiting multiple species (e.g. demersal finfish) under output and/or input control systems.

Initial entry to a newly managed fishery has generally been established by setting access criteria based on fishing history performance, investment and financial dependence, with these criteria set out in the legislated fisheries management plan. Since the *Fish Resources Management Act 1994 (FRMA)* was proclaimed in 1995 an independent tribunal can review proposed decisions by the Executive Director of Fisheries WA to change access entitlements for any licence holder for entry to a particular fishery within an "objections period".

Introducing new management arrangements can affect an individual fisher's or vessel's existing access. Consequently new management arrangements can sometimes be divisive, difficult to achieve, relatively costly to implement, and involve an extended initial introduction and adjustment period.

Once established, fishery management plans also need regular review and adjustment, as the abundance of the stock changes both due to natural effects and fishing. Regulatory adjustments can also be needed as knowledge of the resource increases, and fishing technology changes the impact on exploitation rates.

When fishery management plans are established, rules permitting licence transferability are introduced, which seek to minimise administrative intervention and allow market forces to prevail when managed fishery entitlements attached to Fishing Boat Licences are traded.

Most managed fishery plans do not provide specific performance goals for the particular fishery, but operate within the general objectives of the *FRMA*. These require that the exploitation of fish resources is carried out in a sustainable manner, and that issues relating to social and economic benefits and environmental impacts are properly considered.

Many commercial fisheries have biological performance indicators which provide bases for the review of management strategies.

In practice, managed fishery plans are often the end result of political, economic and social compromise. Management plans for particular fisheries are shaped by a combination of professional management approaches, as well as their history and timing of development and the economic and social forces surrounding them.

The objects of the *FRMA,* while admirable, may also be inherently in conflict if considered in isolation.

2.2.2 Access to commercial fishing

Today, unrestricted access to fish stocks for those who hold only Fishing Boat Licences (FBLs) is principally restricted to the use of hand lines, some types of drop lines, or trolling (i.e. for mackerel) principally in northern waters. All other commercially significant fish stocks, although often small, are subject to some licensing constraint or management plan.

As a consequence of these management changes over the last two decades, many fishers who held Fishing Boat Licences alone have left the commercial fishery, either selling their licence on the open market or to the general licence buy-back scheme. Some have also combined fishing for finfish with recreational charter activities to generate a viable income. Some Fishing Boat Licences also appear to have been purchased to obtain tax benefits for vessels essentially used for recreational boating activities. A number of these licences do not appear to be particularly active, but could re-enter the commercial wetfish sector at any time.

While fish stock management has been highly successful in sustaining the major commercial fisheries, the process is becoming increasingly complex, expensive and demanding. Additional costs are also being driven by Commonwealth requirements under environmental protection legislation to meet increasingly complex Ecologically Sustainable Development (ESD) tests.

The adoption by government of a 'user pays' philosophy in 1995, and introduction of a framework for recovering the management costs of the State's six largest commercial fishing sectors – i.e. western rock lobster, prawns (Shark Bay and Exmouth), scallops (Shark Bay), pearling and abalone – has provided reasonable funding certainty to sustain these valuable fisheries, worth about $527m per year to the State.

Industry acceptance of this strategy has been assisted by the demonstrated economic benefits of long-term fisheries management (over 30 years), and is reflected in the scale of industry contributions towards the costs of research, compliance, administration and consultation. These key ingredients – adequate funding with industry support and profitability – are necessary for successful fisheries resource management.

This approach is not however viable for the State's remaining economically less valuable small-scale commercial fisheries. These often small regional fisheries mainly exploit finfish and shark, but also include prawns, scallops, crabs, *beche-de-mer*, aquarium fish and specimen shells.

Most of these fisheries operate in coastal marine embayments, and near shore waters although some extend further offshore. Many also face increasing competition from recreational fishing, changes to fish populations due to local environmental change, and conflicting demands from other users of coastal waters, i.e. aquaculture, and passive users (marine parks).

Recovery of total management cost (stock monitoring research, compliance, etc.) from these fisheries is unlikely to be viable, due to their lower revenue levels and profit margins compared with the larger, more productive commercial fisheries. The risk of fish stock or fishing collapse is also likely to be greater, due to a lack of substantial long-term supporting research, data analysis and stock assessment, and the consequent uncertainty associated with management advice. At present the balance of these costs are met by government.

2.2.3 Make-up of the commercial fishing fleet

Between 1985 and 30 June 1998, the following key changes took place within the commercial fishing fleet:

- The number of fishing units in the Western Australian fishing fleet shrank from 1,615 to 1,361.
- The number of managed fisheries increased from 7 to 33 (30 managed and 3 interim-managed).
- A total of 69 Fishing Boat Licences without managed fisheries endorsements were sold to the general Fisheries Adjustment Scheme and cancelled.
- A total of 133 estuarine and beach fishing units were acquired by the general adjustment scheme, supplemented by the recent $8 million Resource Sharing Initiative, and cancelled. Between January 1987 and June 1999 the number of estuarine licences dropped from 145 to 58 as a result of a more active fisheries adjustment process.
- The number of units in the wetline fishery (without access to a managed fishery) dropped to 156 compared with more than 300 units in 1986.
- The number of recreational fishing charter vessels in WA expanded from 40 in 1990 to over 135 in 1996. About 50 of these boats also have commercial Fishing Boat Licences. A call for expressions of interest in fishing tour licences in 1998 elicited more than 500 responses.
- The landed value of the catch taken by commercial fishing boat licence holders without other access to managed fish stocks has fallen to about $10-12 million per year, and is now only about two per cent of the value of WA's total commercial fisheries production (including pearling).

2.2.4 Make-up of the commercial wetline fleet

The commercial wetline fleet is a subset of the total fishing fleet, and consists of all boats with Fishing Boat Licences which have access to fish stocks that are not subject to specific management. The catch taken by the wetline fleets outside of managed fisheries is added to the catches taken by a mixture of boats from managed and interim managed fisheries when they are fishing outside of their primary fisheries.

Wetline fishing mainly targets demersal finfish between the South Australian border and the Northern Territory border and includes species or fishing methods not currently subject to a management plan (e.g. beach seining for whitebait, herring and mullet). A major area of recent development has been the growth in Spanish mackerel fishing between the Gascoyne and the Northern Territory border, but particularly in the Kimberley.

Between 1991/92 and 1997/98 about half (720) of the State's total fishing vessels submitted catch returns for wetline fishing.

However, in any one year, between 370 and 400 of the State's fishing fleet undertake this type of fishing activity.

Of those (370-400) boats that were active each year, there were only about 100 which held Fishing Boat Licences with no other access endorsements. There were also 21 wetline-only boats that did not fish at all between 1991/92 and 1997/98. In contrast most estuarine fishing units also undertook some fishing in coastal oceanic waters in the last six years, in addition to their normal estuarine operations.

Of the 603 West Coast rock lobster boats licensed at 30 June 1998, 201 recorded wetline catches between 1991/92 and 1997/98, with typically between 70 and 100 lobster boats wetlining in any one year. The exception to this was 1997/98 when the number increased to 124, apparently due to anticipated low returns from future lobster fishing.

The annual total reported wetline catch from the open access fisheries over the last four years (1994/95-1997/98) has increased from about 2,000 tonnes annually to 2,270 tonnes in 1997/98, and makes up approximately four to five per cent of the total catch from WA annually.

Within the wetline catch only three 'line-caught' species had catches exceeding 100 tonnes a year over the last seven years. For example, in 1997/98 these species were: dhufish – 202 tonnes; Spanish mackerel – 536 tonnes; and pink snapper – 230 tonnes.

The wetline fleet catch of 'net-caught' species only contained two which generally exceeded 100 tonnes a year over the last seven years. The 1997/98 catches of these species were: whitebait – 48 tonnes (down from 256 in 1996/97); and Australian herring – 112 tonnes.

The majority of the wetline-only fleet is highly mobile, although the estuarine licence holders tend to wetline close to the estuary to which they have access. Similarly, boats holding managed fishery licences tend to wetline near the geographical areas associated with their major licence, i.e. rock lobster vessels fish predominantly in the lower west coast.

The major areas for wetline catches are the Kimberley (where most of the Spanish mackerel are taken); the Abrolhos Islands (over 200 tonnes); the Perth metropolitan area (over 150 tonnes); and WA's south-west coast (over 200 tonnes).

2.3 Recreational fisheries management

Common law allows all people in WA to take fish for their own purposes and enjoyment unless limited by statute law. Recreational fisheries legislation provides controls on fishing gear, sizes of fish which can be taken, catch (bag) limits and area and season closures aimed principally at protecting breeding fish and juveniles. Some of these regulations also assist in sharing the resource.

In terms of impact, the schedule of bag and size limits is the major tool used to manage the recreational catch. However, bag limits do not in general constrain the total recreational catch.

Specific licences for recreational fishing activities have mainly been used to improve compliance with rules for high value species, but have also increased community awareness of fishing rules and resource conservation, and assisted with collection of research information. Licences also provide some revenue towards management costs for the recreational fishing sector and fish stocking programs for freshwater fisheries.

Before 1991 the Fisheries Department focused much of its attention on commercial fisheries management. However, recreational fisheries for species regarded as high value, such as rock lobster, or under significant pressure, such as abalone, marron and crabs, were also targeted with specific management.

During the 1980s the State experienced unprecedented interest and growth in recreational fishing, increasing pressure to declare marine parks, and demands for areas to be set aside for pearl culture and aquaculture.

As a consequence, in the early 1990s a major review was undertaken on behalf of government to set the future direction for recreational fishing. This review resulted in the introduction of landmark policies which led the way in recreational fishing management in Australia.

Key changes in management direction implemented as a result of this review included:

- Establishment of a State Recreational Fishing Advisory Committee (RFAC) supported by a number of Regional Recreational Fishing Advisory Committees (RRFACs).
- A comprehensive review of bag and size limits and their extension to virtually all species caught recreationally, including many which previously were not subject to any limits.
- Establishment of a Volunteer Fisheries Liaison Officer (VFLO) program with a strong emphasis on educating the public and encouraging compliance with fishing rules (there are now more than 200 volunteers in the VFLO program).
- Creation of a dedicated Fisheries WA program for the State's recreational fishing sector covering research, compliance, management and education.

- Bolstering research into key recreational fishing species such as tailor, in order to monitor fish movement, breeding habits and levels of exploitation.
- New projects to enhance recreational fishing with emphasis on community involvement.
- Creation of a Recreational Fishing Trust Account for receipt of licence revenue and expenditure solely for recreational fishing purposes.

In addition to these mid-1990s initiatives, recent agency planning has shifted from a state-wide approach, to developing regional management arrangements for recreational fishing within clearly defined biogeographic regions, consistent with the aims of the Commonwealth's *Ocean's Policy*.

During the last five years there has also been a significant shift towards management to enhance the quality of the experience of recreational fishing, as well as maintaining diversity and sustainable management of fish resources.

The expanding charter fishing sector will also be brought under regulatory control in the near future. In 1998 the Minister for Fisheries announced a management program for the recreational charter fishing industry aimed at both control and resource sustainability responding to the rapid growth of the charter fleet – from just 40 boats in 1990, to 135 operators in 1997 who charge fees for recreational fishing trips.

2.3.1 Recreational fishing profile

WA's recreational fisheries fall loosely into two groups – a multi-species marine finfish fishery, predominantly fished by shore and boat anglers, and a number of mollusc and crustacean fisheries.

An estimated 600,000 people in WA now fish for a huge variety of finfish and shellfish, mainly throughout the State's inshore and estuarine areas. Crustaceans such as crabs, prawns, rock lobster and marron also attract significant numbers of devotees, and form an important part of recreational fishing in the State's south-west. Abalone is the most popular mollusc targeted by recreational fishers, with a dive and reef foraging fishery flourishing along inshore reefs between Kalbarri and Esperance and particularly in the Perth metropolitan area.

Recreational fishing licences are issued for marron, rock lobster, abalone, south-west freshwater angling (i.e. trout) and net fishing.

In 1997/98 a total of 50,770 people spent approximately $1.4 million purchasing 19,109 marron fishing licences, 28,520 rock lobster licences, 11,840 netting licences, 12,419 abalone licences and 12,419 freshwater angling licences. Of these 6,716 took out all categories of licence available.

Current estimates of recreational fish catches and impacts are mostly based on regional or species-specific surveys. For example, a 1997/98 boat angling survey showed that recreational fishers landed an estimated 130 tonnes of prized dhufish for the West Coast region of WA, and released a further 60 tonnes. However, comprehensive catch estimates for all regions and years are not yet available.

Major trends are clear from household surveys on participation. Data from a 1987 Australian Bureau of Statistics survey estimated that 284,100 people, – or 26.6 per cent of WA's population over age 15 – went

fishing at some time. Total recreational fishing days at the time of the survey were estimated to exceed three million (Australian Bureau of Statistics 1987).

An Australian Bureau of Statistics (ABS) survey in April 1992 identified an estimated 5,193 tonnes of seafood consumed domestically as coming from the recreational catch for WA.

A participation survey by Patterson in 1996 (Patterson, K. unpublished) estimated 520,000 Western Australians were involved in recreational fishing – about 30 per cent of WA's population. Participation was consistent across age groups and included 46 per cent of the male population and 13 per cent of the female population.

A series of phone surveys commissioned by Fisheries WA in 1994, 1996, 1997 and 1998 indicated a growth in overall participation in recreational fishing to an estimated 600,000 people – an increase from 26 percent to 34 per cent of the population. The surveys also showed an increase in the average number of fishing days or trips per person each year.

Recreational fishing effort therefore appears to be growing at a rate faster than the population, and in 1998 was estimated at 10 million fishing days per year (Sumner and Bahartah 1999). This contrasts significantly with the 1987 estimate of three million fishing days.

While data from these surveys are not directly comparable, there is a clear upward trend in both the total rate and frequency of participation in recreational fishing.

In 1994 Patterson indicated a mean of 9.4 trips per fisher per year. Later surveys (REARK unpublished) indicate an increase in the average number of trips per fisher per year, with about 30 per cent of the fishing population accounting for more than half the trips.

Major activities identified in the later surveys were:

- Estuarine fishing: 32 per cent of fishers, with an average of 9.7 trips per person per year.
- Rock fishing: 25 per cent of fishers, with an average of 6.9 trips per person per year.
- Beach or jetty fishing: 61 per cent of fishers, with an average of 10.1 trips per person per year.
- Freshwater fishing: 13 per cent of fishers, with an average of 11.9 trips per year.
- Boat fishing: 42 per cent of fishers, with an average 18.9 trips per year.

According to the 1987 Australian Bureau of Statistics survey, the key target species on the west coast in 1987 were Australian herring, whiting, crabs, snapper, dhufish, Australian salmon and marron.

Data from the Volunteer Fisheries Liaison Officer monitoring program in 1997 reaffirms that crabs are the main recreational crustacean target species.

The prime areas of fishing continue to be the Perth metropolitan area and the lower west and south-west coasts, followed by substantially lower levels of fishing along the south coast and in the Gascoyne, Pilbara and Kimberley. This pattern is consistent with population densities in the State and domestic tourism patterns.

The economic contribution from recreational fishing to the State's economy was estimated to be in excess of $600 million ($1,000 for each angler) a year in 1997 (Lindner, R. 1998). This compared with $400m in 1987 (Lindner, R. and McLeod, P. 1991).

2.4 Marine planning and conservation reserves

2.4.1 Marine planning

Long-term planning for the use and allocation of marine resources in WA is the responsibility of several State agencies, which undertake a variety of strategic and statutory planning, primarily on a narrow sectoral basis.

The Ministry for Planning prepares regional plans which include future use of coastal land areas and more recently, in the case of Shark Bay, the use of inshore marine areas. Fisheries WA undertakes long-term planning to ensure sustainability of fish stocks and habitat protection, and for commercial and recreational fishing and aquaculture.

The Department of Conservation and Land Management (CALM) currently has the prime responsibility for marine reserves, within which Fisheries WA has specific responsibility for managing fishing activities. There is also a multitude of exploration, transport and development activities which may have an impact on fishing.

In addition, the Department of Environmental Protection/Environmental Protection Agency, the Water and Rivers Commission, the Department of Transport and the Department of Minerals and Energy undertake planning in aquatic environments for various purposes and sectors. More recently, the land legislation has been amended to extend the concept of Crown Land to the three nautical mile boundary of State territorial waters, thus involving the Department of Land Administration in the allocation of access and associated property issues.

In addition, under Offshore Constitutional Settlement arrangements the Commonwealth has delegated to WA the administrative and management responsibilities for most significant fish species out to 200 nautical miles. However, a comprehensive State institutional framework for marine planning out to the edge of the 200 nautical mile Exclusive Economic Zone (EEZ) has yet to be developed.

In late 1998 the Commonwealth launched "*Australia's Oceans Policy*". This policy sets out a framework for integrated and ecosystem-based planning and management for Australia's entire marine jurisdiction.

It proposes to build upon existing effective sectoral and jurisdictional mechanisms, including Western Australia's very effective fisheries management regime.

The core of the *Oceans Policy* will be the development of Regional Marine Plans, based on large marine ecosystems. The Western Australian Government will need to consider its participation in the development of such plans as they are introduced over the next decade.

The *Oceans Policy* proposes to manage uncertainties in resource access, use and allocation processes, for example, by creating tradeable rights, or other market mechanisms where they are able to adequately address the full range of economic, environmental and community values. It also seeks not to impose unnecessary costs or regulatory burdens on State users and managers.

Policy development for the few Commonwealth managed commercial fisheries which also operate in WA waters will take into account competing recreational, charter and commercial fishing interests. This policy development is designed to ensure that integrated planning processes include ways of resolving resource allocation between these interests/sectors.

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* will come into effect in July 2000. The *EPBC Act* contains specific provisions to protect the marine environment and key conservation areas of national interest.

The provisions of the *EPBC Act* do not apply where fishing occurs in a State or Territory managed fishery regulated under State or Territory legislation in effect before the Act commences, but is likely to require specific approval by the Commonwealth Minister for the Environment for any new fisheries or activities which may affect conservation values in the marine environment.

Western Australia's own integrated marine planning process for waters and fisheries resources under its jurisdiction will need to be developed in future taking the *Oceans Policy* and the provisions of the *EPBC Act* into account.

2.4.2 Marine conservation reserves

In August 1997 the *Acts Amendment (Marine Reserves) Act 1997* was passed by State Parliament. The Act amends six Acts of Parliament including the *Fish Resources Management Act 1994* to allow for a representative system of multiple-use marine conservation reserves along the WA coastline.

The amended legislation permits three types of marine conservation reserves: marine nature reserves, marine parks and marine management areas. Once established, these reserves are vested in the newly established Marine Parks and Reserves Authority under the *Conservation and Land Management Act 1984*. Fishing, aquaculture and pearling within marine parks and marine management areas continues to be managed under fisheries legislation.

The Minister for the Environment must obtain the consent of the Minister for Fisheries and the Minister for Mines before establishing marine conservation reserves. In providing this consent the Minister for Fisheries must consider the possible impact of such a reserve on fish, fish habitats and fishing activities. Particularly, the Minister must ensure that the needs of all fisheries' and mines' client groups have been taken into account.

Planning for these reserves must allow for the many existing legitimate uses in the marine environment – that is, a multiple-use approach. For example, commercial and recreational fishing, including aquaculture and pearling, will be provided for in marine management areas and in certain zones of marine parks. However these activities will not be permitted in marine nature reserves. Additionally, Fisheries WA will

need to consider the impact of more fishing pressure on areas near such reserves where fishers target fish as they move outside reserve boundaries.

'Marine management areas' and marine parks are designed to manage sensitive marine areas where multiple uses occur. 'Marine parks' are primarily areas reserved for conservation and uses compatible with those objectives.

There can be four zones in marine parks – general use zones; sanctuary zones; special purpose zones; and recreation zones. Commercial fishing (including line fishing) will not be permitted in recreation and certain special purpose zones. No fishing is permitted in sanctuary zones.

One marine reserve and six marine parks have so far been declared in WA. These are: Hamelin Pool Marine Reserve, and Ningaloo, Shark Bay, Marmion, Swan River, Shoalwater Bay and Rowley Shoals marine parks. Planning is also underway for a new marine park and marine management areas at Jurien Bay, the Montebello Islands, and the Dampier Archipelago. In the longer term, additional marine parks can be expected for the waters of Geographe Bay and the Cape Naturaliste to Cape Leeuwin area, in the Kimberley and off the South Coast.

Additional powers for the creation of marine protected areas also exist under the *Fish Resources Management Act 1994 (FRMA)*, which provides for the establishment of Fish Habitat Protection Areas (FHPAs).

FHPAs may be declared for a range of purposes including the conservation and protection of fish and the management of activities relating to fish. A management plan is required under the FRMA and declared areas may be vested in a body corporate.

One FHPA has so far been declared in WA, encompassing the waters of the Abrolhos Islands.

2.4.3 Fisheries WA and the State marine reserve framework

Fisheries WA's major task is to maintain fish resources at biologically sustainable levels while balancing sound economic and development needs. This is carried out under the auspices of the *Fish Resources Management Act 1994*, its various pieces of subsidiary legislation, which include regulations, management plans and orders, and through licences, licence conditions and ministerial guidelines.

These Fisheries WA responsibilities, under legislation, are compatible with the developing multi-user marine conservation reserve system which is designed to:

- preserve representative as well as special ecosystems in the marine environment; and
- put a formal management framework in place to ensure the various uses of marine conservation reserves are managed on an equitable, integrated and sustainable basis (*New Horizons*, CALM 1997).

The system of reserves created under this framework will interact with the management of fisheries to a lesser or greater degree, depending on the dimensions of the reserves and particularly the size of any non-fishing areas, i.e. sanctuaries or marine nature reserves. Overall, however, management of fishing and

related activities within marine reserves will be undertaken under the *Fish Resources Management Act 1994*, although this will be constrained within marine parks by the subsequent zoning system.

While 'no take' areas in marine reserves are designed to protect species diversity and, in the process by preventing fishing, provide some protection for parts of fished stocks, their applicability as a general fisheries management tool is relatively limited. This is due to the:

- high mobility of most fish stocks;
- typically high fecundity of fish species;
- extensive larval dispersal mechanisms of most marine species; and
- general tendency of many marine finfish species to move on- and off-shore at various stages in their life history.

These features (of most marine species) result in the coastal marine reserves system typically providing limited protection for exploited fish stocks in the WA context.

Fisheries management strategies developed by Fisheries WA focus on more dynamic and targeted measures to protect stocks. These include:

- seasonal and spatial closures to protect breeding animals;
- species-specific minimum legal sizes;
- catch (including bag) limits; and
- fishing effort controls applied to individual fish stocks.

These fisheries management measures, involving a 'whole-of-stock' approach to controlling exploitation levels for sustainability under the *Fish Resources Management Act 1994*, will take into account the impacts of marine reserves, but are unlikely to be able to use them as a significant component in management plans.

As fisheries-specific management arrangements and marine reserves both involve expensive consultation processes and field management costs once implemented, Fisheries WA will have to balance these internal and external responsibilities when allocating resources. That is, the agency must balance these competing requirements for current protection of exploited fish stocks against the longer-term and less immediately critical conservation objectives of the representative marine reserve system, within the constraints and needs of government.

Fisheries WA must also operate and set priorities within the financial and staff resources available to it.

2.5 Aquatic resource sharing and current Fisheries Adjustment Schemes

The key role of fisheries management since its inception in Western Australia has been to ensure the sustainability of fish stocks and fisheries in the face of increasing pressure. To achieve this, management has tended to develop sequentially, dealing with each sector and fishery in turn.

The priorities across more than nine decades have been driven by the risk of over-exploitation posed by unregulated fishing activities, and the perceived benefit derived by the WA community from a particular fishery.

Consequently, commercial fisheries were first to come under management, followed in the past decade by recreational fisheries, and finally the fishing charter tour sector.

Historically, those involved in fisheries management have always recognised that managing conflict and resource sharing between user groups was a necessary part of the social dimension of fisheries management, with many fishing closures and regulations to separate user groups dating back to the early 20th century.

However, the issue of managing the allocation of shares of WA's aquatic resources between user groups has in practice been subsidiary to the issue of ensuring sustainability – particularly in a situation where the fishing industry was still developing and most fish stocks were regarded as under-exploited.

Where a single sector takes the majority of the available catch, resource sharing is an issue of social equity, but where multiple sectors all take substantial portions of the sustainable catch, an explicit resource sharing framework becomes a prerequisite to sustainability.

The *Fish Resources Management Act 1994* contains an explicit recognition in its objects that resource sharing is an essential part of fishery management.

However no specific powers or regulations have been enacted to describe the nature of a 'resource share'. Consequently there is no single or integrated process by which resource shares are assigned between commercial and recreational fisheries; between sub-sectors within these industries; or between the fishing sectors, aquaculture and eco-tourism or conservation interests.

The allocation of fish resources between users is a difficult task. The task is made more difficult by a lack of definitive information on the abundance of many coastal fish stocks and natural environmental variations.

In addition, a lack of time series data on the recreational fishery, and uncertainty around the level of accuracy in commercial fishing returns, also means that scientific research cannot provide a robust analysis of actual resource shares.

Nonetheless Fisheries WA has historically used a variety of administrative arrangements to deal with resource sharing issues. Many of these imply an allocation of access between sectors to a fish stock or area, but are not usually explicit about the nature of this access, and what it may mean as a 'resource share'.

These arrangements have attempted to recognise that specific management controls for one sector may lead to implicit alterations in the availability of fish resources for other sectors, and that commercial and recreational fishing sectors have significantly different aspirations about the use of fish resources, as do environmental groups.

These issues become critical when a fishery is operating near or at maximum sustainable yield, or when environmental variations create a severe downswing in the seasonal abundance of fish. In addition, the effect of fishery management arrangements on biodiversity and the abundance of food chain species is often difficult to predict or describe.

Examples of implicit resource sharing include subsidiary legislation under the *FRMA* such as management plans, regulations and orders which limit certain sorts of fishing activity, gear types or the times various sectors can operate in specific waters, and area leases or closures for either aquaculture or non-extractive uses such as eco-tourism.

In the wider government arena, implicit aquatic resource sharing also occurs through the:

- marine protected areas planning process and marine park zonings;
- creation of fishing closures for eco-tourism or conservation purposes, and
- government priority setting in relation to the use of elements of the marine environment for mineral extraction.

The impact of marine protected areas planning on the historic use of aquatic resources has been recognised by government in the *Fishing and Related Industries Compensation (Marine Reserves) Act*, which was passed in 1997 to complement the amendments to the *Conservation and Land Management Act* and the *Fish Resources Management Act* under the *Acts Amendment (Marine Reserves) Act*. These amendments provide for the payment of compensation if commercial fishing, fish processing, pearling or aquaculture is displaced or significantly affected by the creation of marine reserves or zones within marine parks.

In the past decade, three explicit fisheries adjustment processes have permitted further development of aquatic resource sharing concepts in the context of fisheries management. All three processes are targeted at reductions in the commercial fishing fleet and are based on the principle of providing some recompense related to current market values to licensed operators for the voluntary surrender of commercial fishing licences.

These are the general Fisheries Adjustment Scheme (FAS), introduced in 1987, and two processes introduced under the 1996 Resource Sharing Initiative – the Voluntary Re-allocation and Buy-out Fisheries Adjustment Process (VBFAP) introduced in 1996, and the Guidelines for Voluntary Resource Sharing (VRS) process adopted in 1997.

2.5.1 General Fisheries Adjustment Scheme

In 1983 as a result of increasing commercial fishing effort in WA, the Minister for Fisheries announced a general 'freeze' on the issue of new Fishing Boat Licences.

In 1987 the *Fisheries Adjustment Schemes Act* established the general Fisheries Adjustment Scheme (FAS). The general FAS has been used to 'buy-back' excess commercial fishing effort, in both estuarine managed fisheries and the 'open access' wetline sector.

The major purpose of the general FAS scheme was industry adjustment within the commercial fishing sector to reduce both real and potential fishing capacity.

This scheme was partially funded by the commercial fishing industry and partially by government. All fishers who hold a Fishing Boat Licence paid an annual levy and the State Government contributed to the scheme on a dollar-for-dollar basis. The scheme raised around $320,000 a year.

The general FAS was administered by a committee with two commercial fishing industry representatives, two Fisheries WA representatives and an observer from the Western Australian Fishing Industry Council (WAFIC).

The rate of compensation for the surrender of a licence was based on current market prices and recorded sales of licences on the Fisheries WA register.

Between 1987 and July 1999, 187 commercial licences or fishing units were bought out through the general FAS scheme. Of these, 69 were fishing boat licence holders with no other managed fishery access (i.e. 'wetline' operators).

The impact of this scheme has been a significant reduction in the number of commercial operators in the wetline and estuarine fisheries, with the effect of redistributing the catch among existing operators, and containing increased effort inherent in the use of new fishing technology.

A flow-on benefit from this scheme is also implicit for the recreational fishing sector, in that there is less capacity in the commercial fleet for an escalation in effort and catch, and less competition for the available catch.

The general FAS ceased to operate in June 1999, and is to some extent being replaced by resource sharing schemes.

2.5.2 Voluntary Re-allocation and Buy-out Process

In 1996 the Western Australian Government set aside $8 million over four years for a resource sharing initiative, in line with the 1996 Coalition Fisheries Policy (1.2.7d):

"In consultation with the commercial and recreational fishermen, the development of management arrangements and the application of approved funding of $8 million through the Fisheries Adjustment Schemes Act 1987*, to facilitate adjustment in fisheries in which resource sharing is an issue."*

The initiative was introduced as a series of schemes administered by the Voluntary Re-allocation and Buy-out Committee of Management.

These schemes are aimed at reducing commercial fishing effort in specific areas or fisheries where there is a high level of conflict or competition for the available catch – particularly between the recreational and commercial fishing sectors.

Fisheries targeted through the adjustment schemes process include South Coast Herring Trap, South Coast Salmon, Tropical Rock Lobster, Windy Harbour/Augusta Rock Lobster, Kimberley Gillnet and

Barramundi, South Coast Estuarine, Hardy Inlet Estuarine, Leschenault Estuarine, Mandurah Estuarine, and Swan River Estuarine.

A specific Fisheries Adjustment Scheme is created for each targeted fishery. Letters are sent to all licensed fishers in the fishery, notifying them of the establishment of a buy-out scheme and seeking expressions of interest from those who may wish to surrender their licence in return for compensation through the FAS.

The process has succeeded in removing a significant number of commercial fishing licences from the smaller but often highly contentious commercial fisheries in estuaries and inshore areas.

By the end of August 1999 the process had bought out 46 commercial fishing licences at a cost of $3.2 million and successfully removed both real and latent commercial effort in many targeted fisheries.

These included:

- six licences from the South Coast Herring Trap Fishery;
- two from the South Coast Salmon Fishery;
- four from the Tropical Rock Lobster Fishery;
- eight from the Windy Harbour/Augusta Rock Lobster Fishery;
- three from the Kimberley Gillnet and Barramundi Fishery;
- eight from South Coast Estuarine Fishery;
- two from Hardy Inlet Estuarine Fishery;
- one from the Leschenault Estuarine Fishery;
- nine from the Mandurah Estuarine Fishery; and
- three from the Swan River Estuarine Fishery.

However, given the potential ability of remaining commercial operators to increase their catches, the simple removal of some commercial fishing licences in these areas may not ultimately make a larger share of the resource available to the recreational sector, and will need to be complimented by other measures to ensure a reduction in total commercial catch over time.

2.5.3 Guidelines for Voluntary Resource Sharing

The *Guidelines for Voluntary Resource Sharing* (VRS) process was adopted in 1997. The initiative was established to provide a process by which user groups could negotiate an adjustment of shares in Western Australia's fish resources.

Rather than focusing on the buy-out of commercial fishing licences, the guidelines process allows user groups to work together to develop other management approaches which may effectively change resource shares.

The process relies on user groups nominating those fisheries where a shift in resource shares is required, then working through a mediation process to arrive at agreed management solutions to the issue.

So far, two fisheries have been accepted for mediation under this process, the West Coast Beach Bait and Fish Net Managed Fishery and the Cockburn Sound Crab Managed Fishery. Agreement on the Cockburn Sound Crab managed fishery was reached, while negotiations in the beach bait fishery have been suspended. Other fisheries are currently being considered for inclusion in this process.

Both are small, discreet fisheries that operate in the waters of Cockburn Sound, just south of Fremantle. Both were nominated for participation in the process by commercial fishermen's associations.

Experience in the VRS so far has shown that:

- the mediation process demands significant support and commitment from Fisheries WA and stakeholder groups;
- trained mediators with some knowledge of fisheries issues are essential; and
- the process of negotiation is likely to be protracted.

The VRS process recognises that most resource sharing concerns are driven by the observations of fishers, both commercial and recreational, which are difficult to objectively substantiate in the absence of reliable fishery data for all sectors, and that the resolution of resource sharing issues is a social process.

Consequently the VRS process does not depend upon establishing explicit resource shares for each sector, but rather on sharing information and developing negotiated management solutions to the issues identified by competing interests in the fishery.

2.6 Agency planning and funding

Since 1990 Fisheries WA has increasingly sought operational funding from sources other than Consolidated Revenue. In 1998, nearly half of its business operations were funded from non-State Government sources.

This has meant that the agency has become more open to scrutiny in its operations, and that it must compete more strongly for external funds.

Recovery of management costs is being sought from the State's larger commercial fisheries. Stakeholder involvement has become a key ingredient in setting budget priorities and strategic policy.

Recreational fishers contribute nearly 20 per cent of the cost of management of recreational fishing activity through existing licence revenue.

Stakeholders have been involved substantially in planning Fisheries WA's business through four program-specific five-year business plans, and an agency strategic plan. These are supported by an annual operational and budget planning process.

This has lead to greater focus on client group needs and consistency in the business management approach used by the agency.

At a government level, funding is firmly linked to performance. There must be proper financial reporting, better financial management, and greater performance. Wage levels are linked to improvements in productivity. Cost recovery itself has also generated the need for tighter, detailed, financial management information; better identification of costs; and project management disciplines at the operational levels of the agency for priority setting and budgeting.

Any shift in direction or added responsibilities accepted by Fisheries WA will require additional resources, or a realignment of operational priorities, with some projects terminated in order to make way for new ones aligned to new initiatives. This would occur against a background of increasing public demand for sustainable management and monitoring all of the State's fish resources and habitats.

2.7 Community involvement in management

Fisheries management in WA has had invaluable support from an increasing number of Ministerial Advisory Committees (MACs), which cover commercial, recreational, aquaculture sectors and community interests.

These MACs generally have independent chairpersons, stakeholder representatives and experts to ensure consultation and provide advice on future policy settings for particular fisheries or individual agency programs.

The State's major managed commercial fisheries all have formally appointed Ministerial Management Advisory Committees (MACs), while recreational fishing is represented by a central Recreational Fishing Advisory Committee (RFAC) supported by regional RFACs throughout the State.

However, these advisory committees tend to focus on the operation of the fishery or activity most relevant to them. For instance, the Northern Demersal Fishery MAC deals principally with commercial fishing issues, while other advisory committees take responsibility for regional recreational fishing and aquaculture development.

On a broader level the Minister on behalf of the State Government also receives advice and views from individuals, peak community and industry-based bodies, such as the commercial WA Fishing Industry Council (WAFIC) and the recreational Recfishwest.

The development of an integrated or 'holistic' fisheries management approach which can evaluate and assign resource shares within a sustainable fisheries framework has become increasingly critical as the exploitation level on fisheries increases.

So far, the existing management advisory committee process has been unable to deal effectively with issues that extend beyond narrow sectoral interests.

However, existing management and recreational fishing advisory committees and peak industry and recreational bodies have a key role to play in extending the discussion on integrated management, and developing a process that will be accepted by the WA community as fair, equitable and effective.

Section 3 Key Issues for Fisheries Resource Management

3.1 Impact of population growth

WA is one of Australia's fastest-growing states. Population growth is likely to expand from its 1995 figure of 1,755,011 at a predicted rate of 1.5 per cent per annum to more than 2.7 million people by 2029 (State Planning Commission 1996).

Population structure and its distribution can be expected to change considerably. The key growth changes will be:

- A gradual ageing of the population, no doubt with a proportionate increase in the numbers going fishing.
- An increasing proportion of residents whose ethnic origins have a 'culture' of fishing.
- The population continuing to expand primarily along the State's coast, in the south-west, close to many of the State's rivers and estuaries within established regional centres.

Greater recreational fishing pressure can be expected, along with more mobility of fishers, through increased coastal development, more marinas, better road access and improved boating mobility.

These changes highlight the need for greater control on exploitation levels for fish stocks and particularly reduction in high volume 'meat' fishing practices by some recreational fishers. The best way to achieve this latter change in attitude is to encourage fishing for enjoyment, rather than to provide a basic food supply.

Average seafood consumption is also expected to grow with Australia's ageing society and changing ethnic composition. Small shifts in consumption due to health and diet are also likely to be a driving force in increasing the retail demand for fish. Should, for example, population growth result in a conservative consumption increase of one kilogram per capita, WA's projected direct fish consumption levels is likely to increase by an estimated 15,000 tonnes by 2029.

Such an increase in fish consumption would result in increased demand on commercially available fish resources, as well as increased recreational fishing activity on vulnerable coastal fish stocks. Future increases in demand for domestic consumption are only likely to be met through greater use of presently under-utilised species, aquaculture, or greater imports.

Present recreational 'bread and butter' species such as herring and whiting could well be targeted for new markets. Demands on local fish stocks for bait and aquaculture feeds are also likely to increase.

Export and local demand/prices for WA's high-value species will surely rise in response to increasing world demand, as limits on wild fish catches in successfully managed fisheries take effect and world fish

stocks diminish in abundance through overfishing. Although it is expected that WA's larger commercial fisheries can continue to be managed sustainably, the scarcity value of these stocks on world markets will drive up prices.

3.2 Impact of improved fishing technology

The average commercial wetfish boat 30 years ago was a displacement hull boat, built of wood, with a top speed of about 10 knots.

There have been considerable advances since then, as the commercial wetline fleet benefited from the turnover in boats in the WA rock lobster fleet. The average wetline boat, although still relatively old (10 – 15 years) by standards in other WA commercial fishing fleets, is usually an aluminium or fibreglass planing hull capable of up to 20 knots, with onboard refrigerated seawater tanks or freezers.

These boats are increasingly capable of moving rapidly between fishing grounds and spending more days fishing. Improved weather forecasting has also given fishers better information to help maximise their fishing activities.

Electronic equipment is also much cheaper and more sophisticated. In addition to radar, the average boat has a colour sounder and a Global Positioning System (GPS) linked together to maximise the chance of finding fish and returning quickly to productive fishing grounds.

Fishers also have more efficient catching gear, including power reels and drop lines, while better refrigeration technology has increased the value of the catch taken and allowed the fleet to operate economically at lower catch rates.

Many of these technological trends also apply to recreational fishing, with many experienced 'blue water' anglers using high-tech equipment just as sophisticated as their commercial counterparts. Often it is only the frequency of usage and knowledge of the operator which separates the fishing capacity of the two sectors.

Constraining the use of on-board electronics that assist in fish finding, but also serve to improve navigation and marine safety, is not practical, and would not be accepted by either fishing sector as reasonable.

A range of controls on commercial fishing, gear and time have been introduced to compensate for these trends, but this has also led to questions as to the cost-effectiveness of these controls.

These tighter controls have had an impact on the cost of commercial fishing, and encouraged reductions in fishing capacity through industry restructuring. Controls on fishing capacity have generally been achieved through limits on gear, the total number of boats operating, and the amount of time fishers can operate, coupled with a reduction in overall fleet size through a licence buy-back.

Technology will continue to be a key factor in the increase in fishing efficiency of fleets, but will also improve the monitoring capacity and effectiveness of fisheries management agencies.

3.3 Impact of marine planning and the expansion of marine reserves

Although the process of reserve establishment will take some time, the cumulative longer-term impact on commercial line fishing in marine reserves must be carefully considered. The establishment of 'no take' or sanctuary areas, together with pressure from the recreational and aquaculture sectors to secure areas primarily for their use, could significantly reduce areas accessible to coastal commercial line fishing.

Existing authorisations for commercial fishing, aquaculture and pearling will continue to be valid if the area to which they apply falls within a marine reserve. If an area historically fished becomes, for example, a marine nature reserve or a sanctuary zone in a marine park, a commercial authorisation will only continue until its expiry date. Authorisations may be renewed if the activity is in a zone where the activity is permitted, e.g. a general purpose zone.

If the commercial value of an authorisation is considered to be diminished by the establishment of a marine reserve, the holder of any fishing authorisation will be eligible to apply for compensation under the *Fishing and Related Industries Compensation (Marine Reserves) Act 1997*.

The long-term implications of increased costs in managing fishing within a marine park zoning system must also be considered. Fisheries WA will be responsible for all fisheries compliance in marine reserves, and inevitably will need to allocate extra resources to policing activities. Therefore government must ensure that sufficient resources are available so that management compliance can meet sustainable requirements and is cost effective.

At this stage, there is no across-government coordinated planning process at a State level for broader marine resource use and allocation outside established or proposed marine reserves. A number of agencies manage individual sector responsibilities:

- Fisheries WA manages fishing and aquaculture;
- Department of Minerals and Energy (DOME) manages mining;
- Department of Transport (DOT) manages ports and sea transport;
- Department of Land Administration (DOLA) manages seabed leases in State Territorial Waters; and
- Conservation and Land Management (CALM) manages declared marine parks and reserves.

However, increasing competition for access to the marine environment for an array of activities – recreation, boating, fishing, conservation, shipping, aquaculture, petroleum, mining – will eventually require government to adopt an overall planning approach.

The Commonwealth Government is seeking to address this need in its own jurisdiction through its recently announced *Oceans Policy*. Western Australia has yet to address this issue or decide to participate in the Commonwealth-sponsored planning process.

3.4 Fish stocks at risk

When looking across the broad range and diversity of finfish stocks, most WA fish resources at this time are both sustainable and in reasonable health by national and international standards. Despite this, local depletion is already an issue for some exploited finfish stocks and, as fishing pressure continues to expand over time, this will become an increasing feature of coastal fisheries.

These expected trends will be reflected by:

- changes in stock size composition;
- reductions in catch rates (abundance); and
- greater variations in abundance from season-to-season or year-to-year.

While adequate breeding stock levels can be maintained, as the exploitation rate increases the relative size of catches from different sectors of the fishery must also be expected to change. The average size of individual fish will decline over time and, in many cases, will stabilise right on the legal minimum size for individual species.

This will increase demands for effective management controls, particularly enforcement of legal minimum sizes and measures to maintain adequate breeding stocks. In these circumstances, fisheries managers will need to be increasingly conservative in their approach to managing fish resources.

In turn, this situation will require:

- more rigorous research and monitoring;
- a continuing program of stock evaluation; and
- a better understanding of the links between fish and other components of the ecosystem, all at higher cost to the community.

Greater emphasis on understanding the impacts of expanding recreational fishing activity will become increasingly critical for successful resource management.

The 1997/98 *State of the Fisheries Report* (Fisheries WA 1998) has identified a number of finfish stocks which are fully exploited and may be at risk. They include:

- red emperor and Rankin cod in the Pilbara Trawl Fishery;
- pilchards at Albany;
- whiskery shark off the lower west and south coasts; and
- some cobbler and black bream stocks in our temperate estuaries.

In addition, the study into WA's open access fisheries (Crowe, F. 1999) has also pointed to five species of critical significance to the present wetline sector: pink snapper, dhufish, Spanish mackerel; whitebait and Australian herring.

Assessments of the status of some of these stocks are included to indicate future directions that may be required for species-specific management action.

3.4.1 Red emperor and Rankin cod

Red emperor and Rankin cod are long-lived tropical finfish and key target species of the commercial and recreational fisheries off the Pilbara and Kimberley coasts.

A major research project to determine the status of the stocks of red emperor off the Kimberley is still in progress. Thus, although the Kimberley stock of this species is likely to be fully exploited, the precise status of this stock will not be known until the research is completed in the latter half of the year 2000.

Further south off the Pilbara coast, research over the last six years revealed that both red emperor and Rankin cod stocks were fully exploited and at risk. Age-structured modelling has revealed that the spawning biomass of red emperor had fallen below the reference target point in the western Area 1 of Zone 2 of the Trawl fishery. Corrective measures have been put in place to reduce effort to sustainable levels.

A new management plan was implemented in 1998 to address these declines in catches and catch rates. This has further reduced commercial fishing effort and will allow stocks of these long-lived species to recover.

3.4.2 Pilchards

Pilchards are principally distributed off the lower west and south coasts of the State, where they are exploited by a number of small inshore purse-seine fisheries. Both west and south coast populations are considered to consist of separate breeding stocks, but with functionally distinct adult fish aggregations off Albany, Bremer Bay and Esperance.

With the exception of the years of the early 1990s, recruitment to this south coast population has been relatively low. Current stock assessments indicate that the biomass off Albany has been declining since 1994, and is now at its lowest recorded level, with the fishery in this region having become more reliant on fewer older individuals as a result of the continued poor recruitment.

Evidence suggests a similar situation is developing off Bremer Bay. Individual Albany quota holders have found it increasingly difficult to reduce their catches to meet sustainability objectives while still maintaining their economic viability. This situation was confounded by the advent of a significant mortality event in 1995, and a second more severe event in 1999, during which a large proportion of the breeding stock was killed.

As a result, there is a very high probability that the pilchard biomass levels in all three south coast zones are now extremely low. Thus there appears little likelihood of a significant improvement in stock levels and hence the fishery in the next few years. Management changes have been implemented to address this situation.

3.4.3 Whiskery shark

Whiskery shark is a demersal triakid shark endemic to continental shelf waters off southern Australia between North-West Cape and eastern Victoria.

A demersal gillnet and longline fleet that operates in managed fisheries off both the mid-west coast, and the lower west and south coasts of WA currently target this species, along with several other shark species and a number of demersal scalefish species.

Although previously caught in commercial quantities from waters off South Australia, whiskery shark population numbers in this region are now believed to be extremely low. In Western Australia, catch rates for this species declined markedly during the late 1970s and early 1980s.

Estimates of the level of biomass relative to the virgin level were below the target level of 40 per cent during much of the 1990s. However, the most recent assessment of the status of the whiskery shark stock has the best estimate at about 38 per cent relative to the virgin level. Current management measures, together with those planned for introduction over the next few years should ensure that breeding stock levels recover to acceptable levels.

3.4.4 Dhufish

Current biological understanding indicates that the present legal minimum size for dhufish is well above the size of first breeding maturity. However, the use of a minimum size limit as a management tool may not be highly effective if mortality associated with air bladder distension and decompression during capture is high, even if undersize fish are released.

This issue is critical for the management of all demersal fish stocks and requires further research to properly determine mortality rates.

Despite increasing fishing pressure, the dhufish stock currently appears to be healthy, although overall catches are increasing, particularly since 1997, and some areas are showing local depletion.

For some as yet unknown reason, part of the dhufish stock appears to be inaccessible to the present fishery, but this could easily change with shifts in fishing technology.

On the basis of available evidence there are no immediate concerns for the overall status of this fishery, although growth overfishing (i.e. capture at a smaller size than optimal) is likely to become more evident, as will localised depletion around population centres.

Apart from a daily bag limit for recreational fishers and a minimum size limit for commercial and recreational fishers, there are no specific management arrangements in place for the dhufish fishery. Dhufish are caught commercially in the demersal gillnet and line fisheries, whose management arrangements contain no specific reference to dhufish.

3.4.5 Spanish mackerel

An examination of the Spanish mackerel catch data points to significantly increasing exploitation of this species. Biological information on the WA stock is limited and work on stock movements and structure has only recently begun.

For the immediate future, a number of issues need consideration. As a precautionary measure to ensure breeding stock levels and recruitment sustainability, there has been community support to increase the legal minimum length for Spanish mackerel so that it clearly matches the estimated size at maturity at about 90cm. Legislation to achieve this has now been has been introduced.

There may also be a case to integrate the commercial troll line fisheries in the north and west Kimberley, and perhaps the Pilbara, with the demersal fisheries. Alternatively some steps ought to be taken to limit or reduce latent commercial fishing capacity in this region, which could be refocused on the mackerel stock.

Already a decision has been taken not to allow any new dories (dinghies associated with 'mother ships') into the Spanish mackerel fishery.

3.4.6 Pink snapper

While the oceanic pink snapper stocks along the west and south coasts are generally being harvested at sustainable levels, a specific plan and management program has had to be put in place to deal with stock depletion for the unique genetic stocks within the inner eastern and western gulf stocks of Shark Bay.

While current management arrangements will allow the eastern stock to recover, new management approaches will need to be developed to maintain these fragile inner Shark Bay stocks in the longer term. This area may well become WA's first attempt to directly limit a recreational catch and maximise the utility value of this fishery.

For example, catches could be controlled through an annual allocation of specific permits to take individual fish. This concept has been well developed in wildlife game hunting and fisheries management in North America, and is worth examining for WA.

Research sampling for snapper eggs associated with some spawning aggregations in Denham Sound are also showing signs of significant local depletion. In addition, a recent recreational catch survey has indicated that the catch in the western gulf is higher than desirable in relation to the spawning biomass estimates for this area. This issue is being addressed through the regional recreational fisheries management strategy for the Gascoyne.

In contrast to the inshore stocks, the offshore oceanic pink snapper stocks in the Gascoyne appear healthy, with the total commercial catch constrained by a 550 tonne quota. Anecdotal reports from anglers also indicate an increasing abundance and improved recreational catches and catch rates in the offshore oceanic stock fishery north of Turtle Bay on Dirk Hartog Island. However, growth in commercial and recreational snapper catches in waters from Kalbarri south require further stock assessment.

3.4.7 Australian herring

The commercial Australian herring catch from the south coast declined markedly during the first half of the 1990s, as did catches reported by anglers. However, anecdotal information from anglers reported in the 1999 season indicated a return of large numbers of smaller herring to west coast waters.

A major research project to review the life history of Australian herring and the status of the stock has recently been completed. The project indicates that herring spawn along the lower south-west coast between Perth and Albany, and recruit as juveniles into near-shore waters from July in WA and October in South Australia. Herring mature in their third year and migrate westward.

The research project is developing a population dynamics model, which aims to identify the sustainable catch by sex and by the two major regions in which they occur – the south coast of WA and South Australia and the west coast of WA.

Until this information is available, a precautionary approach to management is recommended, given that Australian herring has been identified as the most important recreational fishing species, and that fishing pressure on this species (particularly on the west coast between Augusta and Perth) is significant.

3.4.8 Whitebait

Whitebait stocks are considered fully exploited and annual catches are likely to continue to show large fluctuations under the influence of environmental factors.

While not a recreational angling species, the acknowledged importance of these whitebait stocks as an important food source for predators such as larger fish and penguins means that extra care needs to be taken when formulating management policy for commercial bait and food fisheries targeting this species.

3.4.9 Other finfish species

Other finfish species under increasing pressure along the State's west coast include tailor, baldchin groper, and coral trout (in the Abrolhos Islands area). These species are still vulnerable to localised depletion, if not over-exploitation, in the longer term.

3.5 Key issues facing commercial fishing

The vast majority of the State's commercially exploited marine resources fall within either the scope of a management plan, an interim management plan or some licensing arrangement. However, there continues to be significant surplus capacity in the wetline fleet – with minimal opportunity for diversification into new fisheries.

Management arrangements, particularly for coastal finfish and the smaller commercial fisheries, are in some cases complex. While some plans have been more successful than others in achieving sustainability for individual stocks, the proliferation of management plans has refocussed commercial fishing effort onto the uncontrolled stocks.

Due to natural fluctuations in abundance and changes in fishing pressure, all of these plans need to be continuously reviewed and updated.

The nature and structure of the State's commercial wetlining fleet is diverse. Government, the fishing industry and the community need to decide now on the future management of this sector of the commercial fishing fleet.

In addition, the expansion and development of commercial fishing can be in direct contradiction to the aspirations and needs of recreational fishing or aquaculture. Economic and social objectives – and their primacy in fisheries management – are difficult to achieve, let alone measure or reach easy community agreement on. Maximising economic wealth in a fishery – and the concentration of wealth – as opposed to a social objective for regional development and employment, do not easily sit side-by-side.

For most managed commercial fisheries where access entitlements are transferable, the key focus has been resource sustainability. Economic and social considerations have only sought to influence management direction where there is wide industry support or some political imperative at the time.

An example of this is the case of commercial fisheries subject to rules for non-transferability, particularly in estuaries. In WA there has been a strong push over about 30 years to reduce the number of participant fishers.

However, these objectives were implicit, and never appeared in a management plan or other public policy statement. In practice they focused on:

- reducing the number of participant fishers;
- removing latent and therefore excessive commercial fishing effort;
- easing the political difficulties of industry structural adjustment; and
- providing for gradual change over time to covertly introduce fish resource use re-allocation.

These subsidiary objectives align in part with the prime aim of sustainability. Conversely, public demand for local fish for both retail and restaurant markets has created a dilemma for those in fisheries management, due to the need to maintain some commercial production from these coastal stocks.

Furthermore, as State governments cope with the consequences of the National Competition Policy and the fishing industry seeks more certainty for resource security, clarification of management objectives and a focus on the directions of management are becoming more apparent.

3.6 Key issues facing recreational fishing

Creel census surveys have recorded recreational catches in three areas of the State. These surveys have covered:

- shore-based catches on the south coast between Esperance and the Perth metropolitan area;
- trailer-boat catches between Augusta and Kalbarri; and
- shore and boat catches for the Gascoyne region, from Shark Bay to Exmouth.

These surveys are part of a five-year program to establish a baseline dataset of total recreational catch and effort for each biogeographic region of the State, but at best the data on recreational fishing impacts is, by design, incomplete for any one year.

However, trends in overall participation rates show that recreational fishing is becoming increasingly popular and exceeds growth trends in State population levels. It is likely that annual recreational fish catches now significantly exceed the estimated 5,000 tonnes taken in 1992.

Technology is also helping recreational fishers to more accurately and easily target and catch fish. This is particularly so for boat anglers who use Global Positioning Systems (GPS), sophisticated digital echo sounders and high-tech gelspun and braid fishing lines.

Recreational fishing pressure has the capacity to have a substantial impact on coastal stocks. This has already occurred in Shark Bay's inner gulf snapper stocks, one of which has had to be closed to fishing. Similarly, in the marron fishery and the metropolitan abalone fishery, severe time limits on recreational fishing have been necessary to keep catches within sustainable limits.

There is likely to be further local depletion of fish stocks as recreational fishing pressure continues to expand.

While commercial fishing is ultimately constrained by operating costs relative to catch rates, recreational fishing effort is seemingly undiminished by economic constraints. Recreational fishers continue to fish provided there is a possibility of something to catch, and in the process are capable of severely depleting some stocks.

Continual growth in tourism, local fishing participation and coastal populations – particularly in the South-West – will impact directly on all inshore and estuarine fish, prawn and crab stocks. The time will come when constraints on recreational fishers will need to include controls on the number of participants, or total days of access to the fishery (eg as in the marron or metropolitan abalone fisheries). However in practice, limiting access in the majority of the State's coastal fisheries will be difficult to achieve without strong public support.

Pressure is already being exerted by the recreational fishing community to shift management towards a more relevant regional focus. This is being driven in part by the failure of generic state-wide controls to deal adequately with local issues in various key fishing regions.

3.7 Impact of competing interests for coastal fish stocks

Resource sharing and allocation were one of the key factors behind the commercial wetline catch study (Crowe, F. 1999) and the proposed consultation process. One of the primary issues leading to this study was whether or not the rock lobster fleet should continue to have wetline access.

The long-term trend in the wetline catches did not confirm a commonly-held view that the rock lobster fleet takes large amounts of finfish by wetlining. In fact, most of their reported wetline catches were

relatively small, with only about a third of the fleet reporting any wetline activity. This situation is consistent with a long-term reduction in the rock lobster fleet numbers, and the resulting increased time and effort required for lobster fishing.

Though there may be some non-reporting of catches, it is still unlikely that the total wetline catch by the rock lobster fleet is very large. Of most interest in the rock lobster wetline fishing pattern were zonal differences in catch levels, with 27 Zone A (= 20 per cent) [Abrolhos]; 50 Zone B (= 30 per cent) [Mid-West coast]; and 124 Zone C (= 40 per cent) [south of Jurien Bay] boats reporting wetline catches between 1991/92 and 1997/98.

The long-term trend also did not support anecdotal evidence of large amounts of dhufish being taken by the rock lobster fleet. Dhufish catches were generally lower in the winter months, when the reported wetline catches of the rock lobster fleet (fishing in their off season) were at their highest.

However, more recent figures from 1997/98 show that larger numbers of rock lobster boats began to wetline in response to rumours of a wetline fishing review and forecasts of very low rock lobster prices in 1998/99. This is discussed in an appendix to the wetline study (Crowe, F. 1999).

Despite the information on historical catches there is likely to be considerable scepticism among other sectors (both commercial and recreational) about the need for rock lobster vessels to retain access to finfish stocks other than for their personal use.

Any move to manage the commercial wetline sector more precisely will need to deal with the issue of latent fishing capacity within managed fishery fleets, such as the rock lobster fleet.

3.8 Cost of management of finfish resources

Both the commercial and recreational sectors, which includes charter boats, target the same finfish resource. Who should pay for the management of this multi-species, multi-user fishery, especially as the need for higher-scale management arises?

Six major fisheries under Fisheries WA's Commercial Fisheries Program operate under full cost-recovery arrangements, with other fisheries contributing to a lesser extent. As a matter of government policy, an increasing number of commercial fisheries could be moving to full cost-recovery over time. Therefore, cost effective management in these smaller commercial fisheries will become an increasing imperative for the commercial client group.

While the cost of managing single species and predominantly commercial fisheries such as rock lobster, prawns, scallops and pearling is relatively inexpensive through economies of scale, management of coastal fish resources, which are generally multi-species/multi-gear/multi-sector, is particularly costly.

Their management is complicated due to the diversity of stocks involved; stock migration; and distribution spread along a 12,000 km coastline, encompassing a number of biogeographic regions.

Irrespective of their economic 'value', multi-sector fisheries based on multiple stocks cost more to manage than single sector, single stock fisheries.

The challenge for government and the community will be in providing adequate funding mechanisms to share the relative cost burden between the various sectors and develop cost-effective management processes, which ensure sustainability.

Fisheries WA's *Strategic Plan 1997-2002* (Fisheries WA, 1997) lists among its planned achievements to meet government policy directions:

- Finalising the implementation of cost-recovery for commercial fisheries, and expanding the number of fisheries under these arrangements.
- Initiating resource sharing between commercial fisheries, recreational fishing and/or other sectors through an $8 million access buy-out program.
- Identifying, promoting and maintaining a diverse range of quality recreational fishing and related eco-tourism opportunities.

The agency is aware of the cost demands of managing small-scale or highly regionalised commercial fisheries. Consolidated Revenue funds should be used to meet high-priority community service obligations, and further cost recovery within the smaller regional commercial fisheries will continue to be examined.

Fisheries WA will continue to review the level of activity and costs in smaller regional commercial fisheries, recreational fishing and charter management, so that they continue to be managed cost effectively in accordance with the objectives of the *Fish Resources Management Act 1994*.

Though there is potential capacity for some changes in commercial fishing cost recovery and re-allocation of existing Consolidated Revenue expenditure, in practice there is a limit to what can be achieved. This is particularly so if Fisheries WA's responsibilities for the ecologically sustainable management of smaller regional commercial fisheries, aquaculture and fish and fish habitat protection are to be met.

The increasing management, consultation, research, stock assessment, education and compliance costs of the recreational and charter fishing sectors must also be monitored.

Existing recreational fishing licence fees flow into a Recreational Fishing Fund, and are applied to projects involving management, fish stock research, community consultation, education, and fishery enhancement.

Increased allocation of government funds from non-Consolidated Revenue sources continues to be sought for recreational fishing projects. These include the Natural Heritage Trust and the Fisheries Research and Development Corporation, however such funding is limited to specific research and development projects and will not meet long-term core management needs.

The adequacy of funding to meet future management demands will be a critical factor in whether or not WA can meet the challenges in recreational and commercial fisheries in the coming decade.

A new approach to fisheries management - integration of all user groups and their eventual consolidation into a single management plan - may be warranted. To be cost-effective, such an approach may require new legislation for the management of smaller regional commercial fisheries which integrates all stakeholder interests across regionally-based fisheries. Obviously funding requirements must be included in these considerations however the question of how adequate funding should be provided is a matter for discussion between Government, the commercial and recreational fishing sectors and the wider community.

3.9 Valuations and adjustments

In the main, political judgments on resource use have not historically been able to utilise comparative valuations or market mechanisms for adjustments between sectors. Free market factors have not yet been used to re-allocate fish resources between sectors in Australia. The institutional framework for such an adjustment mechanism simply does not exist.

In truth, most decisions affecting commercial and recreational fishing policy decision-making and resource allocation focus on more simplistic assessments. Issues often considered include:

- Availability of fresh fish for local, Perth metropolitan and inter-state markets.
- Potential export income for the State.
- Employment impacts in both the fishing and associated sectors.
- Importance of fishing to regional economies.
- Importance of fishing to the tourist industry.
- Importance of fishing to coastal towns.
- Impacts of fisheries on the ecosystem and biodiversity.
- Recreational opportunity and diversity.

While it would be preferable that such decision processes were based on sophisticated, economic valuations of the sectors concerned, the methodology to do this has not yet been developed as a cost effective tool.

This situation is common across Australia and unlikely to alter significantly in the immediate future, although a national study to develop suitable economic methods for valuing commercial and recreational fisheries is currently in progress.

For these reasons, adjustment in resource access between interest groups has historically taken place through government intervention (licence buy-back, compensation and restructuring), or through resource use separation.

Unless there is a clearer allocation of tradeable resource entitlements for all users, the existing *ad hoc* processes for resource re-allocation are likely to continue.

There would need to be a substantial shift in the direction of fisheries management for a free market framework to be established and work. It would require a better understanding of resource use across all sectors and a shift in management towards agreed catch shares and effective controls on both recreational and commercial catches.

3.10 Property and access rights in managing fisheries

Some key issues for managing WA's fisheries stem from the nature of existing access rights.

Most people's concept of property is related to land. For example, the State confers the right to hold title over a piece of land, be it by way of a 'freehold' title or various forms of lease, with pastoral leases being the main type.

However, even though this property is not totally unencumbered – there are requirements to pay taxes on it, keep it in good order and use it only for certain purposes – the concept of ownership gives the title holder an incentive to look after the property.

In contrast, the current system for assigning access to the State's fish resources is much more complex. For a start, fish stocks are not 'owned' until they are caught. The State can confer rights and regulate permission to catch these fish, but essentially no one owns them until they are caught.

Therefore the nature of the property right is fundamentally different – it confers a right to actually fish, but not a right to the fish as an entity.

The State does not guarantee the fisher a quantity of fish, but it does have certain duties to provide the best circumstances for those who are granted permission to fish. For instance, in the case of quota-managed fisheries, e.g. abalone, a licensed diver has no specific rights to an abalone found in the sea except when that abalone is taken for sale. The quota control infers a limit on the catch that can lawfully be taken.

The State can confer increasing degrees of certainty over this right, as it often does by creating output controlled systems – i.e. conferring quota management regimes as compared with gear usage rights (e.g. rock lobster pots) without specific individual catch limits.

Also, with the development of common law and the increasing use of access rights in commercial transactions – and the State's propensity to tax it – there is gradual recognition that this right has some of the attributes of property. This is certainly the case with taxing licence values for stamp duty.

The fishing industry has, over time, sought an increasing recognition of this attribute, seeking to have it become more of a 'property right' akin to that for land. Fishing has become increasingly sophisticated and capital intensive. If industry wishes to undertake a capital investment, it must offer its financial backers a degree of certainty and surety. Some of this will be a matter of confidence reflected in the history of stable management of the resource by the State. Some will come from other assets held by the fisher.

However, the financial backers will also be looking for an explicable and understandable system of fishing rights, which within environmental variations will give operators access to a certain quantity of product. There is also a need to develop approaches that will accommodate shifts in the community use of resources over time.

The current State Government's position is quite clear. Any 'rights' extended to the commercial fishing industry are prescribed by the nature of the entitlement outlined in the legislation for a managed fishery or by licence.

The Minister, on behalf of the community, has preserved his position to amend or revoke a management plan that would, in effect, cause any entitlement or authorisation established by a managed fishery to lapse. In reality this has not happened, but this position provides a fine line between what could be described as 'property' in the final sense or some form of quasi property entitlement.

This WA position differs from the Commonwealth where fishing entitlements have been extended to a form of statutory fishing rights.

The issues surrounding a further extension of any legislative framework for fishing entitlements towards an unfettered, unabridged property right is complex. The desire of the community to earn a resource return or rent beyond the costs of management, and issues arising from possible management and/or resource failure, all require consideration.

There is no intention by the State Government to alter its position on access rights at this time.

However, separate from the nature of the fishing right is the ability to transfer it. The *Fish Resources Management Act 1994* essentially takes the position that subject to certain conditions related to payment of fees, the life of a management plan and adherence to the provisions of the Act, licensees have an expectation that their access right is both renewable and transferable.

Such 'rights' for major fisheries have resulted in significant 'good will' licence values on transfer. However, there are provisions by which, subject to explicable reasons, elements of transferability may be prohibited or constrained.

For example, since they were set up in the late 1960s, the transferability of fishing licences for most estuary fisheries has been essentially prohibited by policy. However, subject to certain conditions, direct descendants of licensees have been granted various types of licences as assistants and trainees, eventually resulting in full access on application when their father or grandfather leaves the particular estuary fishery.

Despite these limitations, this personal access has had some of the nature of a property right as fishers were able to surrender their access to the estuary, together with their associated fishing dinghy licences, to the general Fisheries Adjustment Scheme – a joint industry/government funded initiative.

Since 1983 there has also been a constraint on the issue of new Western Australian Fishing Boat Licences (FBLs), which in turn has created a market for these increasingly rare licences. These FBLs are of two types.

Those FBLs for boats less than 6.5 metres in length have not, as a matter of policy, been able to be transferred, except as a dinghy to an existing large (greater than 6.5 metre) fishing boat, or alternatively surrendered to the general Fisheries Adjustment Scheme. However, there is a genuine and relatively unrestricted market in licences for the larger boats – which form the backbone of the wetline fleet – besides the general Fisheries Adjustment Scheme.

Those holding Fishing Boat Licences are essentially permitted to fish for all species except those for which there are express prohibitions, or where there are areas, or methods, where similar prohibitions exist. That is to say, "everywhere except where not permitted".

In all these fisheries, either through the restraint on transferability, the general Fisheries Adjustment Scheme, or more recently for the estuaries, through the Voluntary Licence Buy-out Schemes, it has been recognised that there must be the ability to adjust the capacity of commercial fisheries.

Adjustments may occur in response to increased efficiency within the commercial fishing sector, or the need to adjust the spread in social benefits between fishing sectors.

As outlined earlier, common law entitlement allows recreational fishing except where restricted by legislation, while more recently native title and its application to native fishing rights has also become a factor that requires consideration.

At this stage, recreational, commercial and native title fishing access entitlements co-exist in fisheries law without any explicit basis for the assignment of priority use by any given sector. Priority use has generally been assigned as a matter of policy through administrative action, in line with the objects of the *FRMA 1994*.

As population levels grow, the ability of fisheries managers to guarantee certainty for resource sustainability will become more difficult. This will be exacerbated where different sectors seek to maintain or increase their share, particularly if recreational fishing pressure grows unabated over time.

The impacts of shifts in exploitation pressure are most likely to be felt first in the finfish stocks, particularly in the near-shore and estuarine areas in the State's south-west. Shifts in fish resource use between the recreational and commercial sectors in both directions are possible and occurring.

The community and government, given the nature of 'fishing entitlements' or 'rights', will need to face the crucial issue of whether the existing framework of management needs to be fundamentally altered. That is, to decide whether to allocate specific resource shares to different user groups and focus management strategies on managing the resource collectively under a single management plan controlling total fishing exploitation or adopt another approach.

Whether the former approach is desirable is a moot point, but at some future stage total catch limits will need to be placed on recreational fishing in order to minimise the risks for resource sustainability. Containment of commercial fishing sector catches by itself will not be sufficient. From a community perspective, the earlier action is taken, the easier it will be to manage and sustain the resource.

Ongoing policy changes will also be required, including longer-term solutions focused on:

- conserving fish stocks throughout their geographic range through habitat and nursery protection areas;
- increasing supply through aquaculture; and
- further restructuring commercial fisheries and the way fish resources are managed and used.

Taking a long-term view, there is a need for a gradual shift to a clearer form of access entitlements that provides a framework for continuous adjustments in fish resource use between commercial and recreational fishers.

More area or time separation in the use of fish stocks by different sectors may also be necessary, particularly if the needs and aspirations for aquaculture, pearling, conservationists and Aboriginal people (as traditional users of fish) are to be provided for, protected and managed.

3.11 Stewardship and the needs of resource users

3.11.1 Commercial fishing

The commercial fishing industry has a key role in the economic development of regional WA. It provides valuable export earnings and a source of fish to WA's consumers, bait for recreational angling and commercial fishing, and supply for the retail and hospitality industries. WA's local finfish catch, especially from the Pilbara trawl and northern line and trap fisheries, is the cornerstone of supply to the State's restaurant and retail markets.

The industry's future expectations focus on:

- sustainable catch levels;
- greater security of access to fish resources; and
- better use of the available catch and improvement in economic returns.

This economic improvement should come from:

- maintaining better product quality;
- improvements in value adding;
- market diversification;
- greater catching efficiency; and
- associated industry restructuring.

Lifestyle interests are increasingly being put to one side, as the major commercial fisheries shift to a more business oriented approach. However, lifestyle factors continue to remain a key factor in the State's inshore/estuarine net fisheries.

3.11.2 Recreational fishing

Recreational users mostly belong to two groups: those who simply wish to catch fish, and those who seek to enjoy both the experience and the environment and may catch fish as well. Increasingly the diversity and range of experiences associated with fishing has become part of the enjoyment of fishing, especially as values and attitudes of the community shift over time.

The key issues facing this sector, with its increasing numbers, focus on:

- maintaining catches by acquiring a greater share of the overall fish resource;
- more equitable sharing of the catch within the recreational sector;
- more diversified fishing opportunities; and
- better access to WA's private and public waterways for fishing.

Recreational fishing leaders have identified direct financial contribution to management as a device for more effectively influencing decision making. Their leadership certainly seeks to have a greater say in – and influence on – a wide range of fishing issues covering access, ecosystem impact, bait usage, and commercial and recreational fisheries management.

3.11.3 Aboriginal communities

Fish stocks in the Pilbara and Kimberley in particular have for a long time provided, in a *de facto* way, subsistence fishing to meet traditional needs of some Aboriginal communities.

Commercial fishing and aquaculture are seen as important opportunities for economic and social development among Kimberley Aboriginal communities. Their fear is that where Native Title rights co-exist with other usage rights, fish stocks will not be adequately managed in order to meet their needs.

The setting aside of areas specifically to meet coastal Aboriginal community needs, adjacent to Aboriginal-held land in the Pilbara and Kimberley in particular, and other areas of Western Australia, is likely to become a matter of increasing public debate.

Maintaining fish stocks for Aboriginal-based eco-tourism through charter fishing and associated coastal accommodation, the setting aside of specific areas for Aboriginal aquaculture investment now and into the future, and a more planned approach to meeting Aboriginal current and future needs, are likely to become more critical.

3.11.4 Aquaculture (including pearling)

Access to quality protected waters for the emerging industry of aquaculture – and for pearl farming – is seen as critical for their development. Competition for space in the face of other needs of the community will impose additional costs and limitations on new industry development.

As technology changes, new solutions may become possible, shifting the industry perhaps towards open water farming. However, for the time being, the co-existence and reconciliation of needs for aquaculture

and pearling requires government intervention and a more planned approach to development and allocation of water lease areas.

3.11.5 Conservation

Biological diversity and habitat protection are key national and international conservation requirements. In Australia, these are encapsulated in the principles of ecologically sustainable development and *Australia's Oceans Policy (1999)*, as well as State legislation such as the *Fish Resources Management Act 1994* and the *Conservation and Land Management Act 1984*.

These imperatives, along with government's desire to establish marine management areas and a representative marine reserve system along the WA coastline, will undoubtedly cause greater political pressure for spatial separation of resource users.

The size and form of such reservations will undoubtedly become a key community decision, with an impact on all marine resource users. Fortunately in WA, management of fishing practices generally has limited their impact on biodiversity.

In addition, most fishing activities have little or no effect on fish habitat and benthic flora. In some very limited areas trawling is permitted, but gear controls and closures over sensitive areas such as seagrass have limited the effect of such activities to less than five per cent of coastal waters.

The selection of representative areas for marine reserves is therefore not constrained in terms of locating suitable areas for biological representation.

3.11.6 Aquatic charter fishing and eco-tours

Aquatic charter operators provide a service to fee-paying customers, taking them fishing or sightseeing.

While most charters are marine-based, there is also a growing number of specialised land-based 'adventure' tour operations focusing on a fishing/camping experience.

These operations are sometimes based on pursuit of a particular prized species, such as barramundi or trout, and sometimes on the experience of fishing in a particular environment, such as a Kimberley wilderness or the karri forest in the State's south-west.

The resource use needs of charter operators tend to reflect the perceived demands of their client groups.

In areas where charter operators have based their business around assurances of high catches for their customers, the quantity of fish available for each customer is a dominant issue, as is access to special marine and terrestrial areas or highly-valued accessible fishing grounds.

As with recreational fishing in general, the expectation of a catch, the availability of a variety of species and size classes, and the pursuit of species highly valued for their angling or eating qualities, are key issues.

The charter industry is also tending to diversify its activities to target niche, high return, specialised tour markets, rather than low ticket price, high-catch harvesting.

3.11.7 Tourism and social benefits

The tourism industry obtains secondary benefits from a well-managed relatively pristine aquatic environment and generally healthy fish stocks.

Quality fishing is a regional tourism 'draw card' which increases both visitor numbers and the length of stay – and hence expenditure – in regional areas.

In addition to charter fishing, and business opportunities including guided tours for high-value market sectors such as gamefishing and sportfishing, there are niche markets for fishing-related industries. These include retail/service industry businesses catering for the families and non-fishing companions of keen fishers.

Lifestyle qualities and values associated with fishing can also be gauged by the extent to which fishing motifs are used in advertising campaigns encouraging investment in real estate and local business.

Promotion of regional cuisine utilising available commercially-caught fresh fish in local restaurants is a growing factor which enhances local business and must be taken into consideration in resource allocation issues.

3.11.8 Other stakeholder interests

There is a range of service industries covering bait supplies, tackle shops, banking, boat builders, gear manufacturers, hoteliers, restaurants and retail fish shops that depend on the welfare of WA's fish stocks. These interests will continue to influence policy through local government and various business and lobby groups.

To these must be added the interest of the community who do not fish actively, but gain satisfaction from the knowledge that they can buy fish and that the State's fisheries are well managed and resources are sustainable for the future. Much of the local fish consumed in the WA retail and restaurant sectors come from deep water, where resource access and sustainability can be largely managed through commercial fisheries.

Section 4 A New Framework for Sustainability and Resource Sharing

4.1 Key principles for resource sharing and management

One of the key challenges facing the management of WA's coastal fish resources is to establish an enduring and accepted administrative framework that can permit changes in the allocation of fish resources between user groups, in response to community priorities and needs.

However, it is critical that the process of resource sharing does not compromise the sustainability of fish stocks, which clearly remains the fundamental principle upon which fisheries must be managed, and is the core responsibility of Fisheries WA.

Such a framework has yet to be developed or implemented in any Australian state, to the detriment of social harmony, commercial and recreational fishing, and ultimately, the health of our aquatic ecosystems.

There is no doubt that the key to sustainable fisheries in the 21st Century will be community support for an agreed set of management principles and directions which can not only ensure the sustainability of fish stocks, but also the fair allocation of secure access to fish and aquatic resources.

The successful adoption of such a strategy will place WA yet again at the leading edge of successful fisheries management – however it cannot proceed without strong support from all sectors and user groups that have an interest in ensuring 'fish for the future'.

To be credible, such a framework would need to deliver results that aim to meet the best interests of the wider community, and best reflect the community's priorities for the use of marine resources.

A new integrated management framework will need to build upon management strategies that have already been developed within sectoral groups, and draw many of the key elements from the current Fisheries WA Strategic Plan and Program five-year Business Plans that have been developed with stakeholder involvement.

It will also need to adopt a multi-sector planning approach that extends the existing world-recognised management arrangements which Fisheries WA has for major commercial fisheries and recreational fisheries management, to take into account multiple sector use of fish resources and changing circumstances in the next 10 to 20 years.

Clearly future management, while continuing to focus on particular fisheries and the needs of each sector, must move forward to deal with the impact of all resource users simultaneously. This requires longer-term marine resource use and fisheries management planning, which integrates resource use by all sectors and interests into an overall strategy.

Ultimately, such a framework would also need to accommodate and consider not only the commercial, recreational and native title capture of fish, but also the demand for 'no take' areas for conservation and eco-tourism.

There would also need to be community agreement that total catch limits should apply for each major group, and the relative shares of the overall stock are in some way defined.

The process of allocating resource shares would also need to be seen as fair and equitable by all key stakeholders, and allow the various sectors a forum in which to present their position, and in which the facts, values and perceptions associated with sectoral use and fishery management policy could be adequately explored and debated.

Any decision making process will need to involve the wider community, and seek wide-ranging opinions in recognition of the fact that fish resources are ultimately owned by the community and not just those who fish.

While resource allocation decisions will need to accommodate all user interests and provide for a diversity of use by the community, they will also need to provide all sectors with a considerable level of confidence that access to fish and aquatic resources within the terms of any decision is guaranteed by government.

At the end of the day the allocation of fish resources must be based on:

- the best available information about the status of those stocks;
- the relative impact of all user groups; and
- decision making that takes into account community benefit and the priorities for resource use.

Before starting to outline a set of proposals on an integrated management framework for community discussion, it is important to identify the key principles around which such a framework should operate. These should include:

- The principal objective for fisheries management remains the sustainability of fish stocks.
- Access to wildstock fisheries must take into account use by all sectors, and recognise differing sectoral values and management objectives.
- Where adjustments in resource use occur between sectors, market forces ought to be used to make adjustments to the maximum extent practical.
- Allocation of access to each sector, as they relate to total resource use, needs to be established clearly.
- Information about levels of resource use by various sectors must be measured and understood.
- Any changes in levels of resource access for reasons of biological sustainability should not be fettered and apply equitably to all resource users.
- Resource share adjustments should be open to scrutiny, and have a time frame sufficient for sensible business planning and the implementation of change.

4.2 How might fish resources be shared?

In an ideal world, free-market economics and tradeable fishing entitlements might provide a means for the community to resolve the resource allocation issue without government intervention.

Where access rights to a fishery have been allocated within the commercial sector, experience shows that market forces can deal adequately with internal allocation issues over time. This is particularly the case for some commercial fishing access entitlements. However, normal market measures to allow such adjustments between sectors cannot and do not operate at present.

Clearly a major aim must be to allow shifts in resource use in response to longer-term biological, economic or social pressures. Any process to achieve this should use both market and administratively-driven processes to allow change.

As with property on land, a clear definition of what constitutes an access entitlement, knowledge of the resource, and allocation of resource shares based on these access entitlements, will be essential if market-driven solutions are to become at all feasible.

Once resource shares between sectors are allocated, this will allow market forces within the commercial fishing sector to make adjustments between different fishing technologies and groups of commercial fishers involved in the take of finfish.

Ultimately, it should become possible to also use market-driven solutions for the re-allocation of resource shares between user groups. However, while it is important to recognise such shifts as desirable, clearly market-based decision making can only be used as adequate information and a management framework which explicitly defines resource shares becomes available.

From a practical viewpoint the lack of quantitative data on fishing impacts (particularly that of recreational fishing) on fish stocks, and the current inability of market forces to operate efficiently for resource use adjustment between sectors, adds to the difficulty of decision making.

The minimum requirements for market forces to work are a fundamental understanding of sustainable catch levels and resource use impacts by each major sector; an understanding of how they might be valued; allocation of access into some form of resource access rights; and institutional arrangements to allow such markets to operate.

The state of economic theory and outcomes flowing from market-based re-allocation models need to be further developed before they can be of real benefit in practice.

Without this knowledge and management framework, government and the community have little option but to intervene and allocate access to fish resources through a negotiated planning process.

The way forward has to be built on an approach which allows for clear administrative and government decision-making, and which has community support.

4.3 Principles for integrating coastal finfish management

If fish resources are to be allocated, then one primary objective must be to establish explicit designated shares of the fishery to various user groups.

These resource shares must be clearly recognised in the longer term and should be adjustable within the total sustainable catch levels set.

To achieve this, government and the community must embrace long-term changes in the structure and direction of fishery and aquatic resource management.

The current management framework offers a number of options for implicit allocation of fish resources to various sectors, many of which are currently in use.

However, the major gap in current policy at a government and fishery management level is a lack of explicit definition of what the resource shares for each sector might comprise – both in form and in quantity, and a lack of any explicit assurance of security of access.

In order to reach a point where it will be possible to properly identify and assign equitable resource shares for WA's coastal fisheries, it is important that the current baseline that quantifies and describes resource use by commercial and recreational fishing and other sectors is adequately described.

There are a number of critical strategies that must be adopted to achieve the baseline from which resource sharing and improved security of access for all sectors can proceed. These include:

- Continued removal of excess latent fishing capacity from the commercial fishing fleet.
- Adequate description of the baseline that quantifies and describes current and historical resource use by commercial and recreational fishing and other sectors.
- Setting of accepted 'notional' or target catch levels for commercial and recreational fishing.
- Translating these total catch shares into management policies which efficiently limit total catches.
- Introducing by the various sectors a management regime which provides for security of access for all resource users and changes in resource use in response to community demands.

All this will require new management thinking; a different approach to research data collection; monitoring and evaluation; and a revised management structure for many fisheries.

In the commercial fishing sector, assuming that direct quota management is not practical or cost effective, catch limits ideally will need to be linked to tradeable effort units.

These might consist of specified amounts and types of fishing gear linked to periods of allowable fishing time for each licence holder, as now occurs in the tropical finfish sector. These would be adjusted in light of experience, efficiency changes as a result of technology, or shifts in fishing fleet dynamics.

Such a strategy must be based on sound management information, and would ultimately remove latent fishing capacity.

In the recreational fishing sector, management will mainly focus on the measurement of catch and matching the distribution of exploitation to availability of fish stocks and agreed catch shares.

One might expect that in the first instance controls such as bag and size limits, and area and seasonal closures could suffice. But in time, as growth in recreational fishing pressure continues, more restrictive limits will need to be imposed on some key species.

Eventually this could lead to fishing constraints which place a ceiling on the total recreational take. Options for achieving such an outcome would need to be developed around limiting access in terms of the total number of angler days, and limiting individual catches through seasonal bag limits or explicit individual annual quotas.

Simplistically, the final objective of all approaches would be to limit the catch to sustainable levels, and share it equitably between and within user groups to guarantee resource sustainability.

In the longer term, the West Coast region is likely to experience the greater fish resource risks and ought to be given urgent management priority. But realistically, new style management in the Kimberley, Pilbara, Gascoyne, and South Coast regions is likely to be easier to achieve. This is because there has been substantial rationalisation of commercial fishing already in these regions and recreational pressure is not as great.

The way forward needs to focus on the community embracing key principles on catch limitations and sharing between and within sectors, and to create a process and forum for establishing agreements on resource use, allocation and management directions.

The legislative and research tools and management concepts are available to take such a direction. To proceed requires community agreement, adequate funds and a refocus of government and Fisheries WA directions and commitments.

Realistically, achieving an integrated framework for the management of finfish and other coastal fish resources for each biogeographic region of the State will take between five and ten years. Without adequate funding, sustainable finfish fisheries with integrated management and identified resource allocation processes are unlikely to be achieved in the long term.

Ultimately, the philosophy of determining total resource use and setting catch targets for each sector ought to extend across all fisheries – including rock lobster and abalone – as well as coastal fish resources.

Proposal 1

That government and major stakeholders agree on the following key principles for integrating management and defining catch shares for WA's marine coastal fish resources:

- ***Establish sustainable target catch and access shares for the commercial and recreational fishing and other sectors.***

- ***Introduce strategies which limit catches to the target levels, and integrate the management of both commercial and recreational sectors.***
- ***Develop management strategies which provide for adjustments in resource use in response to changing community demands.***
- ***Further reduce surplus fishing capacity in the commercial finfish fleet.***

4.4 Management by region

A key step in developing a common basis for a resource sharing framework across all sectors must be to redefine management boundaries and make them consistent, where possible and useful.

In the case of WA's coastal fish resources, and in particular finfish, understanding human usage patterns and stock and species distribution is the basis of effective fishery management.

Consequently, any planning for future resource use is best placed in the context of acceptable biogeographic regions.

In the broad sense, for marine finfish resources, the State can be practically divided into four marine and two inland biogeographic regions. These are: the South Coast; the West Coast to south of Shark Bay; the Gascoyne region including Exmouth Gulf; the north of the State (Kimberley/Pilbara); and the inland waters of the North-West and South-West.

Looking at the broad picture, it is absolutely crucial to develop long-term plans encompassing all fish resource use. Within the next two years, Fisheries WA will be in a position to begin that work in an integrated manner, bringing together the requirements of all sectors of the community.

These regions have already been defined for recreational finfish and charter activities, and management of access to coastal waters for aquaculture is proceeding along similar lines. In addition, Fisheries WA is preparing a series of regional fish and fish habitat protection plans which identify the impacts of fishing and threats to aquatic habitats in each bio-region.

These biogeographic regions serve as the basis for an integrated strategy which would make the logistics of administration and management easier to achieve, and be of direct relevance to the distribution of key fish stocks.

Consequently, there is a need to combine groups of commercial finfish fisheries into a single management regime, and adjust management boundaries to reflect these regions and establish the basis for comparability and management with the recreational and charter fishing sectors.

Proposal 2

That the State's coastal fish resources should be managed on the basis of four major marine and two inland biogeographic regions.

These regions are the Kimberley/Pilbara, the Gascoyne, the West Coast between Zuytdorp Cliffs and Augusta, the South Coast, the inland tropical waters of the North-West, and the inland temperate waters of the South-West.

Proposal 3

That to complement management for recreational and charter fishing, and establish a consistent basis for integrated management and resource allocation, current management boundaries for commercial coastal finfish fishing should be modified as follows, using the commercial catch and effort database block boundaries as a basis:

- ***That a Gascoyne commercial finfish fishery be created by extending the existing Shark Bay Snapper Managed Fishery boundaries northwards from 26°30' south to the western boundary of the current Pilbara trap fishery (114°9'36" east), and incorporating all finfish species.***
- ***That Black Point (115°30' east) be the boundary of the southern biogeographic region, and that there be separate commercial finfish licences for the West and South coasts.***

4.5 Sharing fish resources and integrating management

For integrated management and resource allocation plans to be effective and credible, they must be developed through a focused decision-making process which allows all interest groups to participate; exposes all relevant information to community scrutiny; and provides a fair means of making recommendations to government on the use of fish resources.

It is proposed that a peak 'Fisheries Resources Council' be established to:

- investigate and deliberate on resource re-allocation issues;
- assist with detailed long-term planning; and
- provide advice to government on marine resource use issues at a regional level.

Such a body would help with communication and mediation between sectors and provide a balanced assessment of the merits of competing uses to government.

The form, role, structure and statutory responsibilities of such a committee in its advisory or decision-making role within government needs careful consideration.

However it is important that such a council has sufficient expertise in fisheries matters; is seen to be impartial in its deliberations; and is capable of considering the wider community interests, as well as the claims of competing user groups.

As a starting point for discussion, a five-member group is suggested, consisting of the Chief Executive of Fisheries WA or nominee; an independent fisheries management expert; an independent community representative; and one representative each from commercial and recreational fishing interests.

Such a council would complement, not replace, the present system of specific fishery or user group Ministerial Advisory Committees. The principal role of this Fisheries Resources Council would be to provide long-term management directions covering all sectors. It would aim to bring about changes in resource use which meet community expectations into the future.

Proposal 4

That a peak Fisheries Resources Council be established to co-ordinate the submission to government of six regional plans for the allocation and sharing of fish resources between user groups. It should also set the long term direction for management to achieve these aims, and provide a forum for determination of total catch shares for each user groups on a fishery-by-fishery or region-by-region basis.

4.6 What might resource allocation planning include?

Any plan for the allocation of fish resources would need to go beyond the fishery management elements of species biology, historic patterns of fish use and capture, and the needs of markets, and include an understanding and analysis of economic, political and social information. Research would have to be developed both within and outside Fisheries WA.

In multi-species fisheries, given that research resources are limited, a useful approach to establishing effective monitoring of fishery performance is to develop an index of catch, effort, and species composition based on several key indicator species, which would need to take into account the inter-relationships of the species in the fishery.

The suite of key species that constitute 'the fishery' would need to be defined, and fishing activity on these indicator species managed to accommodate changing patterns of fishing activity and stock abundance.

The extent that this is useful may vary from fishery to fishery but is likely to be particularly relevant for multi-species and demersal finfish fisheries.

In reality, any such approach would need to operate over a time scale which would allow the collection of useful time-series data, and allow both commercial and charter fishing businesses and the recreational fishing community to adapt to, and plan for, changes in resource allocation. An appropriate horizon for any resource use plan would need to be between 5 and 10 years.

Any such plan would need to be reviewed and adjusted through agreed changes to commercial and recreational fishery management strategies, with appropriate formulae that take into account predicted fishing efficiency or effort changes.

The recreational catch would need to be assessed in order to set notional catch levels and establish a basis for resource sharing and management of the recreational take.

Other elements in such a plan might include:

- Strategies that encompass multiple use issues and ensure management which allows market forces to be the main factor in sector adjustments.
- Approaches which resolve conflicts (which may often be perceived) in fish resource use, or provide for spatial separation of user groups, incompatible fishing operations or gear (for example, weekend or seasonal closures).

Proposal 5

That Fisheries WA develop 10-year regional resource allocation plans which integrate the management and use of coastal fish resources. These plans will be submitted for consideration to the peak Fisheries Resources Council, and should encompass each of the State's six major fisheries biogeographic regions.

Proposal 6

That a series of regional strategies for the State's recreational fisheries under development by Fisheries WA should complement management plans already in place for the State's commercial fisheries and complete the management picture for most finfish stocks.

Work on the resource allocation plans proposed in this paper should begin as soon as each complementary regional strategy for recreational fisheries has been completed.

Proposal 7

That the regional resource allocation plans should be prepared in the following order: West Coast, Gascoyne, Pilbara/Kimberley and South Coast.

4.7 Management for specific fisheries

A series of adjustments to current management for commercial fisheries are needed in order to establish the bases for assigning longer term resource shares. These adjustments are mainly aimed at reducing significant latent capacity for the take of finfish by commercial fishers, and establishing a starting point for setting a medium term direction for the allocation of more specific transferable resource shares in key estuarine and inshore fisheries.

In the short term, controls on effort for commercial fisheries will be complemented by regional recreational fisheries management strategies which spell out limits on individual daily catches, quantities of fish in possession, or constrain access through closed areas or seasons.

However, in the longer term the setting of notional calculated allowable catches and corresponding allowable effort for each sector will become a crucial element in the assignment and re-allocation of resource shares.

Population trends point to the major areas of population growth in WA being in the south-west; centred along the west coast south of Shark Bay; in metropolitan Perth and in the State's current major regional centres.

To reduce the risks of over-exploitation of coastal marine and estuarine fish stocks through commercial fishing, a number of strategies have already been introduced for the commercial sector.

These include:

- Specific management for commercial fishing including rock lobster, abalone, shellfish, trawling, shark and bait fishing operations, estuarine fishing, and mussels, crabs, octopus and line fishing in Cockburn Sound.
- Extensive closures (including seasonal) and restrictions on some key species including controls on gear, catch limits (quotas), and legal minimum sizes.
- Long-term reduction in the number of estuarine and beach commercial fishers. Avenues for adjustment have included rules on non-transferability of licences, buy-back of licences, and family licensing provisions.
- Proposals for the management of the Abrolhos Islands as a Fish Habitat Protection Area and exclusion of some areas to commercial line fishing.
- Continuing reductions in the State's wetline fleet within each biogeographic region.

Similarly, recreational fishers recognise and accept a raft of rules that constrain individual catches on each trip or fishing day. These include daily bag limits, overall possession limits, minimum legal sizes, some seasonal closures, some limited area closures, and constraints on the use of high-take fishing gear. These are being further refined through regional planning to adapt recreational fishery management to more specific circumstances.

Background information and the specific management directions for the key finfish fisheries where resource sharing is a major management issue, which aim to establish the basis for assigning longer term resource shares, are described in more detail in a set of five management papers:

- *A Study into WA's Open Access and Wetline Fisheries* (Crowe, F. 1999). Fisheries Research Report No. 118.
- *A 12 Month Study of Coastal Recreational Boat Fishing between Augusta and Kalbarri on the West Coast of WA during 1996/97* (Sumner and Williamson, 1999). Fisheries Research Report No. 117.
- *Management Directions for WA's Coastal Commercial Finfish Fisheries* (Fisheries WA, 2000). Fisheries Management Paper No. 134.
- *Management Directions for WA's Estuarine and Embayment Fisheries* (Fisheries WA, 1999). Fisheries Management Paper No. 131.
- *Management Directions for WA's Recreational Fisheries* (Fisheries WA, 2000). Fisheries Management Paper No. 136.

Section 5 Funding for the future

It is crucial for the community to realise that the existing funding structure for fisheries management in WA cannot possibly cope with all future research and management needs.

This is particularly so for most of the State's finfish fisheries, which consist of multiple stocks and species exploited by hundreds of thousands of people across vast distances.

The great majority of the State's coastal finfish fisheries produce relatively low economic returns through commercial fishing, but generate enormous social benefits which flow into tourism and quality of life through recreational and charter fishing, and through ensuring a supply of fresh fish to local markets.

There is also no question that WA's inshore fisheries are fragile and of low productivity by world standards, and their capacity to withstand high levels of exploitation is very limited.

It is fair to say that up until the late 1990s, these finfish fisheries have been managed largely on a precautionary basis, through a gradual wind-down in excess capacity in the commercial fishing sector, and the establishment of social standards such as bag limits for recreational fishing.

Marine conservation groups have also begun to advocate the use of 'no take' areas as a means of replenishing fish stocks. However there is little evidence to suggest that this approach actually works across the broad spatial requirements of many fish populations, and no information on whether or not it is cost effective.

To establish an effective management system for finfish fisheries, it is essential to have a proper scientific understanding of the dynamic nature of fish stocks and how they respond to changes in exploitation. It is also essential to have a research program which can evaluate the effectiveness of changes to management.

WA has a world-recognized paradigm for successful fishery management in its rock lobster fishery. It is time that the lessons learnt in developing management for this industry are applied across the broad spectrum of WA's other fisheries, and extended to encompass the needs of all user groups.

As outlined earlier, fisheries funding in WA in the 1990s moved away from its traditional main base – Consolidated Revenue. Fisheries WA no longer relies solely on government funding and has realigned its business practices to become more cost-effective.

Under current arrangements, Consolidated Revenue funds meet about half the agency's total expenditure. The remainder comes from either cost-recovery, recreational fishing licence fees or short-term project funding through grants from external bodies. The commercial fishing industry provides about $12 million and recreational fishers $1.5 million through licensing. The State's contribution to Fisheries WA in 1999/2000 is $15.5 million.

59

Expenditure is assigned through a series of projects within the four key program areas of Fisheries WA, which in 1999/2000 had approved budgets as follows:

- Commercial fisheries: $13.5 million
- Recreational fisheries: $7 million
- Pearling and Aquaculture: $6.5 million
- Fish and Fish Habitat Protection: $2 million

It is inevitable that the need for additional resources for fisheries management and demands for action from the community will escalate in inverse proportion to the quality of the fishing experience and the availability of fish.

If sufficient resources are not applied early in the cycle, the opportunities available through tourism development and value-adding will be foregone and fisheries management will need to focus on stock recovery through the closure of fisheries and creation of no-fishing areas.

A proper framework for resource sharing and integrated management, and the necessary research and management programs to support such an approach across all fish stocks in WA, is likely to cost in the order of $2.5 million a year over and above current levels of expenditure, while a further $1 - 2 million per year will be required to meet increasing demand for fishery management and compliance services within the existing framework.

Additional funds will also be required to effect further reductions in commercial fishing in the interests of resource sharing or the establishment of marine reserves.

5.1 Where will the money come from?

There is absolutely no doubt that new funding sources will have to be identified and pursued if WA's coastal finfish fisheries are to continue to provide the quality of social benefits that they now provide.

The concept of seeking additional funding through a direct Commonwealth contribution or a levy on fishing tackle and bait sales was taken to the Commonwealth Government in 1993 by a national recreational fisheries working group with members from all States. This approach for funding support was rejected out of hand and in recent years the Commonwealth Government has gradually handed over the management of all recreational and charter fishing and most commercial fisheries to the State governments.

Demands on management are increasing and there is no doubt the area of growth is no longer the commercial fishing sector - it is the recreational fishing sector. In addition to management for sustainability, this sector is also increasingly demanding a more explicit share of the fish resource, and additional management of commercial fisheries to safeguard the recreational catch share.

These demands are also mirrored by the commercial fishing sector, which is calling for greater security of access and a limit on the impact of recreational fisheries.

Funding for recreational fisheries management and research will need to grow in tandem with increasing numbers of fishers and fishing effort - especially as recreational fishers seek, and receive, a larger share of the overall resource.

What will happen to our fish stocks, and fishing in general, without proper financial support?

If left unmanaged, competition and conflict between user groups for access to fish is likely to reach such a crescendo that effective management will be paralysed.

In such circumstances, there will be increasing dissatisfaction among user groups with greater risks of political intervention and litigation. Much of this is bound to focus on resource shares and access and decision making outside an agreed framework may lead to the undermining of resource and licence security for commercial fishers, and a push for substantial areas to be excluded from commercial and/or recreational fishing and perhaps aquaculture development.

In the end, the fish stocks of WA will diminish and the fishing community - both commercial and recreational - will be the big losers.

It is therefore essential that the question of securing adequate funding for ongoing research, education and management is the subject of widespread community consideration and debate. Fresh ideas on alternative financial strategies and new funding sources will be welcome.

Proposal 8

That adequate resourcing and effective funding strategies should be an integral part of any package for fundamental changes in the management of the State's coastal fish stocks.

Section 6 References

Australian Bureau of Statistics (1987) *Recreational Fishing in Western Australia*.

Brayford, H. and Lyon G.E. (1995) *Offshore Constitutional Settlement*, Fisheries Management Paper 77, May 1995, Fisheries Department of Western Australia, Perth, WA.

Commonwealth of Australia (1998) *Australia's Oceans Policy*.

Crowe, F., (1999) *A Study into WA's Open Access and Wetline Fisheries*, Fisheries Research Report No 118, Fisheries WA, Perth WA.

Department of Conservation and Land Management (1998) *New Horizons in Marine Management*.

Department of Fisheries and Wildlife, Western Australia, (1983) *Discussion Paper – Future Management of Western Australian Developed and Under-exploited Fisheries*, Perth WA.

Fisheries Department of Western Australia (1985) *Discussion Paper – Arrangements for Entry to all Fisheries off and along the Western Australian Coast*, Perth WA.

Fisheries Department of Western Australia (1988) *The Offshore Constitutional Settlement, Western Australia, 1988*, Fisheries Management Paper No. 20, Perth WA.

Fisheries Department of Western Australia (1991) *The Future for Recreational Fishing – Final Report of the Recreational Fishing Advisory Committee*, Fisheries Management Paper No. 41, Perth WA.

Fisheries WA (1997) *Strategic Plan 1997-2002*, Perth WA.

Fisheries WA (1997) *Programs Business Plan 1997-2002*, Perth WA.

Fisheries WA (1998) *Future Management of the Aquatic Charter Industry in Western Australia, Final report of the Tour Operators Fishing Working Group*, Fisheries Management Paper No. 116, Perth WA.

Fisheries WA (1999) *A Quality Future for Recreational Fishing in the Gascoyne. Proposals for community discussion by the Gascoyne Recreational Fishing Working Group*, Fisheries Management Paper No.124, Perth WA.

Fisheries WA (unpublished), Volunteer Fisheries Liaison Officers Survey Database.

Fisheries WA (1998) *State of the Fisheries Report 1997/98*, Perth WA.

Fisheries WA, (1999) *Management Directions for WA's Estuarine and Embayment Fisheries*, Fisheries Management Paper No. 131, Perth WA.

Fisheries WA (2000a) *Management Directions for WA's Coastal Commercial Finfish Fisheries*, Fisheries Management Paper No. 134, Perth WA.

Fisheries WA, (2000b) *Management Directions for WA's Recreational Fisheries*, Fisheries Management Paper No. 136, Perth WA.

References

Grazby, M., (1996) *Improving the Western Australian Wetfish Market*, Report to Fisheries WA, Perth WA.

Lindner, R.K. & McLeod, P.B., (1991) *The Economic Impact of Recreational Fishing in Western Australia*, Fisheries Management Paper No. 38, Fisheries Department of Western Australia, Perth WA.

Patterson Market Research (unpublished, 1994) *Report on recreational fishing to the Fisheries Department of Western Australia*, Perth WA.

Reark Research (unpublished, 1996) *Final Report – Community Attitudes Survey*, Report to Fisheries WA.

Sumner, N. and Williamson, P., (1999) *A 12-month Survey of Coastal Recreational Boat Fishing between Augusta and Kalbarri on the West Coast of WA during 1996/97*, Fisheries Research Report No.117, Perth WA.

Western Australian Planning Commission (1996), *State Planning Strategy*, Perth WA.

Section 7 Announcement of Wetline Study

3 November 1997

New study of fishing boat licence

The Fisheries Department has announced a study of fishing activity undertaken with Western Australia's fishing boat licence [FBL].

Fisheries Department Executive Director Peter Rogers said there had been community concern that what was commonly known as the 'wetline' fishery, had unrestricted access to a wide range of species.

Mr Rogers said the sustainability of species, such as dhufish, had been a concern.

The 'benchmark' date of 3 November, 1997 had been set - no 'wetline' fishing history after this date would be considered in the development of any new management arrangements for the fishery.

Fishermen with an FBL have been individually informed by mail today of the benchmark date.

"We will analyse all available information on this fishery, including catch data provided by commercial fishermen," Mr Rogers said.

"The analysis will also involve consulting stakeholder groups over issues affecting the fishery."

Most of the Western Australian commercial fishing fleet, about 1600 vessels, are holders of an FBL. Three-quarters of the commercial fleet predominantly fish in the State's 29 managed fisheries while about 250 fishing boat licence holders rely on the 'wetline' fishery for their livelihood.

The fishery includes the use of hand lines, drop lines and hand-hauled netting.

Mr Rogers said the department would consult stakeholder groups on management options which would best address any sustainability or resource sharing issues.

He said the study and its benchmark date would not alter the arrangements for the review of line fishing off the Pilbara coast, nor did it affect fishing under a Managed or Interim Managed Fishery authorisation.

Mr Rogers said he expected the study to be completed by early next year. The Minister for Fisheries, the Hon Monty House, would then decide whether a formal review of the fishery would be undertaken.

FOR MORE INFORMATION CONTACT:
Commercial Fisheries Program
Fisheries Department of WA
(08) 9482 7333

FISHERIES DEPARTMENT OF WA
3rd Floor, SGIO Atrium, 168-170 St George's Terrace, Perth 6000 Ph (08) 9482 7333 Fax (08) 9482 7389
Web Site: http://www.wa.gov.au/westfish

Section 8 Figures and Tables

Tables

Figures

Table 1: Stock exploitation status and catch projections for major commercial fisheries in WA.

Fishery	Stock assessment complete	Exploitation status	Breeding stock levels	Previous catch projections (tonnes)	*Catch (tonnes) current season	Year	Catch or effort projection next season (tonnes)	Year	Comments current season catch
INVERTEBRATES									
Western rock lobster	Yes	Fully exploited	Increasing	9500-10000	9902	96/97	10000-11000	97/98	A below average catch was achieved in 1996/97 as predicted from puerulus settlement three and four years previously.
Esperance rock lobster	Yes	Limited data	Adequate	80	74	96/97	40-70	97/98	Catch figures and projections include the fishery's three management zones: Esperance, GAB and Albany.
Shark Bay prawn	Yes	Fully exploited	Adequate	1200-2000	2063	97	1155-2063	98	Increased catches of king prawns may be due to higher than average water temperatures during recruitment phase.
Exmouth prawn	Yes	Fully exploited	King prawn adequate Tiger prawn increasing	850-1100	815	97	771-1276	98	Tiger prawn stock is rebuilding from low annual levels resulting from cyclonic activity.
Onslow prawn	No	NA	Limited data	Not available	120	97	30-265	98	High rainfall improved banana prawn catches but reduced tiger prawn catches.
Nickol Bay prawn	No	NA	Limited data	Not available	237	97	Banana prawns 10-100	98	High rainfall improved banana prawn catches and this relationship provides catch forecast.
Broome prawn interim managed	No	NA	Limited data	Not available	54	97	King prawns 35-140	98	Limited fishing season of approx. 8 weeks. Stock adversely affected by a cyclone.
Kimberley prawn	No	NA	Limited data	Not available	528	97	230-590	98	Banana prawn catches improved by rainfall.
South West trawl	NA	NA	NA	Not available	35	97	Not available	98	Dominant catch for 1997 was prawn. Scallop catch in meat weight.
Abalone Zone 1 (greenlip/ brownlip)	No	Fully exploited	Adequate	117.17 (Q)	108.78 (720 days)	97	108.75 (Q) (540-635 days)	98	Quotas converted to whole weight using greenlip/ brownlip abalone conversion factors. Catches higher this year due to 13-month rather than 12-month season.
Abalone Zone 2 (greenlip/ brownlip)	No	Fully exploited	Adequate	110	105.5 (685 days)	97	110 (Q) (650-850 days)	98	Quotas converted to whole weight using greenlip/ brownlip abalone conversion factors.
Roe's abalone	No	Fully exploited	Adequate	122	121.2 (990 days)	96/97	120 (Q) (750-1100 days)	97/98	Catch projection includes Roei caught under Zone 1 and Zone 2 quotas.
Shark Bay scallop	Yes	Fully exploited	Adequate	450-500	328	97	180-250	98	Annual recruitment varies radically due to environmental influences. Projections given in meat weight.
Abrolhos Islands & Mid West trawl	No	Fully exploited	Adequate	Not available	9	97	90-150	98	Projections given in meat weight based on October 1997 survey.

Note: Above table is taken from Fisheries WA Annual Report 1997/98.

Table 1 (continued): Stock exploitation status and catch projections for major commercial fisheries in WA.

Fishery	Stock assessment complete	Exploitation status	Breeding stock levels	Previous catch projections (tonnes)	*Catch (tonnes) current season	Year	Catch or effort projection next season (tonnes)	Year	Comments current season catch
FINFISH									
Pilbara trawl	Yes#	Some species over exploited	Limited data	3000-3400	2630	97	2300-2700	98	Assessment only includes major species. Voluntary 17% effort reduction in 1997.
Pilbara demersal trap & line	No	Fully exploited	Limited data	Not available	343	97	Not available	98	Low level of effort continuing.
Kimberley demersal trap & line	No	Fully exploited	Limited data	Not available	673	97	650	98	An interim management plan has been formulated for the fishery, which is now known as the Northern Demersal Scalefish Fishery.
Kimberley gillnet & barramundi	Yes#	Fully exploited	Adequate	30-50	37	96/97	28-47	97/98	Barramundi catch only.
Shark Bay snapper	Yes	Fully exploited	Adequate	450-500 (Q)	561	97	500-550 (Q)	98	Improved market in 1997 led to a higher than average catch.
WA salmon	Yes	Fully exploited	Adequate	1000-2000	2626	97	1700-5000	98	Environmental factors (Leeuwin Current) influence recruitment and catch levels.
Australian herring trap	No	Fully exploited	Adequate	500-1000	1001	97	520-1550	98	South coast catch recovered to historical levels.
Southern demersal gillnet & longline	Yes#	Fully or over exploited	Decreasing	800-1000	924	96/97	800-1000	97/98	Management measures designed to reduce catch to improve breeding stocks have been implemented.
West Coast demersal gillnet & longline	Yes#	Fully or over exploited	Decreasing	350-450	452	96/97	350-450	97/98	Management measures designed to reduce catch and improve breeding stocks are being implemented.
Cockburn Sound	NA	NA	Not appropriate	Not available	75	97	49-125	98	Finfish only (excludes bait fish).
Princess Royal Harbour/King George Sound	NA	NA	Not appropriate	20-70	70	97	47-90	98	Includes crabs, squid, finfish. Excludes purse seine.
Shark Bay beach seine & mesh net	Yes#	Fully exploited#	Adequate#	100-120#	122 (whiting)	97	90-140 (whiting)	98	Whiting only used in catch projection.
Exmouth Gulf beach seine2	NA	NA	Not appropriate	Not available	Not available	97	Not available	98	
Estuarine fisheries	Yes#	Fully or over exploited	Not appropriate	700-800	833	97	248-540	98	Includes crabs, prawns and finfish. 1998 projection is for south coast estuaries only.
Albany/King George Sound purse seine1	Yes	Fully or over exploited	Decreasing (low)	3025	3044	97	3030 (Q) (2005-2215 days)	98	Recruitment was better than in previous years, but still less than average.
Bremer Bay purse seine1	Yes	Fully exploited	Adequate	2560	2176	97	2250 (Q) (1060-1172 days)	98	Lower recruitment again experienced in 1997.
Esperance purse seine1	Yes	Under exploited	Adequate	1800	1485	97	1330 (Q) (490-600 days)	98	Recruitment being maintained.
West Coast purse seine	Yes	Fully exploited	Adequate	3500	2314	97	2000-3000	98	Reduced catches due to the lower availability of the stock.
Mid-West purse seine2	No	NA	NA	1000-2000	Not available	97	500-1000	98	Development fishery. Low availability of large schools led to a reduction in both effort and catch.
Lake Argyle catfish	Yes	Fully exploited	Decreasing	90-120	147	96/97	101-138	97/98	
AQUACULTURE									
Pearl oyster	Yes	Fully exploited	Increasing	627000 oysters[3]	622662 oysters	97	572000 oysters[3] (Q) (15000-19000 dive hours)	98	1997 quota attained. (Zone 1 quota was effectively reduced by 5000 shell because one operator had his quota reduced owing to a prosecution.

Footnotes: * Catch figures supplied for latest year available. NA = No assessment. # For key species only. Q = Quota management.

1 In future these three sectors of the south coast pilchard fishery will be reported as one fishery with three zones.

2 Catches cannot be reported as fishery has too few operators (confidential).

3 Pearl catch quota is in individual oysters.

1996-97

SPECIES	LIVE WEIGHT (kg)	ESTIMATED VALUE A$
Barracuda (Northern pike)	448	1569
Barramundi (Giant perch)	3574	25018
Boarfish	146	395
Bonito	106	232
Bream, Robinson	372	1302
Bream, black	1328	5071
Bream, mixed	43	151
Bream, silver (Tarwhine)	126	364
Bream, western yellow fin	813	3659
Catfish, sea	233	466
Chinaman cod	4895	14686
Chinaman fish	6	13
Cobbler	1517	5295
Cod	14638	51846
Cod, Rankin	2719	9790
Cod, grey banded	675	2362
Cod, spotted	242	848
Crab, sand	43983	197924
Cuttlefish	109	273
Dart	51	61
Dhufish, Westralian	159982	1514942
Emperor, blue lined	260	780
Emperor, red	7564	49165
Flagfish, Spanish	457	1052
Flathead, other	199	379
Flounder	144	503
Footballer	66	99
Garfish, sea	14642	47687
Groper	17	48
Groper, baldchin	29893	134519
Groper, blue	3528	12349
Hapuku	22007	94632
Herring, Australian	121080	54486
Herring, hairback	20	30
Jobfish	52	260
Jobfish, rosy	1578	7891
John Dory	7	35
Kingfish, black (Cobia)	1090	2179
Kingfish, yellowtail	458	867
Knifejaw	671	697
Leatherjacket	1296	3702
Ling, pink or rock ling	23	110
Mackerel, Spanish	475867	3806935
Mackerel, blue	669	3680
Mackerel, other	70423	246480
Mackerel, scaly	120	48
Mangrove Jack	9	25
Morwong	95	142
Mullet, other	1856	4640
Mullet, red	60	108
Mullet, sea	59355	145287
Mullet, yellow-eye	2069	1055
Mulloway	5306	20748
Mussel	400	1180
Octopus	22	99
Parrot fish	141	282
Perch, Moses	28	68
Perch, other	40	113
Perch, pearl	1889	8500
Perch, scarlet sea	5	19
Pike, sea	854	1281
Redfish	20352	91583
Redfish, bight	4763	15480
Salmon, Australian	21	11
Samsonfish	55814	83232
Scad, yellowtail	6	21
Sea urchin	48	168
Shark, blacktip	909	1819
Shark, bronze whaler	19922	109571
Shark, grey nurse	390	1139

1996-97

SPECIES	LIVE WEIGHT (kg)	ESTIMATED VALUE A$
Shark, gummy	16226	81452
Shark, hammerhead	1631	2284
Shark, other	19377	87195
Shark, pencil	51	76
Shark, spurdog	566	594
Shark, thickskin	3110	12442
Shark, tiger	172	129
Shark, whiskery	8714	38342
Shark, wobbegong	9212	23031
Skates and Rays	5907	7631
Snapper, Ruby	940	3760
Snapper, goldband	45	225
Snapper, northwest (large)	42756	149645
Snapper, northwest (small)	809	1780
Snapper, pink	251988	1007951
Snapper, queen	10889	22875
Snapper, spangled emperor	39021	136572
Sole	1	3
Sprat, blue	9594	33628
Squid	7723	53100
Sweep	2683	4790
Sweetlip	20676	70299
Sweetlip, emperor	21192	65696
Tailor	5596	16788
Threadfin	1440	2591
Threadfin, giant	3472	12170
Trevalla, deepsea	2692	4684
Trevally, golden	413	826
Trevally, other	17595	35190
Trevally, skipjack	4915	9831
Trout, coral	11805	94436
Tuna, bigeye	2	5
Tuna, mackerel	7	18
Tuna, northern bluefin	177	354
Tuna, other	4532	9064
Tuna, skipjack or striped	556	1000
Tuna, yellowfin	1463	7314
Tuskfish, bluebone	1542	8087
Whitebait	256086	345716
Whiting, King George	2418	19338
Whiting, other	309	1005
Whiting, western sand	10488	26220
other fish	9368	14614
TOTAL	1970648	9204202

Table 2(a): Total commercial finfish catch and estimated landed value for major species (CAESS 1996/97).

1997-98

SPECIES	LIVE WEIGHT (kg)	ESTIMATED VALUE A$
Barracuda (Northern pike)	71	249
Barramundi (Giant perch)	1914	13396
Boarfish	159	431
Bonito	352	775
Bream, Buffalo	75	30
Bream, Robinson	257	900
Bream, black	4747	18125
Bream, mixed	126	442
Bream, monocle	52	182
Bream, sea	3	5
Bream, silver (Tarwhine)	156	451
Bream, western yellow fin	2034	9153
Catfish, sea	157	314
Chinaman cod	4882	14647
Chinaman fish	41	92
Cobbler	694	2421
Cod	19744	69929
Cod, Rankin	5811	20919
Cod, grey banded	1053	3686
Cod, spotted	188	657
Crab, sand	36722	165249
Crab, spiny	667	4669
Cuttlefish	418	1045
Dhufish, Westralian	204891	1940202
Emperor, blue lined	168	504
Emperor, red	10596	68872
Flagfish, Spanish	567	1304
Flathead, other	436	831
Flounder	15	52
Footballer	107	160
Garfish, sea	14121	45990
Groper, baldchin	35594	160174
Groper, blue	8879	31076
Gurnard	4	8
Hapuku	21366	91875
Herring, Australian	110501	49725
Herring, Perth	115	35
Jobfish	883	4415
Jobfish, rosy	2584	12920
Kingfish, black (Cobia)	2253	4506
Kingfish, yellowtail	818	1548
Knifejaw	794	825
Leatherjacket	4101	11720
Ling, pink or rock ling	6	29
Mackerel, Spanish	534292	4274338
Mackerel, blue	19	105
Mackerel, other	128555	449942
Morwong	426	639
Mullet, other	1355	3388
Mullet, red	35	63
Mullet, sea	68052	166574
Mullet, yellow-eye	8041	4099
Mulloway	11867	46401
Octopus	220	990
Parrot fish	348	696
Perch, Moses	38	91
Perch, other	181	506
Perch, pearl	1110	4994
Perch, red	40	119
Perch, scarlet sea	135	513
Perch, yellowtail	63	221
Pike, sea	526	788
Queenfish	345	862
Redfish	40434	181955
Redfish, bight	7637	24820
Salmon, Australian	543	299
Samsonfish	105996	158067
Scallop, saucer	1324	9268
Sea urchin	42	147
Shark, blacktip	14657	29314

1997-98

SPECIES	LIVE WEIGHT (kg)	ESTIMATED VALUE A$
Shark, bronze whaler	56228	309252
Shark, eastern school	100	252
Shark, grey nurse	1657	4845
Shark, gummy	4678	23485
Shark, hammerhead	3983	5576
Shark, other	43638	196371
Shark, pencil	725	1088
Shark, spurdog	500	525
Shark, thickskin	94045	376179
Shark, tiger	719	539
Shark, whiskery	23453	103193
Shark, wobbegong	18723	46808
Skates and Rays	5103	6593
Snapper, Ruby	251	1004
Snapper, frypan	14	36
Snapper, goldband	3337	16685
Snapper, long nose	51	128
Snapper, northwest (large)	52053	182184
Snapper, northwest (small)	779	1714
Snapper, pink	221337	885350
Snapper, queen	22570	47412
Snapper, red	707	1980
Snapper, spangled emperor	45945	160808
Sprat, blue	14174	49682
Squid	8029	55204
Sweep	3496	6240
Sweetlip	15477	52622
Sweetlip, emperor	56262	174412
Tailor	8022	24066
Threadfin	970	1745
Threadfin bream, Butterfish	2	4
Threadfin, giant	1087	3810
Trevalla, deepsea	3978	6922
Trevally, golden	1044	2088
Trevally, other	37324	74649
Trevally, skipjack	6078	12157
Trout, coral	12595	100760
Tuna, mackerel	137	343
Tuna, northern bluefin	91	182
Tuna, other	6003	12007
Tuna, skipjack or striped	856	1541
Tuna, yellowfin	1777	8883
Tuskfish, bluebone	1506	7900
Whitebait	47771	64491
Whiting, King George	921	7363
Whiting, golden lined	2556	7668
Whiting, other	431	1401
Whiting, western sand	15442	38605
other fish	28057	43770
TOTAL	2300083	11244253

Table 2(b): Total commercial finfish catch and estimated landed value for major species (CAESS 1997/98).

Table 3: Number of fishing units in each estuarine fishery and proposed optimum commercial effort.

Name of Fishery	No. of fishing units January 1987	No. of fishing units January 1998	No. of fishing units 20 October 1998	*Estimated. Optimum no of units
South Coast Estuarine	66	40	33	10-15
Mandurah Estuarine	41	24	14	5 - 10
Leschenault Estuarine	14	7	6	3
Hardy Estuarine	7	4	2	N/A
Swan Canning Estuarine	17	8	6	5
Total Number of Units	145	83	61	< 33
Percent Reduction since 1987	0%	41%	58%	
Percent Reduction since January 1998	0%	0%	28%	

Table 4: Reported catch of all species in each estuarine fishery between 1992/93 and 1997/98.

ESTUARY	LIVE WEIGHT (kg)					
	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98
South Coast Estuaries	347189	290537	279775	291045	239248	349678
Swan Canning Estuaries	96225	84240	91049	73889	79709	83714
Peel Inlet Harvey Estuary	297420	346064	381839	260329	345111	306589
Leschenault Inlet	98051	84210	81882	68450	83046	102810

Note: King George Sound excluded. Data is not available for Hardy Inlet because it has less than five operators.

Table 5: Total catch trends in estuarine fisheries during 1997/98.

SPECIES	LIVE WEIGHT (kg)			
	South Coast Estuaries	Swan Canning Estuaries	Peel Inlet Harvey Estuary	Leschenault Inlet
Bream, black	15426	2976	.	110
Cobbler	69046	634	6119	1799
Crustaceans	11533	30620	63092	4301
Herring, Perth	.	18846	2460	345
Mullet, sea	41170	22728	91911	43853
Mullet, yellow-eye	25138	3275	104930	30459
Other species	187365	4635	38077	21943
TOTAL	349678	83714	306589	102810

Note: King George Sound excluded. Data is not available for Hardy Inlet because it has less than five operators.

Figure 1: Proportionate catch for finfish species in managed and all open access fisheries across State 1997/98.

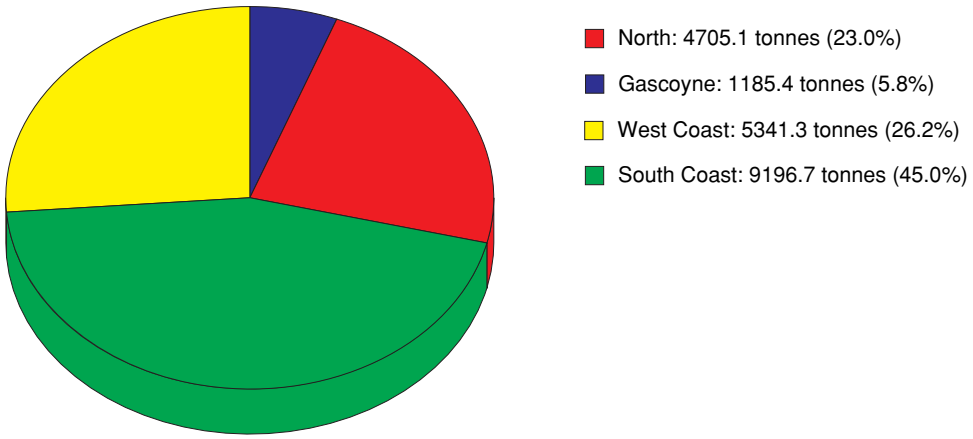


Figure 2: Proportionate catch for finfish species in managed and open access fisheries in the State's Pilbara/Kimberley region 1997/98.

Figure 2(a): Commercial finfish catch for the northern region [(1) using only the gear permitted under the provision of the Fishing Boat Licence; and (2) using only the gear permitted under access provisions of each managed fishery].

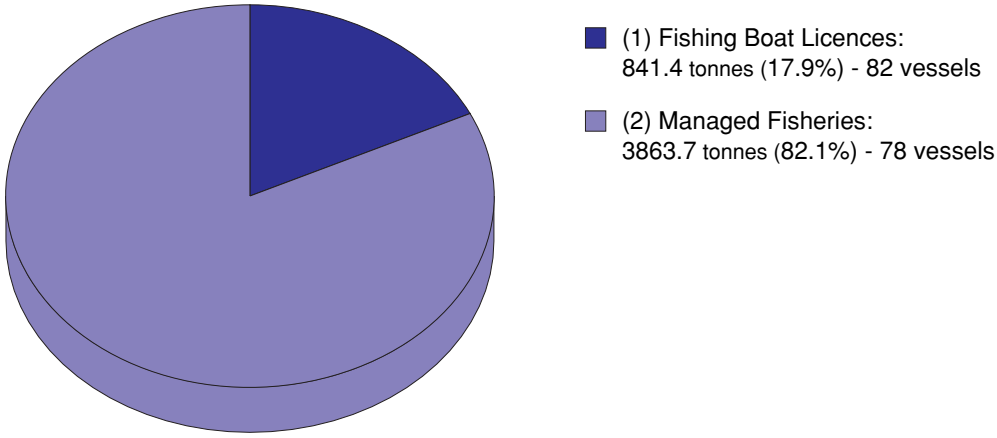
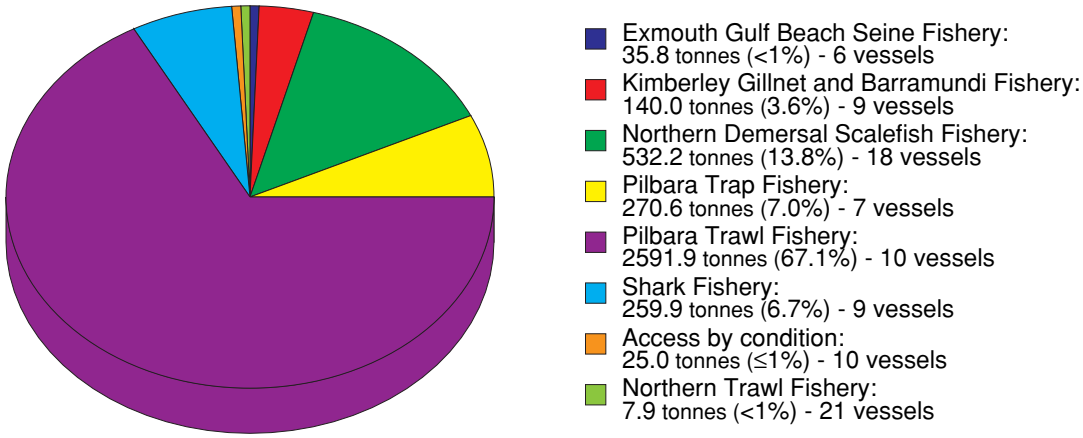


Figure 2(b): Commercial finfish catch (3863.7 tonnes) from managed fisheries of the northern region, using only the gear permitted under the access provisions of each managed fishery.



Note: Some vessels operate in more than one fishery.

Figure 3: Proportionate catch for all finfish species in managed and open access fisheries in the Gascoyne 1997/98.

Figure 3(a): Commercial finfish catch for the Gascoyne region [(1) using only the gear permitted under the provisions of the Fishing Boat Licence; and (2) using only the gear permitted under access provisions of each managed fishery].

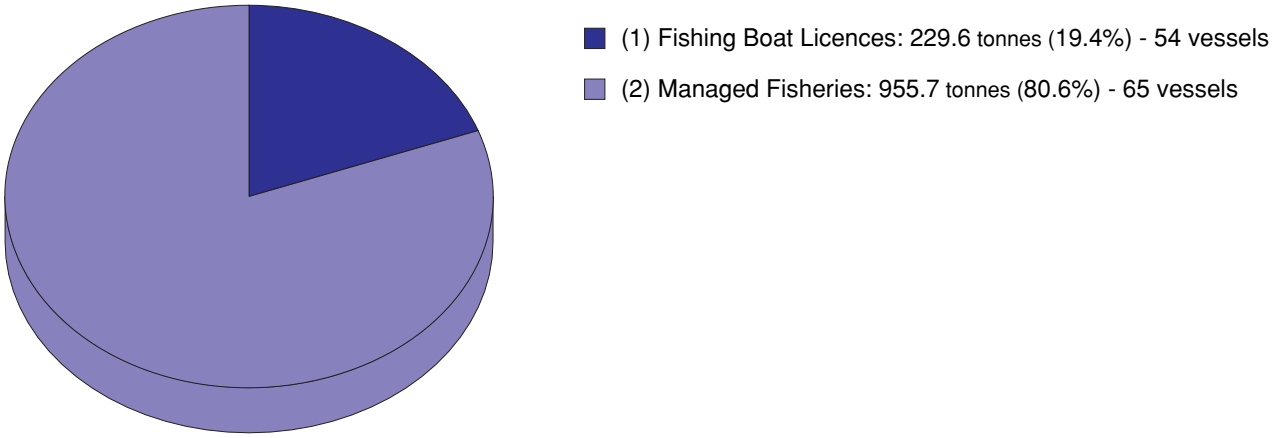
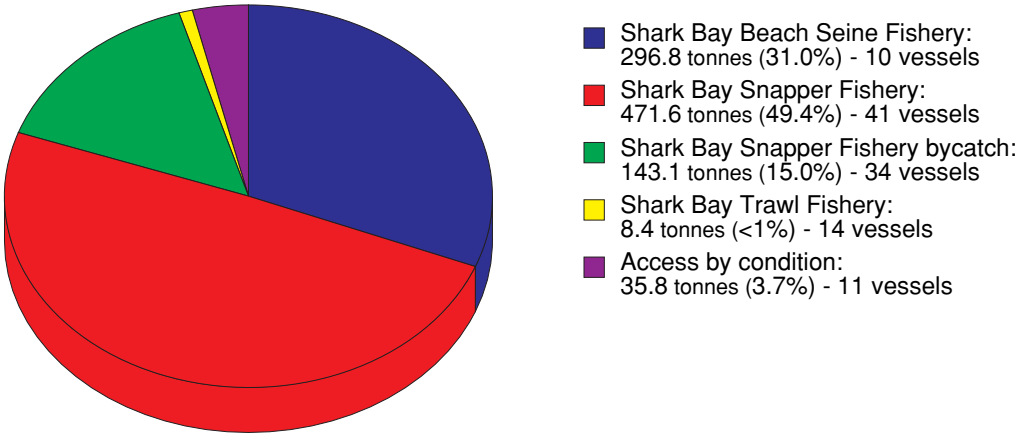


Figure 3(b): Commercial finfish catch (955.7 tonnes) from managed fisheries of the Gascoyne region, using only the gear permitted under the access provisions of each managed fishery.



Note: Some vessels operate in more than one fishery.

Figure 4: Proportionate catch for finfish species in managed and open access fisheries in the State's West Coast region 1997/98.

Figure 4(a): Commercial finfish catch for the West Coast region [(1) using only the gear permitted under the provisions of the Fishing Boat Licence; and (2) using only the gear permitted under access provisions of each managed fishery].

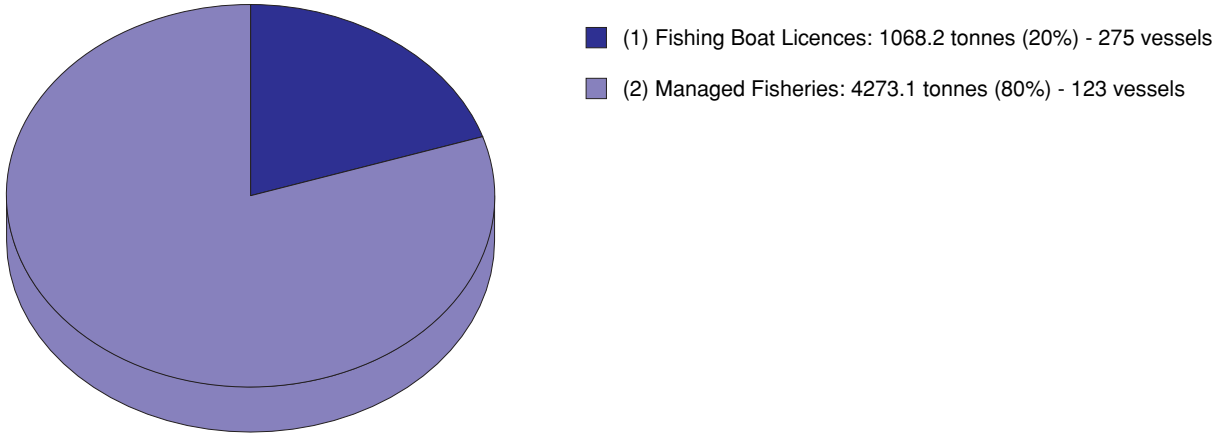
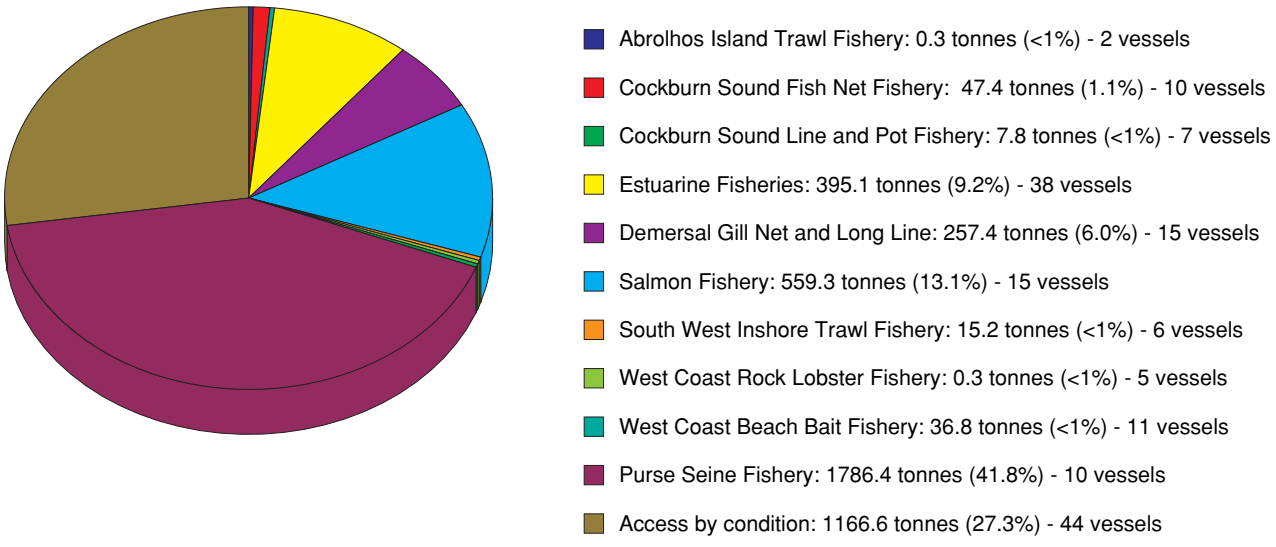


Figure 4(b): Commercial finfish catch (4273.1 tonnes) from managed fisheries of the West Coast region, using only the gear permitted under the access provisions of each managed fishery.



Note: Some vessels operate in more than one fishery.

Figure 5: Proportionate catch for finfish species in managed and open access fisheries in the State's South Coast region 1997/98.

Figure 5(a): Commercial finfish catch for the South Coast region [(1) using only the gear permitted under the provisions of the Fishing Boat Licence; and (2) using only the gear permitted under access provisions of each managed fishery].

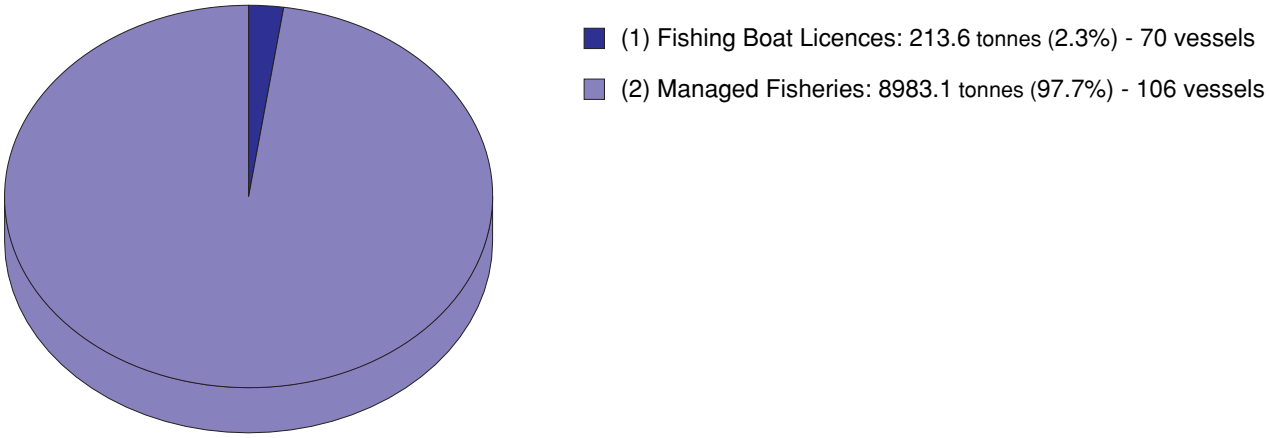
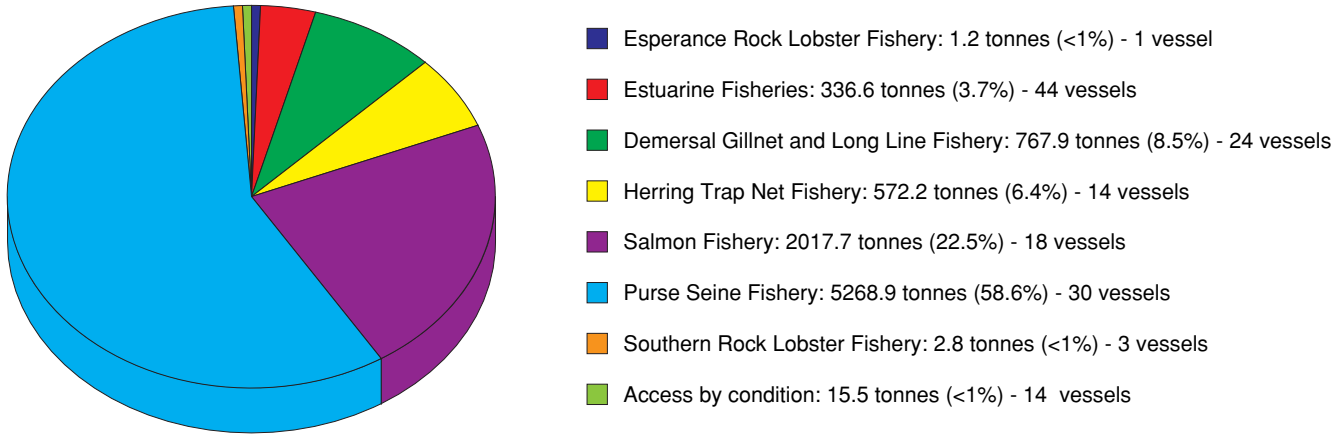


Figure 5(b): Commercial finfish catch (8983.1 tonnes) from managed fisheries of the South Coast region, using only the gear permitted under the access provisions of each managed fishery.



Note: Some vessels operate in more than one fishery.

Figure 6: Trends in commercial Fishing Boat Licences and recreational boat registrations.

Figure 6(a): The number of professional fishing licences and commercial fishing vessels licensed each year in WA.

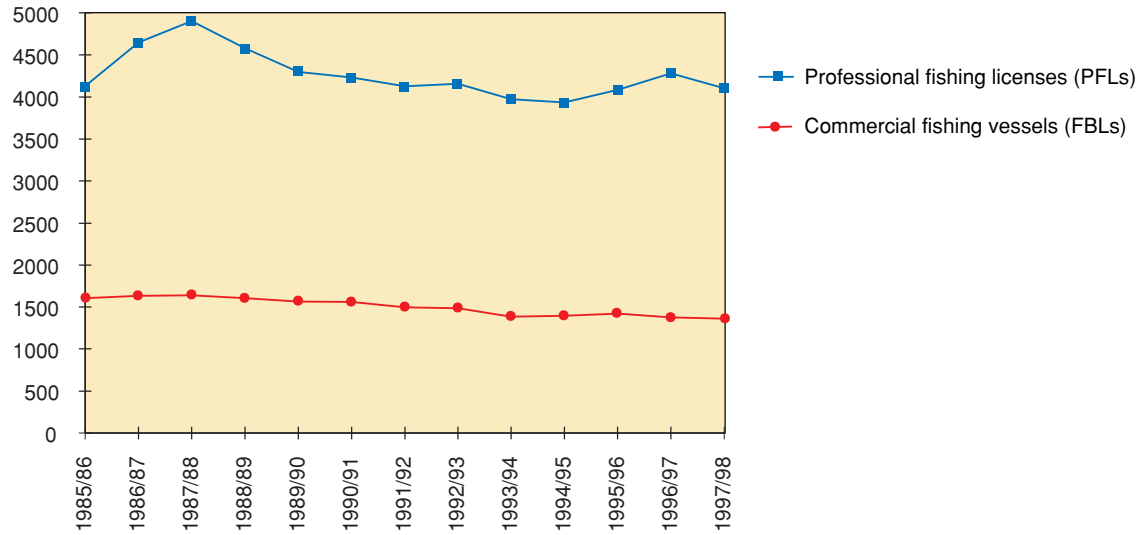


Figure 6(b): The number of licensed recreational vessels and recreational fishing licences issued each year in WA.

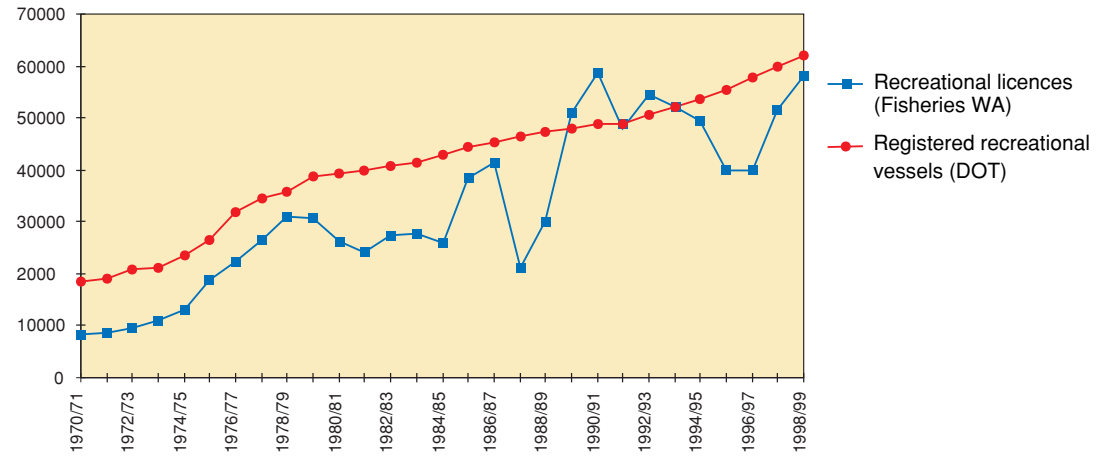
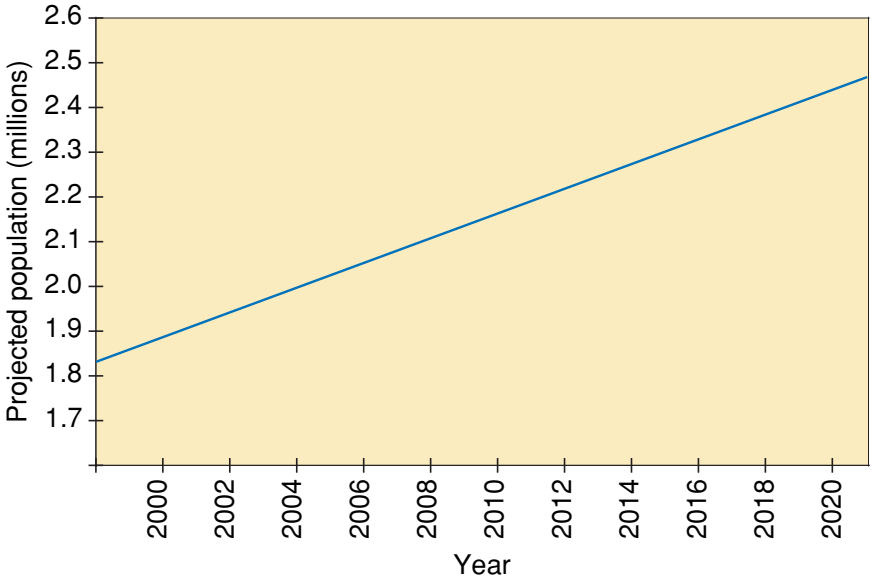


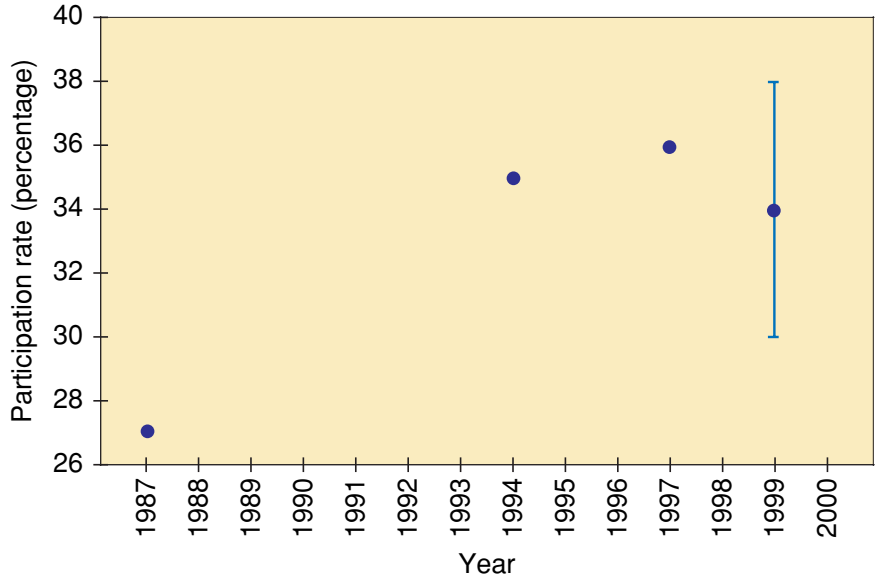
Figure 7: Trends in recreational fishing participation rate and fishing effort against predicted population growth 1987 - 2020.

Figure 7(a): Population projection for Western Australia (ABS Series II).



References: Australian Bureau of Statistics (1998). Population Projections 1997 - 2051.

Figure 7(b): Participation in recreational fishing as a percentage of total population.



Note: The uncertainty associated with the estimated participation rates (95% confidence interval) could only be estimated for 1999.

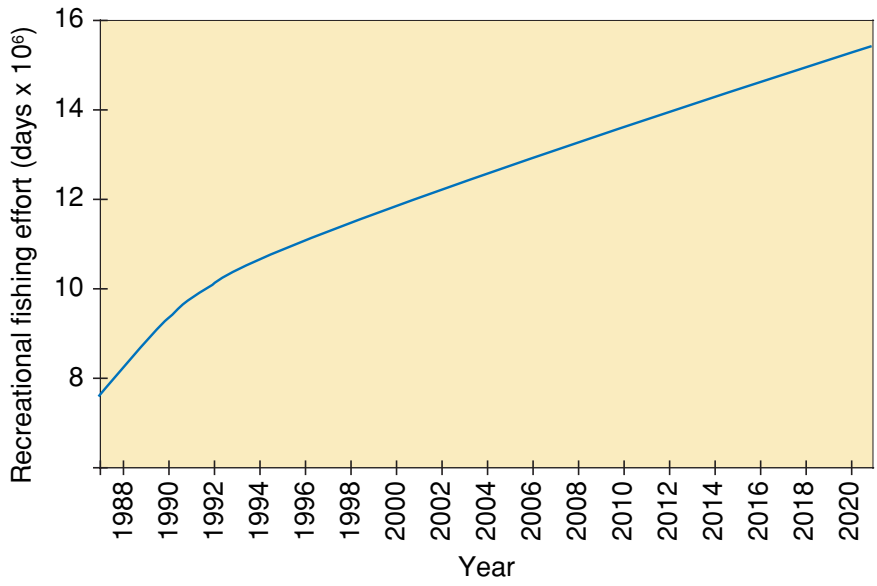
References: Australian Bureau of Statistics (1987) Recreational Fishing Western Australia.

Baharthah, T. and Sumner, N. R. (1999) Fisheries WA Community Survey 1999 (in prep.).

Patterson Market Research (1994) Consultants report for Fisheries WA.

Reark Research (1997) Community Attitudes Survey. Consultants report for Fisheries WA.

Figure 7(c): Future projection of recreational fishing effort based on population and participation trends



Recreational fishing effort (days x 10⁶)

Assumptions: 1) The mean number of days fished per recreational fisher is 18 per year (Baharthah and Sumner 1999).

2) For years 1987 to 1999 the participation rate was estimated by fitting a curve to the participation rates for 1987, 1994, 1997 and 1999. After 1999 the participation rate was assumed to be constant and was set to the rate of 0.34 estimated by Baharthah and Sumner 1999.

3) The population projections were based on Australian Bureau of Statistics (1998b).

References: Australian Bureau of Statistics (1987) Recreational Fishing Western Australia.

Australian Bureau of Statistics (1998a) Western Australian Year Book.

Australian Bureau of Statistics (1998b) Population Projections 1997 - 2051.

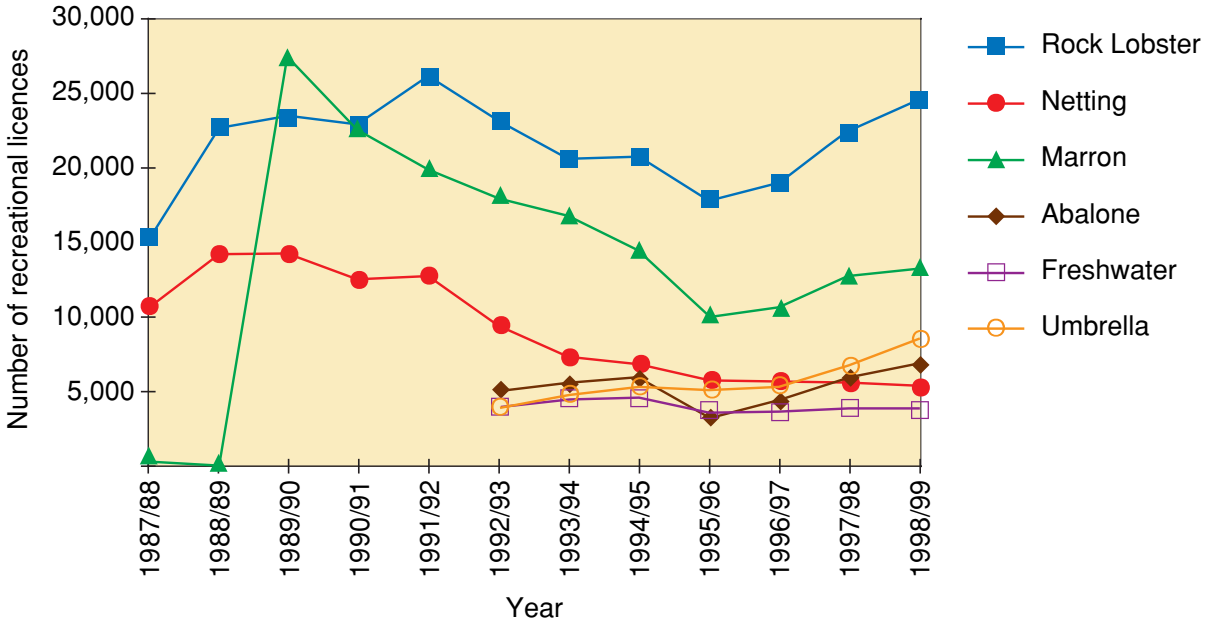
Baharthah, T. and Sumner, N. R. (1999) Fisheries WA Community Survey 1999 (in prep.).

Patterson Market Research (1994) Consultants report for Fisheries WA.

Reark Research (1997) Community Attitudes Survey. Consultants report for Fisheries WA.

Right Marketing (1999) Fisheries WA Community Survey 1998. Consultants report for Fisheries WA.

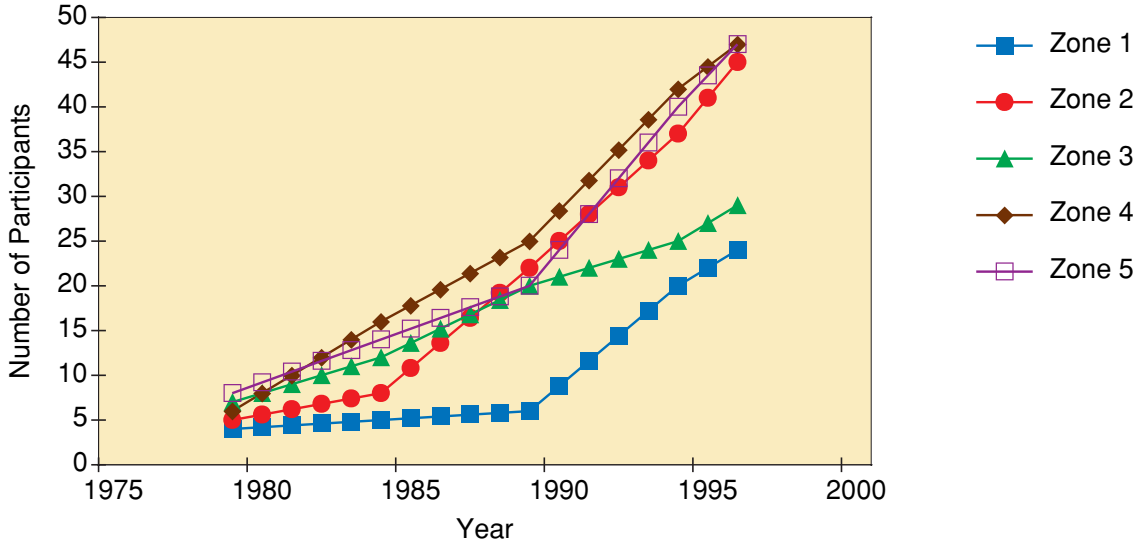
Figure 8: Trends in participation in licensed recreational fisheries 1987/88 - 1998/99.



Note: The umbrella licences have been shown separately rather than included with other licence types. Umbrella licences enable their holders to participate in all licenced recreational fisheries.

References: Fisheries WA Recreational Licencing System (unpublished data).

Figure 9: Growth in participation in charter fishing 1979 - 1996 by region.



Note:

Zone	*Region*
1	*Esperance - Bunbury*
2	*Perth Metropolitan*
3	*Lancelin-Geraldton*
4	*Denham-Port Hedland*
5	*Broome-Wyndham*

Figure 10: Proposed biogeographic management regions for finfish.

1) **Pilbara/Kimberley** - Waters East and North of the point where 114°50'00E intersects the North West coast of Western Australian (approximately 4nm South of the mouth of the Ashburton River) to the NT/WA border.

2) **Gascoyne** - Waters West of the point where Longitude 114°50'00E intersects the North West coast of Western Australian (approximately 4nm South of the mouth of the Ashburton River) South to 27°00.00S (Zuytdorp Cliffs - between Kalbarri and Steep Point).

3) **West Coast** - Waters South of 27°00.00S (Zuytdorp Cliffs) to Cape Leeuwin.

4) **South Coast** - Waters East of Cape Leeuwin to the WA/SA border

5) **Southern freshwater** - All freshwater south of 27^0S.

6) **Northern freshwater** - All freshwater north of 27^0S

Fisheries Management Papers

No. 1 The Report of the Southern Western Australian Shark Working Group. Chairman P. Millington (1986).

No. 2 The report of the Fish Farming Legislative Review Committee. Chairman P.Rogers (1986).

No. 3 Management Measures for the Shark Bay Snapper 1987 Season. P. Millington (1986)

No. 4 The Esperance Rock Lobster Working Group. Chairman A. Pallot (1986).

No. 5 The Windy Harbour - Augusta Rock Lobster Working Group. Interim Report by the Chairman A. Pallot (1986).

No. 6 The King George Sound Purse Seine Fishery Working Group. Chairman R. Brown (1986).

No. 7 Management Measures for the Cockburn Sound Mussel Fishery. H. Brayford (1986).

No. 8 Report of the Rock Lobster Industry Advisory meeting of 27 January 1987 . Chairman B. Bowen (1987).

No. 9 Western Rock Lobster Industry Compensation Study. Arthur Young Services (1987).

No. 10 Further Options for Management of the Shark Bay Snapper Fishery. P. Millington (1987).

No. 11 The Shark Bay Scallop Fishery. L. Joll (1987).

No. 12 Report of the Rock Lobster Industry Advisory Committee to the Hon Minister for Fisheries 24 September 1987. (1987)

No. 13 A Development Plan for the South Coast Inshore Trawl Fishery. (1987)

No. 14 Draft Management Plan for the Perth Metropolitan Purse Seine Fishery. P. Millington (1987).

No. 15 Draft management plan, Control of barramundi gillnet fishing in the Kimberley. R. S. Brown (1988).

No. 16 The South West Trawl Fishery Draft Management Plan. P. Millington (1988).

No. 17 The final report of the pearling industry review committee . F.J. Malone, D.A. Hancock, B. Jeffriess (1988).

No. 18 Policy for Freshwater Aquaculture in Western Australia. (1988)

No. 19 Sport Fishing for Marron in Western Australia - Management for the Future. (1988)

No. 20 The Offshore Constitutional Settlement, Western Australia 1988.

No. 21 Commercial fishing licensing in Western Australia. (1989)

No. 22 Economics and marketing of Western Australian pilchards. SCP Fisheries Consultants Pty Ltd (1988).

No. 23 Management of the south-west inshore trawl fishery. N. Moore (1989)

No. 24 Management of the Perth metropolitan purse-seine fishery. N. Moore (1989).

No. 25 Rock Lobster Industry Advisory Committee report to the Minister for Fisheries November 1988. (1989)

No. 26 A report on marron fishing in Western Australia. Chairman Doug Wenn MLC (1989).

No. 27 A review of the Shark Bay pearling industry. Dr D.A.Hancock, (1989).

No. 28 Southern demersal gillnet and longline fishery. (1989)

No. 29 Distribution and marketing of Western Australian rock lobster. P. Monaghan (1989).

No. 30 Foreign investment in the rock lobster industry. (1989)

No. 31 Rock Lobster Industry Advisory Committee report to the Hon Minister for Fisheries September 1989. (1989)

No. 32 Fishing Licences as security for loans. P. Rogers (1989)

No. 33 Guidelines for by-laws for those Abrolhos Islands set aside for fisheries purposes. N. Moore (1989).

No. 34 The future for recreational fishing - issues for community discussion. Recreational Fishing Advisory Committee (1990).

No. 35 Future policy for charter fishing operations in Western Australia. P. Millington (1990).

No. 36 Long term management measures for the Cockburn Sound restricted entry fishery. P. Millington (1990).

No. 37 Western rock lobster industry marketing report 1989/90 season. MAREC Pty Ltd (1990).

No. 38 The economic impact of recreational fishing in Western Australia. R.K. Lindner, P.B. McLeod (1991).

No. 39 Establishment of a registry to record charges against fishing licences when used as security for loans. P. Rogers. (1991)

No. 40 The future for Recreational Fishing - Forum Proceedings. Recreational Fishing Advisory Committee (1991)

No. 41 The future for Recreational Fishing - The Final Report of the Recreational Fishing Advisory Committee. Recreational Fishing Advisory Committee (1991).

No. 42 Appendix to the final report of the Recreational Fishing Advisory Committee. (1991)

No. 43 A discussion of options for effort reduction. Southern Gillnet and Demersal Longline Fishery Management Advisory Committee (1991).

No. 44 A study into the feasability of establishing a system for the buy-back of salmon fishing authorisations and related endorsements. (1991)

No. 45 Draft Management Plan, Kimberley Prawn Fishery. (1991)

No. 46 Rock Lobster Industry Advisory Committee, Chairman's report to the Minister (1992)

No. 47 Long term management measures for the Cockburn Sound restricted entry fishery. Summary of submissions and final recommendations for management. P. Millington (1992).

No. 48 Pearl oyster fishery policy guidelines (*Western Australian Pearling Act 1990*). Western Australian Fisheries Joint Authority (1992).

No. 49 Management plan, Kimberley prawn fishery. (1992)

No. 50 Draft management plan, South West beach seine fishery. D.A. Hall (1993).

No. 51 The west coast shark fishery, draft management plan. D.A. Hall (1993).

No. 52 Review of bag and size limit proposals for Western Australian recreational fishers. F.B. Prokop (May 1993).

No. 53 Rock Lobster Industry Advisory Committee, Chairman's report to the Minister for Fisheries. (May 1993)

No. 54 Rock Lobster Industry Advisory Committee, Management proposals for 1993/94 and 1994/95 western rock lobster season (July 1993).

No. 55 Rock Lobster Industry Advisory Committee, Chairman's report to the Minister for Fisheries on management proposals for 1993/94 and 1994/95 western rock lobster seasons (September 1993).

No. 56 Review of recreational gill, haul and cast netting in Western Australia. F. B. Prokop (October 1993).

No. 57 Management arrangements for the southern demersal gillnet and demersal longline fishery 1994/95 season. (October 1993).

No. 58 The introduction and translocation of fish, crustaceans and molluscs in Western Australia. C. Lawrence (October 1993).

No. 59 Proceedings of the charter boat management workshop (held as part of the 1st National Fisheries Manager Conference). A. E. Magee & F. B. Prokop (November 1993).

No. 60 Bag and size limit information from around Australia (Regulations as at September 1993) F. B. Prokop (January 1993).

No. 61 Economic impact study. Commercial fishing in Western Australia Dr P McLeod & C McGinley (October 1994)

No. 62 Management arrangements for specimen shell collection in Western Australia. J. Barrington, G. Stewart (June 1994)

No. 63 Management of the marine aquarium fish fishery. J. Barrington (June 1994)

No. 64 The Warnbro Sound crab fishery draft management plan. F. Crowe (June 1994)

No. 65 Not issued

No. 66 Future management of recreational gill, haul and cast netting in Western Australia and summary of submissions to the netting review. F.B. Prokop, L.M. Adams (September 1994)

No. 67 Long term management strategies for the Western Rock Lobster Fishery. (4 volumes) Evaluation of management options Volume 1. B. K. Bowen (September 1994)

No. 68 Long term management strategies for the Western Rock Lobster Fishery. (4 volumes) Economic efficiency of alternative input and output based management systems in the western rock lobster fishery, Volume 2. R.K. Lindner (September 1994)

No. 69 Long term management strategies for the Western Rock Lobster Fishery. (4 volumes) A market-based economic assessment for the western rock lobster industry, Volume 3. Marec Pty Ltd (September 1994)

No. 70 Long term management strategies for the Western Rock Lobster Fishery. (4 volumes) Law enforcement considerations, Volume 4. N. McLaughlan (September 1994)

No. 71 The Rock Lobster Industry Advisory Committee Chairman's Report, October 1994, The Western Rock Lobster Fishery - Management proposals for the 1994/95 and 1995/96 seasons (November 1994)

No. 72 Shark Bay World Heritage Area draft management plan for fish resources. D. Clayton (November 1994)

No. 73 The bag and size limit review: new regulations and summary of submissions. F. Prokop (May 1995)

No. 74 Report on future management options for the South West trawl limited entry fishery. South West trawl limited entry fishery working group (June 1995)

No. 75 Implications of Native Title legislation for fisheries management and the fishing industry in Western Australia. P. Summerfield (February 1995)

No. 76 Draft report of the South Coast estuarine fishery working group. South Coast estuarine fishery working group. (February 1995)

No. 77 The Offshore Constitutional Settlement, Western Australia. H. Brayford & G. Lyon (May 1995)

No. 78 The Best Available Information - Its Implications for Recreational Fisheries Management. Workshop at Second National Fisheries Managers Conference, Bribie Island Queensland. F. Prokop (May 1995)

No. 79 Management of the Northern Demersal Scalefish Fishery. J. Fowler (June 1995)

No. 80 Management arrangements for specimen shell collection in Western Australia, 1995. J. Barrington & C. Campbell (March 1996)

No. 81 Management Options (Discussion Paper) for the Shark Bay Snapper Limited Entry Fishery. Shark Bay Snapper Limited Entry Fishery Working Group, Chaired by Doug Bathgate (June 1995)

No. 82 The Impact of the New Management Package on Smaller Operators in the Western Rock Lobster Fishery. R. Gould (September 1995)

No. 83 Translocation Issues in Western Australia. Proceedings of a Seminar and Workshop held on 26 and 27 September 1994. F. Prokop (July 1995)

No. 84 Bag and Size Limit Regulations From Around Australia. Current Information as at 1 July 1995. Third Australasian Fisheries Managers Conference, Rottnest Island. F. Prokop (July 1995)

No. 85 West Coast Rock Lobster Fishery Management Plan 1995 - Draft for Public Comment. Edited by M. Moran (August 1995)

No. 86 A Review of Ministerial Policy Guidelines for Rock Lobster Processing in Western Australia from the Working Group appointed by the Minister for Fisheries and chaired by Peter Rich (December 1995)

No. 87 Same Fish - Different Rules. Proceedings of the National Fisheries Management Network Workshop held as part of the Third Australasian Fisheries Managers Conference. F. Prokop

No. 88 Balancing the Scales - Access and Equity in Fisheries Management - Proceedings of the Third Australasian Fisheries Managers Conference, Rottnest Island, Western Australia 2 - 4 August 1995. Edited by P. Summerfield (February 1996)

No. 89 Fishermen's views on the future management of the rock lobster fishery. A report. Prepared on behalf of the Rock Lobster Industry Advisory Committee by The Marketing Centre. (August 1995)

No. 90 A report on the issues effecting the use of the Dampier Archipelago. Peter Driscoll, Landvision Pty Ltd (March 1996)

No. 91 Shark Bay World Heritage Property - Management Paper for Fish Resources. Kevin A Francesconi (September 1996)

No. 92 Pearling and Aquaculture in the Dampier Archipelago - Existing and Proposed Operations. A report for public comment. Compiled by Ben Fraser (September 1996)

No. 93 Shark Bay World Heritage Property - Summary of Public Submissions to the Draft Management Plan for Fish Resources. Kevin A Francesconi (September 1996)

No. 94 Rock Lobster Industry Advisory Committee Report - Management arrangements for the Western Rock Lobster Fishery for the 1997/98 season. Frank Prokop (May 1997)

No. 95 Australian Salmon and Herring Resource Allocation Committee. P McLeod & F Prokop (in press)

No. 96 Summary Report of the Freshwater Aquaculture Taskforce (FAT) by Chris Wells (in press)

No. 97 (in press)

No. 98 A Pricing Policy for Fisheries Agencies - Standing Committee on Fisheries and Aquaculture Management Committee. P Millington (March 1997)

No. 99 Management of the South Coast Purse Seine Fishery. J Fowler, R Lenanton, Kevin Donohue, M Moran & D Gaughan.

No. 100 The Aquaculture of non-endemic species in Western Australia - Redclaw crayfish (*Cherax quadricarinatus*). Tina Thorne (June 1997)

No. 101 Optimising the worth of the catch - Options and Issues. Marec Pty Ltd (September 1997)

No. 102 Marine farm planning and consultation processes in Western Australia. Dave Everall (August 1997)

No. 103 Future management of the aquatic charter industry in Western Australia by the Tour Operators Fishing Working Group (September 1997)

No. 104 Management of the Houtman Abrolhos System (draft). Prepared by the Abrolhos Islands Management Advisory Committee in conjunction with Fisheries Western Australia (October 1997)

No. 105 Plan for the Management of the Houtman Abrolhos Fish Habitat Protection Area (draft). Prepared by the Abrolhos Islands Management Advisory Committee in conjunction with Fisheries Western Australia (October 1997)

No. 106 The impact of Occupational Safety and Health on the management of Western Australian Fisheries. Cameron Wilson (in press)

No. 107 The Aquaculture of non-endemic species in Western Australia - Silver Perch (*Bidyanus bidyanus*). Tina Thorne (June 1997)

No. 108 Issues affecting Western Australia's inshore crab fishery - Blue swimmer crab (*Portunus pelagicus*), Sand crab (*Ovalipes australiensis*). Cathy Campbell (September 1997)

No. 109 Abalone Aquaculture in Western Australia. Cameron Westaway & Jeff Norriss (October 1997)

No. 110 Proposed Voluntary Fishery Adjustment Scheme - South Coast Purse Seine Managed Fishery Report by Committee of Management (October 1997)

No. 111 Management Options for Pilbara Demersal Line Fishing. Gaye Looby (December 1997)

No. 112 Summary of Submissions to Fisheries Management Paper No. 108 - issues affecting Western Australia's inshore crab fishery. Compiled by Cathy Campbell (April 1998)

No. 113 Western Rock Lobster Management - Options and Issues. Prepared by Kevin Donohue on behalf of the Rock Lobster Industry Advisory Committee. (June 1998)

No. 114 A Strategy for the Future Management of the Joint Authority Northern Shark Fishery. Prepared by Tim Bray and Jo Kennedy. (June 1998)

No. 115 Guidelines for granting Aquaculture Leases. Prepared by Fisheries WA, the Aquaculture Development Council & the Aquaculture Council of WA. (July 1998)

No. 116 Future Management of the Aquatic Charter Industry in Western Australia - Final Report. By the Tour Operators Fishing Working Group (September 1998)

No.117 Management of the Houtman Abrolhos System. Prepared by the Abrolhos Islands Management Advisory Committee in conjunction with Fisheries Western Australia. (December 1998)

No. 118 Plan for the Management of the Houtman Abrolhos Islands Fish Habitat Protection Area (Schedule 1)

No. 119 Access to Wildstock for Aquaculture Purposes (not published)

No. 120 Draft Management Plan for Sustainable Tourism at the Houtman Abrolhos Islands. Prepared by LeProvost, Dames and Moore for the Abrolhos Islands Managment Advisory Committee in conjunction with Fisheries WA. (December 1998)

No. 121 Future Directions for Tourism at the Houtman Abrolhos Islands - Draft for Public Comment. Prepared by LeProvost, Dames and Moore for the Abrolhos Islands Management Advisory Committee in conjunction with Fisheries WA. (December 1998)

No. 122 Opportunities for the Holding/Fattening/Processing and Aquaculture of Western Rock Lobster (*Panulirus cygnus*). A discussion paper compiled by Fisheries WA. (November 1998)

No. 123 Future directions for the Rock Lobster Industry Advisory Committee and the Western Rock Lobster Managed Fishery. A discussion paper prepared by Kevin Donohue on behalf of the Rock Lobster Industry Advisory Committee. (December 1998)

No. 124 A Quality Future for Recreational Fishing in the Gascoyne. Proposals for Community Discussion. A five-year management strategy prepared by the Gascoyne Recreational Fishing Working Group (May 1999)

No. 125 Changes to Offshore Constitutional Settlement Arrangements; North West Slope Trawl Fishery and Western Deepwater Trawl Fishery. A discussion paper by Fiona Crowe and Jane Borg (May 1999)[not published]

No. 126 The South Coast Estuarine Fishery. A discussion paper by Rod Pearn and Tony Cappelluti. (May 1999)

No. 127 The Translocation of Barramundi. A discussion paper by Makaira Pty Ltd.[July 1999]

No. 128 Shark Bay Pink Snapper Managed Fisheries in WA

No. 129 Review of the Western Australian Pilchard Fishery 12 - 16 April 1999. Prepared by K.L. Cochrane, Fisheries Resource Division, Food and Agriculture Division of the United Nations (November 1999)

No. 130 Developing New Fisheries in Western Australia. A guide to applicants for developing fisheries Compiled by Lucy Halmarick (November 1999)

No. 131 Management Directions for Western Australia's Estuarine and Marine Embayment Fisheries. A strategic approach to management (November 1999)

No. 132 Summary of Submissions to Fisheries Management Paper No. 126 - The South Coast Estuarine Fishery - A Discussion Paper. Compiled by Rod Pearn (November 1999)

No. 133 Abalone Aquaculture in Western Australia, A Policy Guideline (December 1999)

No. 134 Management Directions for WA's Coastal Commercial Finfish Fisheries. Issues and proposals for community discussion (March 2000)

No. 135 Protecting and Sharing Western Australia's Coastal Fish Resources. The path to integrated management. Issues and proposals for community discussion (March 2000)

No. 136 Management Directions for WA's Recreational Fisheries (March 2000)