
Fisheries discussion paper

Management Options for Pilbara Demersal Line Fishing

by Gaye Looby

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3rd Floor, SGIO Atrium
168 -170 St Georges Terrace, Perth WA 6000

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1.0 INTRODUCTION

Fisheries Western Australia licensing arrangements allow all vessels with an unrestricted fishing boat licence ('wetline licence') to take scalefish throughout the State. These arrangements have led to a high level of excess capacity in the licensed 'wetline' fishing fleet to exploit the scalefish resources. The declaration of the Kimberley Interim Line Fishery and the forthcoming declaration the Northern Demersal Scalefish Fishery have resolved this problem for the Kimberley waters. However, the high level of excess capacity in the 'wetline' fleet to exploit the waters of the Pilbara remains a problem. In addition to this high level of potential fishing effort, the existing exploitation of the demersal scalefish resources by the other demersal scalefish fisheries of the Pilbara has raised concern over the long-term sustainability of this resource. This concern has provided the impetus for a proposal to introduce new management arrangements for commercial line fishing for demersal scalefish in the Pilbara.

Proposals to review access to the demersal line fishery in this region constitute a basic step towards developing a management plan for the Pilbara demersal scalefish resource. The major objective of management changes is to put the total take of demersal scalefish in these waters into a managed fishery environment over the next two to three years. This will allow a comprehensive set of management controls to be applied to ensure the sustainability of the fish stocks. It will also establish a defined group of licensees with a vested interest in the long-term security of the resource.

The announcement of new management arrangements for the waters off the Pilbara coast was made by the Minister for Fisheries in April 1997. The benchmark date for fishermen to acquire a history in demersal line fishing in this area was set at 15 April 1997. The intent of the announcement was to limit the movement of commercial line vessels into the Dampier Archipelago and the Pilbara waters generally.

The towns of Onslow, Dampier, Karratha, Wickham, Point Samson and Port Hedland are situated along the Pilbara coastline and provide the support for the commercial and recreational vessels fishing these waters. In addition some boats from Exmouth fish the waters of the Pilbara region. The Pilbara Trap Managed Fishery and the Pilbara Fish Trawl Fishery are the primary fisheries based on the demersal scalefish resource. Other fisheries include a small line fishery, composed of wetline operators, as well as prawn trawl operators from the Nickol Bay Prawn and Onslow Prawn Managed Fisheries. The Pilbara region is also a significant recreational/charter fishing area for residents and tourists.

The most significant issue arising from any proposed management changes will be the equity in the allocation of access to the resource, both between and within the various fishery groups. In order to minimise the conflict that may arise from these competing users it is important that the future management arrangements be planned in an integrated manner. This is best achieved by a thorough consultative process involving all user groups of the resource and Fisheries WA, as the manager.

As part of the consultative process Fisheries WA announced in June 1997 that it would be preparing a discussion paper setting out possible future management options. Industry members were invited to provide any relevant information relating to their past and current activities and to comment on any possible impacts of such a proposal on their proposed operations.

Thirty eight responses were received from industry members and the information provided has contributed to the drafting of this discussion paper (see Appendix 1 for the list of industry respondents).

The purpose of this discussion paper is to provide background information on the fishery and to present possible future management options for consideration by affected fisheries and other user groups such as recreational fishers and charter operators. This paper is not all inclusive and does not advocate an agency preference for a particular option. However, where it is considered that there may be potential difficulties for the agency with respect to particular options, those difficulties will be outlined.

2.0 DEMERSAL LINE FISHING OFF THE PILBARA COAST

This paper relates to the Pilbara demersal scalefish resource in the waters from North-West Cape to 120° East longitude and seaward to the 200 nautical mile limit of the Australian Fishing Zone. For the purpose of this paper, the term 'fish' will refer to demersal (bottom associated) scalefish only. It is proposed that the management arrangements for the Pilbara demersal line fishery will cover the take of demersal fish using line and hook. This does not include the taking of pelagic (open sea or surface dwelling) species such as mackerel.

Currently there are approximately 1700 Western Australian licensed fishing boats, all of which are currently permitted to take scalefish by line in the waters off the Pilbara coast, although only 36 of these vessels have fished these waters in the past few years. However, the mobilisation of the unused capacity, or latent effort, has the potential to drastically increase competition for the available fish resources and, as a result, increase the likelihood of over-fishing.

3.0 BACKGROUND BIOLOGY

The fish fauna of the continental shelf off the Pilbara coast is a mixture of tropical reef-associated and open-seabed fish species consistent with the variety of habitats found there. The commercial fish species are dominated by lethrinids, lutjanids and serranids (emperors, snappers and cods) though species such as threadfin bream (nemipterids) are more abundant and dominated the catch in the former Taiwanese Pair Trawl Fishery. There are many other families of finfish in moderate abundance.

The composition of the fish community changes as the water depth increases. For example the eteline lutjanids (jobfishes and ruby snappers) dominate the outer shelf and upper continental slope. The habitat requirements of the various species are extremely varied from species to species and the distribution and abundance patterns are typically patchy, so that fishers who know the area can go to particular locations and expect a certain species to be more abundant there than elsewhere. There may also be seasonal variations in distribution and abundance of some species though these are not so well known. Commonwealth Scientific & Industrial Research Organisation (CSIRO) research indicates that the habitat that the lethrinus species is associated with seabed having a high abundance of large benthos (sponges etc.) while threadfin bream and lizardfish are more associated with clear sandy seabeds and lutjanids are commonly associated with large epibenthos or vertical relief areas. Habitat requirements can also vary within families of fish. For example the large spangled emperor (*Lethrinus nebulosus*) has a high dependence on reef habitat while the very closely related blue spot emperor (*Lethrinus spp*) can be found both on reef and on clear, featureless seabed.

Species also have widely varying biological features, such as the maximum size they can reach, the rates of growth and natural mortality, size and age at maturity and the number of eggs spawned per year. Generally, the larger slow-growing species tend to be the ones with the lowest natural mortality rates. Although these species are the most vulnerable to overfishing, they are the major target of commercial fishing operations because of their suitability for the market.

Many of the small faster-growing species do not readily enter traps or take baited hooks and instead are caught by the more efficient method of trawling. Trap and line fishing are not equally effective fishing methods for catching particular species. For example, red emperor and spangled emperor appear to have a higher catchability with traps than lines whereas the more open-water, faster-swimming jobfish are taken more readily by lines than traps. This variation in catchability between methods and species means that simple conversion factors between different methods of fishing effort will not apply across all species.

3.1 History of Fishing off the Pilbara Coast

Prior to Australian offshore demersal fishing on the North-West Shelf, there was a brief Japanese fishery and two decades of Taiwanese pair trawling. During the early 1970s the Taiwanese fishers initially took substantial catches of large, slow-growing species such as red emperor, scarlet perch, jobfish and red snapper. However, fishing for these species rapidly declined as the stocks decreased. By the mid-1980s, low catches of these species were taken and the fishery became dependent on a different suite of species like the small snappers and emperors and threadfin bream, until operations ceased in 1987.

In the few years that followed there was some recovery of the stocks of the large species with generally low and variable trap and line catches. However, the establishment of the Pilbara Fish Trawl Fishery during the early 1990s, resulted in a rapid increase in the effort in demersal fishing. By 1992, concern was being expressed by the Research Division of Fisheries WA that the catches in this fishery had already exceeded the best estimate available for the sustainable yield.

Between 1993 and 1995, a major experiment was conducted by the Research Division and industry to determine levels of fishing effort to enable sustainable catches in the Pilbara Fish Trawl Fishery. The results of the experiment indicated that the large, slow-growing species such as red emperor and Rankin cod, were being over-exploited by the Pilbara Fish Trawl Fishery at the 1994 level of effort. Flagfish and threadfin bream were possibly under-exploited and blue spot emperor needed careful monitoring due to its large concentrations in the west of the fishery and its ease of capture.

Most of the trawl effort has been concentrated in the west of the trawl fishery, between 116° East and 118° East. The catch rates for the slow-growing species of red emperor, Rankin cod and jobfish have declined dramatically in the west of the fishery. This confirms the findings of the experiment that these species are being over-exploited.

The proposed interim management plan for the Pilbara Trawl Interim Managed Fishery, to be introduced on 1 January 1998, includes a 33 per cent effort reduction, a redistribution of effort across the fishery and an area closure to reduce the effects of fishing on the stocks of the larger, slow-growing species. This is expected to generate a slow recovery of these stocks, but it is dependent to some extent on continued recruitment from stocks in adjacent untrawled waters of the Pilbara Trap Managed Fishery and the line fishery.

The untrawled part of the trap and line fisheries is approximately equal in area to the trawl fishery and could be expected to have a similar sustainable yield. Over recent years, however, the trawl sector has dominated the overall catch (see Figure 1). Despite the dominance of the total catch by the trawl sector, and the fact that the trap and line sectors take only eight per cent and four per cent of the demersal scalefish catch respectively, the species composition of the catch between the commercial sectors is so different that the trap and line components can have a major impact on the slow-growing species. The majority of the trawl catch is small, short-lived species, not especially vulnerable to over-fishing. By contrast, the trap and line catch is dominated by large, slow-growing species, especially red emperor and Rankin cod which is predominantly taken by the trap sector, and jobfish by the line sector. Of the 1996 Pilbara commercial catch, the trap and line sectors take about one third of the total spangled emperor, red emperor, and jobfish catch and half of the Rankin cod catch (see Figure 2). The jobfish catch has increased dramatically in the line sector in recent years, which is of particular concern as this slow-growing species is especially vulnerable to over-fishing.

In the last few years, the trap sector has had the equivalent of two serious operators out of a total of six licensees. The line sector has had one or two serious operators for demersal scalefish in the last few years out of 36 line fishers who have operated in the area in recent years. There is a large amount of latent effort in the trap and line sectors, and if only a small portion of this became active there would be serious consequences for the slow-growing species such as red emperor, jobfish, Rankin cod and spangled emperor.

4.0 CHARACTERISATION OF THE FISHERY

4.1 Main User Groups

The major users of the demersal scalefish resource in the Pilbara are licensees in the Pilbara Trawl Fishery, the Pilbara Trap Managed Fishery, the Onslow and Nickol Bay Prawn Managed Fisheries, charter operators, a number of line-only operators and recreational fishers. There are also the non-exploitive users or passive users. This sector includes those who participate in sightseeing, snorkelling, non-fishing diving and wildlife interaction.

One of the difficulties in assessing effort in this fishery is that many operators use handline fishing in conjunction with other fishing methods, in particular trap and prawn trawl activities. Another is the range of various line methods used by many commercial fishers, which causes difficulties in interpreting the Catch and Effort Statistics submitted by them.

4.1.1 The Line Fishery

The line fishery has primarily evolved from the activities of operators participating in adjacent fisheries. Traditionally the majority of demersal line operators in the Pilbara have not been dedicated operators. Nevertheless, catches have been steadily increasing over the last few years. In 1994 the reported annual line catch for demersal scalefish was 76 tonne, in 1995 it was 91 tonne and in 1996 it was 133 tonne.

In recent years market demand for high quality fish, as well as a specific demand for jobfish, has prompted greater interest in this method of taking fish. As a consequence a few efficient operators, and in particular some from adjacent fisheries (trap and mackerel operators), have intensified their activities in medium depth waters (between 50 and 100 metres) of the fishery. There has also been a trend towards exploring new fishing grounds in waters which are greater than 100 metres and farther from port.

4.1.2 The Trap Fishery

The Pilbara Trap Managed Fishery extends from a line running due north from North-West Cape to 120° East longitude and on the landward side of the 200 metre isobath. Waters within a line generally following the 30 metre isobath are closed to trapping. Fishing effort is concentrated between the 30 metre isobath and 100 metre isobath (see Figure 3). This fishery has been a managed fishery since 1 May 1992.

The reported annual catch for fish taken by trap in 1996 was 302 tonnes. The principal species taken in the fishery are spangled emperor, red emperor, Rankin cod and jobfish.

Following a review of the fishery in 1996 based on performance criteria, the number of licences was reduced from twelve to six. In April 1997 this fishery converted to trap units. The capacity of the fishery is currently limited to 78 trap units. Each unit equals 1 trap which means that each licensee had an initial allocation of 13 traps per licence. However, the management plan allows the Executive Director discretion to alter the value of these units. Since April 1997 licences have also been fully transferable and units may be transferred within the fishery.

The recent increase in trap catch, in conjunction with the considerable latent effort remaining in this fishery, has prompted the need to consider the management arrangements for further input restrictions.

Some trap operators also fish using handline and dropline methods. The annual line catch by trap operators has dramatically increased in the last year. During 1994 and 1995 trap fishermen reported a catch of 11 tonne and 16 tonne using line, but during 1996 the recorded catch using line was almost 30 tonne.

4.1.3 Prawn Trawling

4.1.3.1 The Onslow Prawn Managed Fishery

The Onslow Prawn and Nickol Bay Prawn Managed Fisheries operate in the waters off the Pilbara coast (see Figure 4).

There are four different licence classes in this fishery allowing the holder to fish in certain parts of the fishery. A Class A licence is issued for Areas 1, 2 and 3; Class B licence is issued for Areas 2 and 3; Class C licence is issued for Area 2; and Class D licence is issued for Area 3 (see Table below).

There are seven vessels licensed to operate solely in this fishery. Area 1, west of Onslow may only be fished by the four Class A vessels which have access to this area. The remaining three (Class B) Onslow licensed vessels have access only to Areas 2 and 3 to the east of Onslow. For historical reasons Areas 2 and 3 are operated as overlap areas with the two adjoining fisheries, the Exmouth Gulf and Nickol Bay Prawn Managed Fisheries. Through this arrangement 12 (Class C) Exmouth Gulf vessels can fish in Area 2 while 12 (Class D) Nickol Bay vessels can fish in Area 3 (see Table 1 following).

CLASS OF LICENCES	No. OF LICENSEES	AREAS OF THE FISHERY
A	4	1, 2 and 3
B	3	2 and 3
C	12 (Exmouth Gulf Prawn Licensees)	2
D	12 (Nickol Bay Prawn Licensees)	3

TABLE 1.

4.1.3.2 The Nickol Bay Prawn Fishery

The boundaries of the Nickol Bay Prawn Managed Fishery encompass all waters of the Indian Ocean and Nickol Bay between 116°45' East longitude and 120° East longitude and on the landward side of the 200 metre isobath (see Figure 4). There are 14 licensed boats in this fishery.

The catch of demersal scalefish by the combined prawn trawl fleet using line has been variable. Although variable, the reported catch has ranged from 16 to 62 tonnes in the years from 1994 to 1996.

4.1.4 Fish Trawl

Although operators with licences endorsed to take finfish by trawl do not qualify directly as a 'user group' involved in the line fishery, their trawling activities do impact substantially on the sustainability of the resource. Furthermore, the proposed Interim Managed Fishery Management Plan for the Pilbara Fish Trawl Fishery has significant implications for future line fishing management arrangements. It is worthwhile outlining some of the issues which are expected to affect the line fishery.

The Pilbara Fish Trawl Fishery has been classed as a developmental fishery since 1 January 1993, however, this fishery is expected to become an Interim Managed Fishery on 1 January 1998.

The boundaries of the major component of the Pilbara Fish Trawl Fishery are all State waters between 116° East longitude and 120° East longitude on the North-West Shelf of Western Australia, and landward of the 200 metre isobath (see Figure 5). Waters inside a line approximating the 50 metre isobath are closed to fish trawling.

Since the early 1990s the majority of the demersal finfish taken off the North-West Shelf are from the Pilbara Trawl Fishery. There are 11 licensed fishing boats in this fishery. With the implementation of the proposed Interim Management Plan three boats will have eight months' access and eight boats will have four months' access. Fishing effort will be controlled through time units, area closures and gear controls. Time access units will be transferable.

In 1998 a 33 per cent reduction in effort will be introduced to this fishery which is intended to establish an annual catch of approximately 2700 tonnes (i.e. 1994 catch level). As part of a management proposal to increase the level of protection for the red emperor and Rankin cod stocks a closure to Area 3 of the fishery (i.e. waters between longitudes 117°20' East and 118° East and between 50 and 70 metre isobath) will also be applied (see Figure 5). This closure will apply equally to operators in the Pilbara trawl, trap and line fisheries. A further closure will be implemented to Area 6 of the fishery (i.e. waters between 100 and 200 metre isobath) where access will only be granted to those operators wishing to participate in a two year research program.

4.1.5 Recreational

There are four groups of recreational fishers: charter boat operators, land and boat-based anglers, and spearfishing divers. Those involved in recreational fishing and other recreational activities constitute the largest single user group in the area. Approximately 2000 recreational vessels are registered in the Pilbara region. The recreational catch has not been quantified but it is universally acknowledged as being significant. The main demersal scalefish targeted by recreational fishers are nor-west snapper (the lethrinids), emperor and coral trout.

In the Pilbara area, there are 13 charter vessels, five of which have commercial fishing boat licences and target demersal scalefish. Charter fishing includes consumptive and non-consumptive utilisation of the fish resources. These activities have the potential to expand as tourist demand expands and as the wider community becomes aware of the features of this area, in particular the Dampier Archipelago.

Fisheries WA does not actively manage the charter industry even though it falls within the jurisdiction of the *Fish Resources Management Act 1994* (FRMA). However, a recent review undertaken by the Tour Operators Fishing Working Group has recommended that the charter industry be recognised as a distinct user group. It proposes that a new licence category be introduced under the FRMA and that management arrangements be implemented to minimise the impact from these operators on sustainable fish stock levels.

4.1.6 Community/Environment

This group incorporates the non-extractive or passive users of the resource who have a stake in the management arrangements to ensure that economically sustainable development of commercial fisheries is achieved. In broad terms, the general community interest is focussed on the way the resource is used, conserved and enhanced to ensure that quality of life is preserved for future generations.

5.0 MANAGEMENT ISSUES

In preparing long-term management arrangements in a multiple use and multi-species fishery it is desirable to have a sound knowledge of the demersal scalefish resource and the activities of the users of that resource. However, as comprehensive data is not available, the Minister for Fisheries and the Executive Director depend on the best advice of scientists, managers and the various user groups to make decisions on the most appropriate management regime. In cases where there is insufficient scientific data available the agency's policy will be to adopt the 'Precautionary Principle' approach to management. This policy dictates that the absence of adequate scientific information will not be used as an excuse for postponing or failing to implement appropriate conservation or management measures for any fishery.

It is imperative that the total impact on the fish stock and the habitat is taken into account when management proposals are being formulated. This means that the process for developing new management arrangements must recognise that the line fishery should not be managed in isolation from other fisheries based on these resources.

5.1 Management Objectives

The specific management objectives for the line sector of the demersal scalefish fishery are to:

- remove latent effort;
- develop the management arrangements that are administratively simple, effective, cost efficient and enforceable;
- allocate access to the fishery based on fair and transparent processes which are generally acceptable to government, industry and other interest groups;
- protect the marine environment and in particular fish stocks and fish habitats; and
- maintain stocks by developing sustainable exploitation regimes.

6.0 MANAGEMENT DIRECTIONS

This paper recognises that in planning the management needs of the fishery in the future, the planning process must take into account the needs of all interest groups including government, the industries that utilise the resource (both commercial and recreational fishers) and the wider community.

Planning in this fishery incorporates the following basic requirements :

- Scientific information

Research data is limited, particularly in relation to the impact of the recreational fishery. Future research will be required and will significantly depend on the level of support from the main interest groups.

- Enforcement

Surveillance to ensure compliance with any management arrangements which are developed will be expensive and difficult, as much of the commercial fishing in waters off the Pilbara coast occurs in areas remote from ports. There is a need to provide adequate surveillance as the fishery is multi-species based and supports multi-method fishing activities. The installation

of the satellite tracking system, known as the Vessel Monitoring System, will be integral to the success of any management arrangements in the commercial sector.

- **Management Controls**

Management methods will need to include appropriate gear and boat controls. The role of different line fishing methods - i.e. dropline, demersal longline, handline and trotline - and the merits of 'mechanical' versus 'traditional' methods of hauling these lines must be considered.

The planning framework should also take into account the effect of methods of fishing on resource sustainability. The fishing methods of line, trap and trawl do not necessarily catch the same suite of fish species and therefore do not compete for the same fish resources. Where there is competition for the resource between the various methods, the management approach should favour methods which produce the best overall economic result from the catch. The current market preference for quality fish is: line-, trap-, then trawl-caught fish. However, trawling, and to a lesser extent, trapping, have the capacity to land high volumes of fish economically. This can maximise the total value and supply markets that line fishing cannot provide in sufficient quantities.

The relationship between quality and volume of fish caught in the demersal scalefish resource is species and gear dependent. As one of the objectives of the *Fish Resources Management Act 1994* is to maximise the economic benefits of fisheries, the approach of management will be to develop management arrangements for species and gear which contribute to this outcome. This may involve:

- getting the highest economic return from a sustainable catch level;
- setting the operating environment so that fishermen can increase the efficiency of their operations and therefore increase their profit by reducing operating costs without jeopardising sustainability;
- encouraging changes in the structure of the effort in the fishery to allow for a wider variety of different products for the market;
- encouraging different sectors to target different markets; and
- balancing commercial and recreational fishing to assist in the development of tourism.

7.0 MANAGEMENT OPTIONS

There are four broad categories for management options for demersal line fishing in the Pilbara. They are;

1. Do nothing.
2. Allow unlimited access for licensed fishing boats with history in the fishery.
3. Establish a management plan (either specific to a line fishery or one that encompasses trawl, trap and line fishing).
4. Prohibit line fishing.

Option 1.0 Do nothing

This option prompts the basic question of whether a new management regime needs to be implemented at all. In the absence of scientific data to show that the resource in this area is currently over-exploited by line fishing, it may be argued that no new management arrangements need to be implemented. This would mean that there would be no restrictions

applied to the approximate 1700 vessels with Western Australian Fishing Boat Licences which currently have access to this fishery.

Positive Attributes

- continues access to current licensees with a Western Australian Fishing Boat Licence;
- provides equity of allocation to line fishers; and
- is administratively simple.

Negative Attributes

- threatens the sustainability of the resource;
- maintains a very high level of latent effort;
- puts long-term access of commercial local line fishers at risk due to threat to sustainability of resource; and
- ignores the 'Precautionary Principle'.

Option 2.0 Allow unlimited access for licensed fishing boats with history in the fishery

If the conclusion is that the line fishery does require new management arrangements, it may be appropriate to allow any vessel with a fishing history of taking demersal scalefish by line in the Pilbara waters to be issued with a licence to enable them to continue their line fishing activities. On this basis the impact of this decision would be to limit the number of entrants to the fishery to 36 boats. This option would allow for no management restrictions to be imposed on those successful entrants.

Those without history in the area would have an opportunity to put a case as to why a licence should be granted.

Positive Attributes

- continues access for those who have traditionally participated in the fishery;
- provides for some equity of allocation between existing line fishers; and
- removes some latent effort.

Negative Attributes

- threatens the sustainability of the resource;
- provides the potential for a high level of latent effort to remain; and
- ignores the 'Precautionary Principle'.

Option 2.1

This option is linked to Option 2, in that only boats with an historical claim (approximately 36) be considered for entry to the fishery. However, the proposal here is to allow management controls to be implemented which would contain fishing effort at current levels. Possible controls include gear controls and restricting operators to spatial (area) closures and/or temporal (time) closures.

Positive Attributes

- continues access for those who have traditionally participated in the fishery;
- provides some equity of allocation to those who have line fished in the past; and

- removes latent effort.

Negative Attributes

- increases compliance costs;
- increases management costs;
- increases demand for research associated with management controls;
- maintains threat to the sustainability of the resource;
- disadvantages those who have shown a greater commitment to line fishing than others;
- reduces viability of operators wishing to specialise in line fishing; and
- ignores 'Precautionary Principle'.

Option 3.0 Establish a specific management plan

The wider application of various management methods in a management plan would provide a greater range of management options. Some possible management controls are the zoning of areas, unitisation of time, gear controls, spatial (area) and temporal (time) closures.

Option 3.1 Zoning the Fishery

In evaluating the management options for the demersal scalefish resource, current activities and fishing methodologies lend themselves to the notion of a zoning approach. Possible zones are; the Inshore Zone (0 - 30 metre isobath), the Mid-Shelf Zone (30 - 200 metre isobath) and the Offshore Zone (200 metre isobath - 200 nautical miles).

While many of the mid-shelf species also occur in the inshore zone, there are species which are specific to inshore areas when the appropriate habitat is available. For example, the spangled emperor, (*Lethrinus nebulosus*), is a dominant mid-shelf species which occurs right up to the shoreline where there is reef habitat. Whereas the blue-lined emperor, (*Lethrinus laticaudis*), is generally only found in the inshore zone. Bream, barramundi and threadfin salmon are other species which are not found offshore.

Red emperor and Rankin cod are dominant species in the mid-shelf zone but not inshore, though their juveniles may be abundant in some inshore areas. The fish fauna changes gradually with increasing depth with each species having its own range of depths. For example the gold-band snapper occurs mainly in the 80 - 150m depth range but is replaced by other related species of eteline lutjanids in the deeper shelf and slope waters. There is also a tendency in many, but not all species, for the juveniles to be more abundant in the shallower parts of a species' range.

The offshore zone assemblage of fishes (i.e. greater than 200 metre isobath) in tropical waters consists of two distinct faunal groups. The fish fauna of the upper region of the deeper-slope zone (200 - 500 metre isobath) is characterised by the ruby snappers (*Etelis* spp.), the tang snapper or golden sea-perch (*Lipocheilus carnolabrum*), the lenko snapper (*Dentex tumifrons*) and the grey-banded or eight-bar grouper (*Epinephelus octofasciatus*). The lower region of the deeper-slope zone (i.e. greater than 500 metre isobath) is relatively unexplored and is likely to be characterised by roughies such as Darwin's roughy (*Gephyroberyx darwini*).

The fish fauna of the continental slope region is distinctly different to that associated with offshore oceanic insular localities such as the Rowley Shoals. Fishes of the deeper-slope zone (i.e. greater than 200 metre isobath) in general have a reduced productive capacity and hence

are vulnerable to overfishing as a consequence of slow growth, extended longevity, late maturity and low rates of natural mortality.

3.1.(i) *The Inshore Zone*

This zone would encompass the area seaward of the high water mark and extend to the 30 metre bathymetric contour. Approximately 13 charter boat operators and five beach seine fishermen currently fish these waters. This proposal would allow for the continuation of current activities by these two user groups. New charter boats with commercial fishing licences would not be permitted any commercial fishing rights in this area. The beach seine netters in this area would be restricted in the quantities of demersal fish they could land, probably at their current level of take. Access to the inshore areas by commercial licensed netting operators would be non-transferable. This would enable either the area to eventually be used exclusively by the recreational sector or alternatively by line fishers granted access to the Mid-shelf Zone or a combination of access for these groups.

3.1.(ii) *The Mid-Shelf Zone*

The greatest concentration of fishing effort currently occurs in this area. The proposed boundary for this zone would lie between the 30 metre isobath and the 200 metre isobath. However, the area between the 100 metre isobath and the 200 metre isobath needs to be considered in a separate context in the short term. Access to this area would be limited to line fishers (as is the current approach with trap and trawl operators) who agree to participate in the research program that has been designed to assess the productivity of the area between the 100 and 200 metre isobaths.

3.1.(iii) *The Offshore Zone*

The offshore zone would constitute a deep-sea line fishing area which lies beyond the 200 metre isobath out to the 200 nautical miles (Australian Fishing Zone). This Offshore Zone could provide for an expansion of fishing activities by licensees in the Mid-shelf Zone or alternatively, by specialist deepwater line fishing operations. However, as there is little known about the resource in these deep-sea waters and resource sharing between the various users is currently being negotiated with the Commonwealth, any fishing activities undertaken in this zone would initially be carried out on a developmental basis only.

Management of the Mid-Shelf Zone

As the greatest concentration of fishing effort occurs in the Mid-shelf Zone (30 - 100 metres) the focus of the following management options will relate specifically to these waters. The starting point will be that, in the absence of adequate data for the demersal scalefish resource, management arrangements must take a conservative approach (i.e. the Precautionary Principle). Advice from the Research Division concerning stock sustainability in these waters recommends that a total initial time allocation of about 300 days of line fishing should be considered as an appropriate starting point for exploitation of the demersal scalefish resource. Using this time allocation as a baseline there are several management options that may have application for the various user groups accessing this area. They are:

Option 3.1.1

This option allows for the introduction of management arrangements which would result in a low number of full-time operators (e.g. two or three). Access for successful boats would depend on the previous time, effort and commitment they had shown to line fishing in this area.

Positive Attributes

- identifies participants;
- administratively simple;
- minimises compliance costs;
- minimises research costs;
- minimises management costs by having a small and defined set of operators; and
- provides security to licensees.

Negative Attributes

- denies access to diversified fishermen with a history of demersal line fishing.

Option 3.1.2

Given that there are several sectors who use line methods to supplement their other commercial fishing activities, it may be appropriate to allocate part-time access to all these user groups. Included in the diversified groups are operators from the trap, prawn trawl, rock lobster and adjacent pelagic fisheries.

Positive Attributes

- retains access for some existing users; and
- maintains line fishing as an integral component of the activities of diversified fishers.

Negative Attributes

- threatens the sustainability of the resource if not managed appropriately;
- maintains high level of latent effort;
- increases the demand for research;
- increases management costs;
- increases compliance costs;
- increases the pressure on resources to be shared amongst large number of access holders;
- fails to change existing situation in real terms; and
- ignores the 'Precautionary Principle'.

Option 3.1.3

This option involves the integration of the line activity with current Pilbara Trap Managed Fishery into a Pilbara Trap and Line Managed Fishery whereby the existing six trap boats and a small number of dedicated line boats would be allocated access to a combined trap and line demersal scalefish fishery. This option would permit an exchange of trap access units with line days.

Positive Attributes

- allows line fishing to be continued as an integral component of trap operations;
- provides for a sound economic base for a future line fishery;
- contributes towards the rationalisation of the trap fishery which currently has a high level of latent effort;
- provides security to licensees who gain access; and
- reduces management costs by having a small set of defined operators.

Negative Attributes

- denies access to diversified fishers with a history of demersal line fishing.
- increases demand for research; and
- increases compliance costs.

Option 3.1.4

This option is a variation on the Option 3.1.3. The difference would be that only the existing six licence fishing boats in the Pilbara Trap Managed Fishery would be given access to the demersal scalefish resource using line. This option would result in the formation of a Pilbara Trap and Line Managed Fishery.

Positive Attributes

- allows line fishing to be continued an integral component of trap operations;
- provides a sound economic base for a future line fishery;
- contributes towards the rationalisation of trap fishery which currently has high level of latent effort;
- reduces management costs by having a small set of defined operators; and
- provides security to licensees.

Negative Attributes

- denies access to line operators who have shown a commitment to line fishing; and
- denies access to diversified fishers with a history of demersal line fishing.
- increases demand for research; and
- increases compliance costs.

Option 3.2 Spatial Closures

Fishing effort in the line fishery may also be managed by the introduction of area closures, either separate to, or in conjunction with, the previous option. A closure to Area 3 of the Pilbara Fish Trawl Fishery (i.e. the area from 50 to 100 metre isobath between longitudes 117°20' and 118°) to all trawl, trap and line operators will be introduced by 1 January 1998. In addition to this closure it may be necessary to consider restricting access to other areas of the Pilbara waters, for example, the areas west of Onslow and east of Port Hedland.

Positive Attributes

- provides for an equitable allocation system;
- allows for a fish habitat protection area; and
- reduces management costs.

Negative Attributes

- creates the potential for an excessive level of latent effort in the open areas if not used in conjunction with other effort reduction mechanisms;
- may remove desirable grounds from the fishery;
- increases research demands;
- increases compliance costs; and

- creates a need to apply these restrictions to all sectors, which may impact differentially on the various sectors.

Option 3.3 Temporal Closures

This option allows a relatively simple method of managing fishing effort by restricting the amount of access time to the fishery. Given the annual constraints imposed by the cyclone season in these waters it may be appropriate to restrict access to this fishery from November to March each year. Temporal closures could also be used in conjunction with spatial closures and either or both could be used as part of the management plan option.

Positive Attributes

- provides for an equitable allocation system; and
- gives the resource large blocks of time where there is reduced fishing.

Negative Attributes

- creates the potential for an excessive level of latent effort if not used in conjunction with other effort reduction mechanisms;
- increases research demands;
- increases compliance costs;
- creates a lack of continuity in market supply; and
- creates a need to apply these restrictions to all sectors, which may impact differentially on the various sectors.

Option 4.0 Prohibit line fishing

Given the general lack of historical commitment to the line fishery, the high level of competition for the demersal scalefish resource from adjacent fisheries and the concerns over long-term sustainability of the resource, it may be appropriate to consider not having a line fishery in this area at all. In particular, the costs involved with line fishing, which arise from the labour intensive nature of handline and dropline methods, may determine that it would not be an economically viable fishery.

Positive Attributes

- provides added protection of stock;
- minimises research costs;
- minimises management costs;
- minimises compliance costs; and
- applies equally to all fishers.

Negative Attributes

- is inequitable to fishers who have shown some commitment to the fishery; and
- disadvantages diversified fishers.

8.0 THE CONSULTATIVE PROCESS

The process for developing management arrangements for the Pilbara demersal line fishing is allowing for full and open input by all interested parties. The process for consultation so far has been:

- a letter to all licence holders of a Western Australian Fishing Boat Licence advising them of a benchmark date of 15 April 1997;
- written comment from industry members;
- meetings with industry in Onslow and Karratha; and
- distribution of this Discussion Paper.

The proposed process for further consultation is as follows:

- Submissions collated by Fisheries WA;
- Development of preferred management option (which may involve the establishment of a working group);
- Preparation of a draft management plan once the Minister has approved recommendations on future management;
- Preparation of draft legislation for Minister's approval; and
- Gazettal of necessary legislation - regulations, Section 43 Order or management plan.

8.1 An Invitation to Comment

The options outlined in this paper for community discussion are intended as 'thought provokers' towards development of management arrangements for sustainable demersal line fishing in the Pilbara. In considering management of the fishery it is crucial to consider the overall use of demersal scalefish resources in these waters.

Fisheries WA invites people who have an interest in the fish resources of the Pilbara to make a submission regarding the issues outlined in this paper. A submission is a way to provide information, express your opinion and put forward your suggested course of action, including any alternative approaches.

You may wish to agree, disagree or comment on either general or specific matters outlined in the paper or introduce other options. When making comment on a specific issue in the paper:

- refer each point to the appropriate section in the discussion paper;
- clearly state your point of view;
- indicate your reasoning or source of information; and
- suggest recommendations, safeguards or alternatives.

If you prefer you may limit your submission to a list of points.

You may choose to collaborate with a group of people to make a joint submission, which will assist in reducing the workload on some individuals and may be useful in increasing the pool of ideas.

All submissions will be treated as public documents unless specifically marked confidential, and may be quoted in full or in part in any further reports.

The closing date for submissions is 15 March 1998. Please remember to include your name, address, the date and whether your submission is to remain confidential.

Submissions should be addressed to:

Pilbara Line Fishing Review
C/- Commercial Program Manager
Fisheries WA
168 St Georges Terrace
Perth 6000

ACKNOWLEDGEMENTS

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APPENDIX 1

INDUSTRY RESPONDENTS

S Sharp	P Fullarton	A Sharp
T Sharp	T Westerberg	G Bass
G Sell	H Gilbert	G Kennedy
J Melvin	J Layton	N Baker
N Dempster	D Baker	R Dunstan
A Guy	D Gibson	J Servaas
M O'Byrne	P Glass	R Renting
R Chitty	G Stewart	R Nash
B North	S Podgorny	J Clarke
M McGowan	J Higgins	J King
S Salmeri	R Gammon	G Greaves
M Manifis	R & M Alexander	W Titko & C Russell
J Davey & J Mercer	K Hodges & K Piefke	

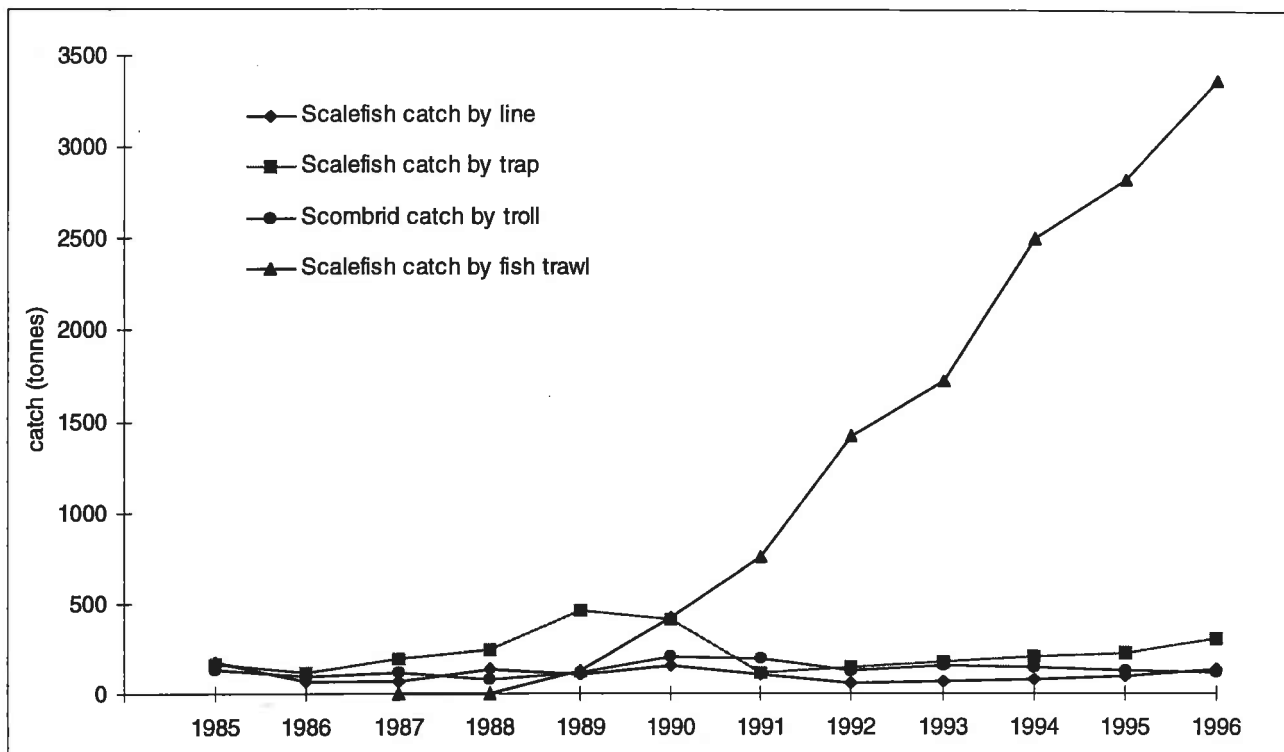


Figure 1. Catches for line, trap, and fish trawl. The trap and line sectors take about 8% and 4% of the catch.

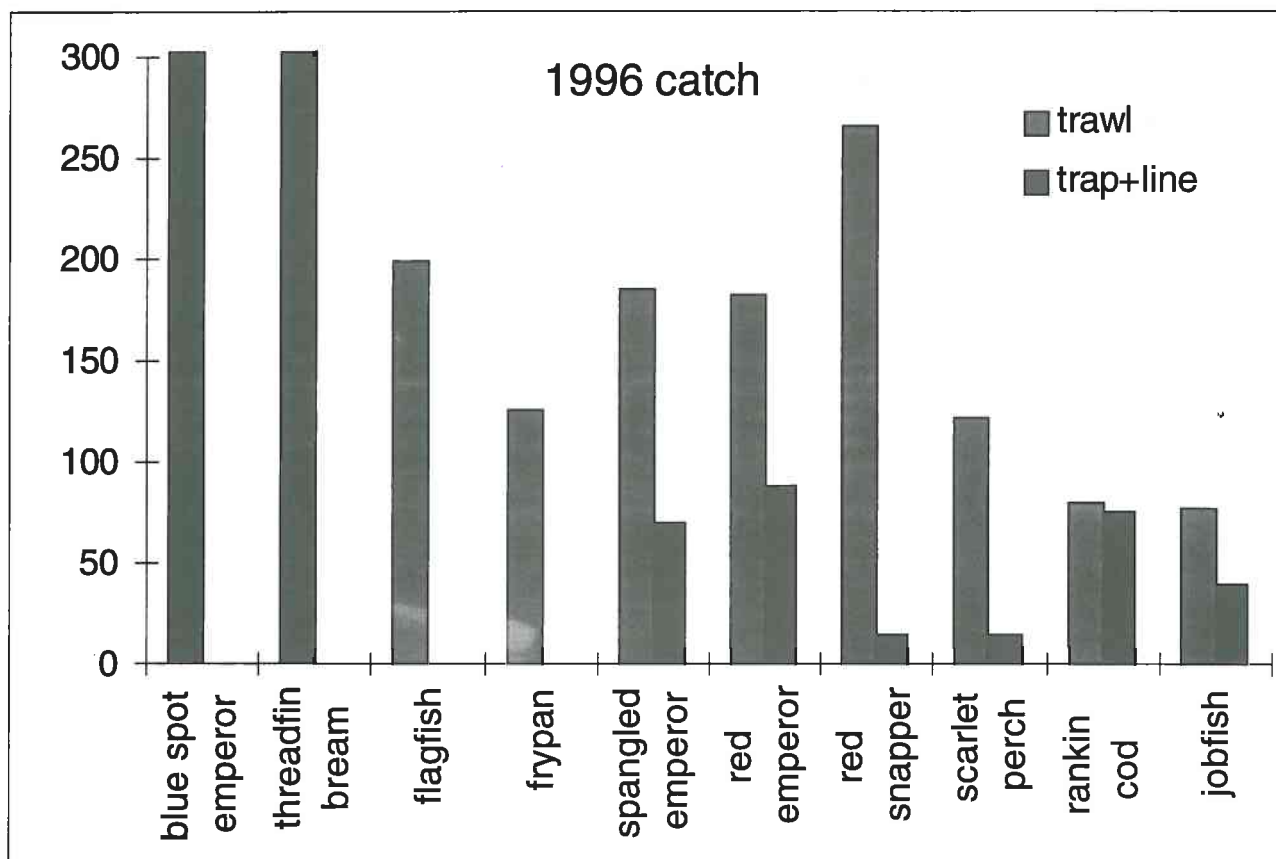


Figure 2. Catch share among commercial sectors in 1996. The trap and line fishers take a major proportion of the catch of the vulnerable species, such as red emperor, rankin cod, and jobfish. The blue spot emperor catch is 744 t.

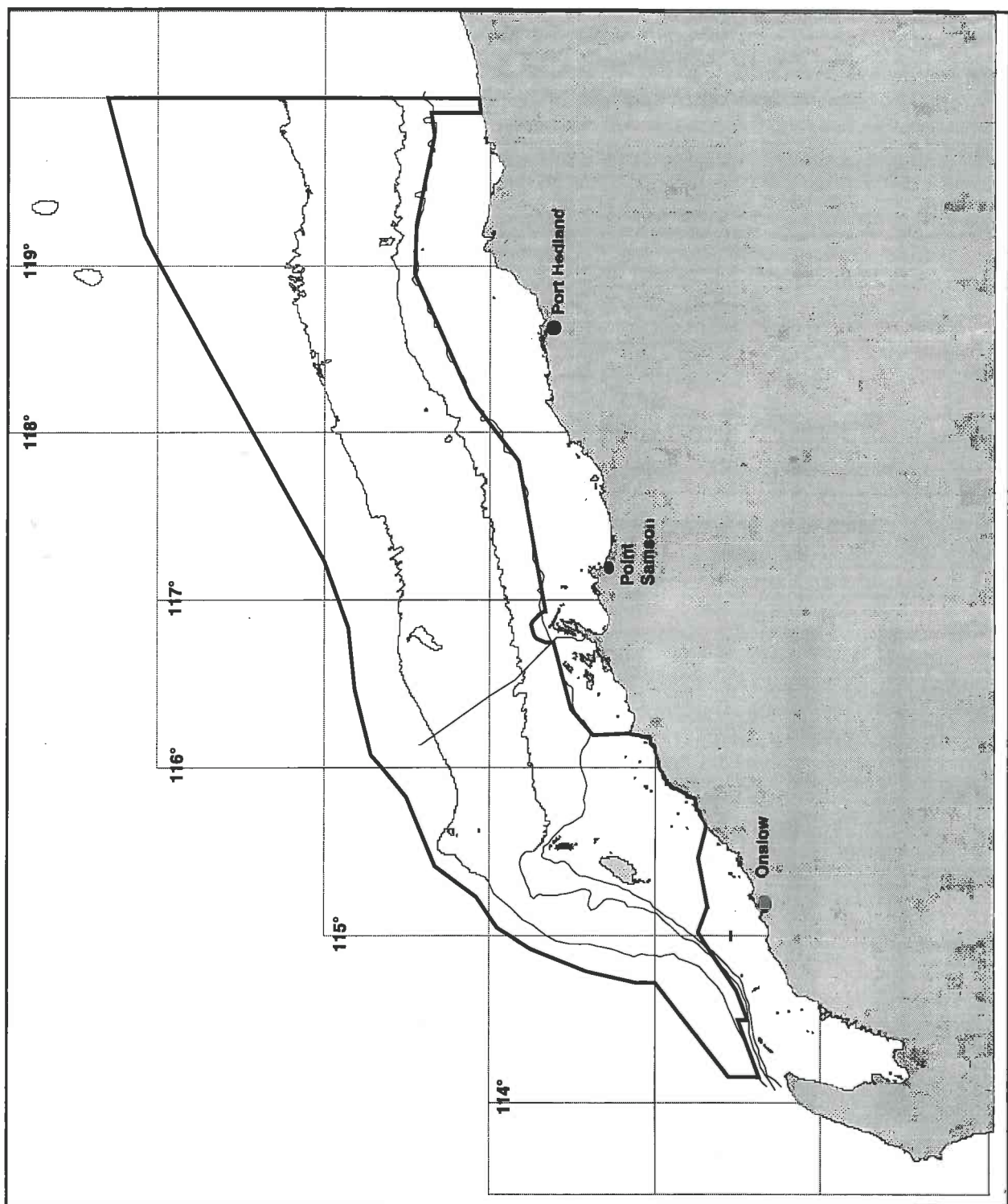


Figure 3 Boundaries of the Pilbara trap fishery

Onslow-Nickol Bay Prawn Fisheries

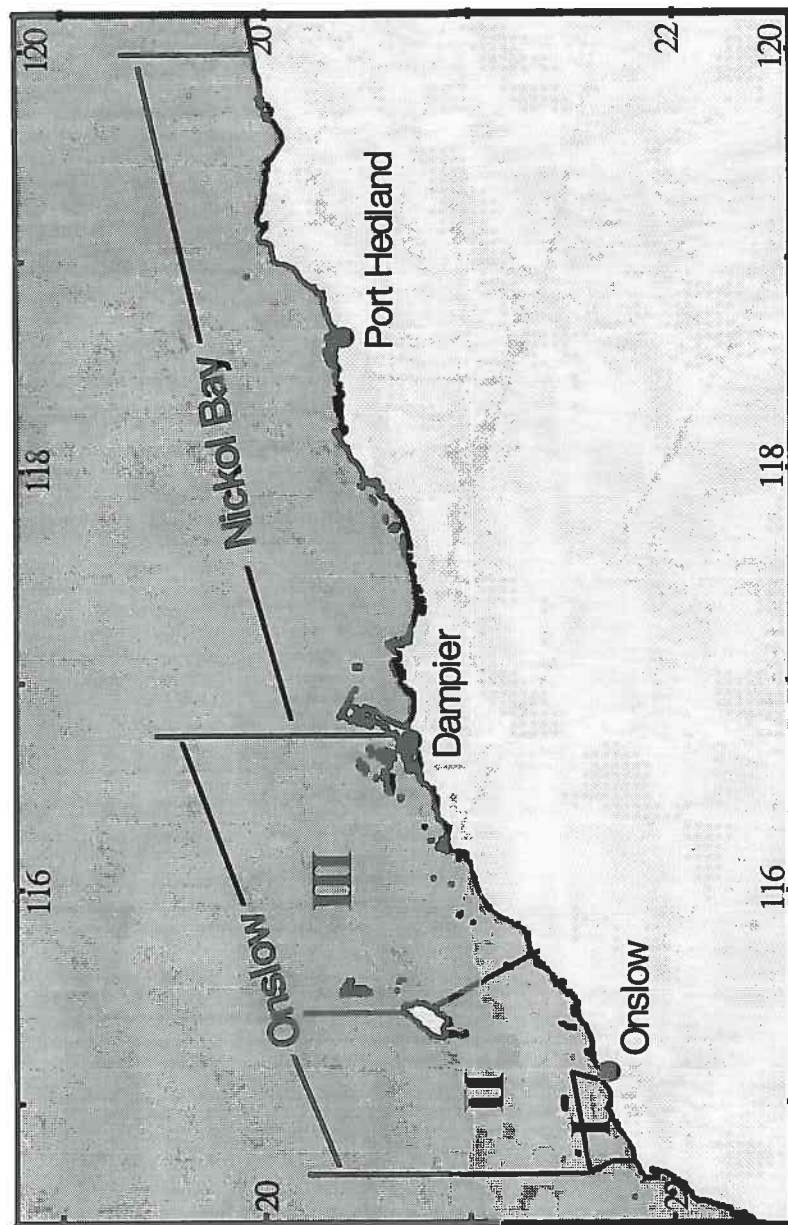


Figure 4

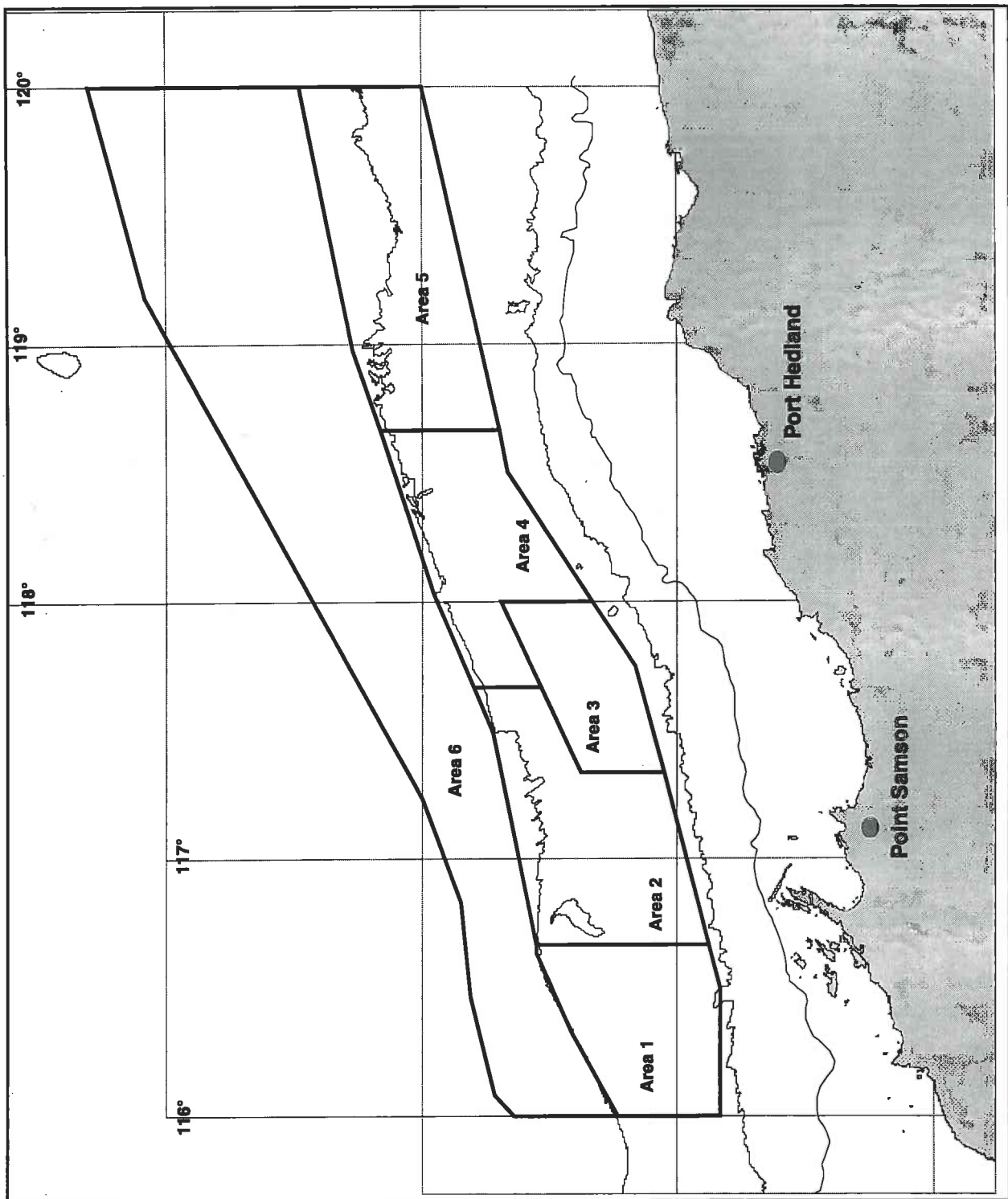


Figure 5 Boundaries of the Pilbara trawl fishery (Zone 2)

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 feasibility 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, Rottne 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, Rottne 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, M Moran & D Gaughan. (*in press*)
- 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)
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- No. 104** Management of the Houtman Abrolhos System. Kim Nardi (Abrolhos Islands Management Advisory Committee) (October 1997)
- No. 105** Management of the Houtman Abrolhos Fish Habitat Protection Area. Kim Nardi (Abrolhos Islands Management Advisory Committee) (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)