



Minister for Regional Development;  
Fisheries; the Kimberley, Pilbara and Gascoyne

## **MESSAGE FROM THE MINISTER**

---

The sustainability of key demersal scalefish species along the West Coast, particularly dhufish, pink snapper and baldchin groper, has been a growing concern for the WA Government and various stakeholder groups.

This concern is based on evidence of escalating fishing effort, particularly by the burgeoning recreational fishing sector. The number of registered recreational boats has grown rapidly as the State's population continues to climb. Recreational fishers have also become more effective as they have quickly adopted new technology. In particular, global positioning systems (GPS) and high quality sounders have now become standard items on fishing boats and this has made recreational fishing much more precise and targeted.

More people fishing and more effective fishing methods have increased the pressure on fish stocks. To better understand the impact this increased pressure is having on fish stocks, the Department of Fisheries undertook a number of dedicated research projects to assess the status of dhufish, pink snapper and baldchin groper. These popular and well-recognised species of fish were chosen for the assessment because they are good indicators of the health of demersal scalefish stocks more generally.

This research is now available and it shows Western Australians are already overfishing dhufish and pink snapper throughout their natural distribution, and overfishing baldchin groper within the Abrolhos Islands. If the current situation is not addressed it is likely that continued fishing pressure will see these stocks of fish collapse within four to five years.

It is important to acknowledge that both the commercial and recreational sectors are capable of exerting considerable impacts on these stocks and more effective management of both sectors is required to reduce catches.

I have already taken steps to address the commercial catch of demersal scalefish. A new management plan, which will soon be implemented, will reduce the number of commercial fishers operating under a new and strict management system. This new plan will ensure the commercial sector fish in a sustainable way and are able to provide high quality seafood to restaurants and local retailers.

Recognising the seriousness of the problem and the particular significance of increasing fishing pressure in the metropolitan region, I have now made the unprecedented decision to remove all commercial fishing for demersal scalefish in the waters off the greater metropolitan coastline. Specifically, there will be no commercial fishing for demersal scalefish from Lancelin to a point south of Mandurah (31° south to 33° south), due to be effective from November this year.

This action will provide immediate relief to fish stocks but further action is necessary and the burden of responsibility cannot and should not be carried alone by commercial fishers. Each of us has a responsibility to fish for the future and ensure that fishing - commercial and recreational - is sustainable in the long term.

Recreational fishers in Western Australia are to be commended for the way they have supported the existing management system based on bag and size limits but it is clear that the problems we now face require new and innovative solutions.

The strategy that is ultimately adopted to manage recreational fishing must aim to ensure sustainability. But it is important not to take the fun out of fishing by becoming too regulated. It is also important the community supports the system we choose because voluntary compliance with the necessary rules will help us achieve our goals more quickly. To support the new system, the WA Government will fund new research programs to ensure we have the necessary knowledge to measure our success and adjust the system where required.

The purpose of this discussion paper "*Fisheries Management Paper 225*" is to engage with recreational fishers and the wider community in order to develop new strategies that can achieve this vision of sustainable and enjoyable recreational fishing. This paper explains more fully the nature of the problems facing us and presents some of the new measures we should consider. Your views on the way forward are critical to this process and you are encouraged to become involved in the comprehensive consultation process outlined in the discussion paper.

The process of determining a new recreational fishing strategy including community consultation will take at least six months to deliver an outcome from the date of releasing this discussion paper.

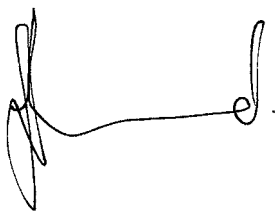
During this period it is important that we do not allow recreational fishing pressure to continue to escalate. Therefore, I will be implementing an interim management package to cover this period.

These new rules may not form part of the longer-term strategy that will be developed through the consultation process. But in the short term they are crucial to limit recreational fishing pressures.

This interim package will be phased in from November this year and will:

- Extend the closure to fishing for pink snapper in Cockburn and Warnbro Sounds from 1 October to 31 January.
- Extend the existing possession limit to the place of residence throughout WA.
- Totally protect baldchin groper within the Abrolhos Islands.
- Create a possession limit of 4 Category 1 (high risk) fish per person on aquatic charter vessels operating along the WA coast.

I look forward to engaging with recreational fishers and the wider community as we work together to ensure that fishing is both sustainable and enjoyable.



**Hon Jon Ford JP MLC**  
Minister for Fisheries

**MANAGING THE RECREATIONAL CATCH  
OF DEMERSAL SCALEFISH ON THE WEST COAST**

*Future Management Scenarios  
for Community Consideration*

---

FISHERIES MANAGEMENT PAPER NO. 225

---

Department of Fisheries  
168 St Georges Terrace  
Perth WA 6000

September 2007

ISSN 0819-4327



Managing the Recreational Catch of  
Demersal Scalefish on the West Coast  
Future Management Scenarios for Community Consideration

September 2007

Fisheries Management Paper No. 225

ISSN 0819-4327



A complete list of Fisheries Management Papers  
is available online at [www.fish.wa.gov.au](http://www.fish.wa.gov.au).

**CONTENTS**

<b>EXECUTIVE SUMMARY .....</b>	<b>4</b>
<b>CONSULTATION PROCESS .....</b>	<b>6</b>
<b>MAKING A SUBMISSION.....</b>	<b>7</b>
<b>SECTION 1 SETTING THE SCENE .....</b>	<b>8</b>
1.1 PROFILE OF THE WEST COAST DEMERSAL SCALEFISH FISHERY .....	8
1.1.1 Recreational fishing .....	9
1.1.2 Charter fishing .....	16
1.2 BIOLOGY AND ECOLOGY OF KEY DEMERSAL SPECIES.....	21
1.2.1 Dhufish .....	21
1.2.2 Pink snapper.....	22
1.2.3 Baldchin groper.....	22
1.3 RESEARCH AND MONITORING.....	23
1.3.1 How do we monitor stocks? .....	23
1.3.2 What is the current status of key demersal (bottom) species? .....	24
<b>SECTION 2 KEY ISSUES FOR RECREATIONAL MANAGEMENT .....</b>	<b>27</b>
2.1 HISTORY OF RECREATIONAL FISHERIES MANAGEMENT .....	27
2.2 HIGH MORTALITY OF RELEASED FISH .....	28
2.3 MULTI-SPECIES NATURE OF FISHERY .....	30
2.4 CONTINUAL IMPROVEMENT IN FISHING EFFICIENCY .....	30
2.5 INCREASING BOAT OWNERSHIP .....	31
2.6 NEED FOR DETAILED INFORMATION ON RECREATIONAL FISHING .....	33
2.7 SPATIAL SCALES FOR MANAGEMENT .....	33
2.8 LIMITATIONS OF CURRENT BAG, BOAT AND SIZE LIMITS.....	34
<b>SECTION 3 HOW CAN WE CONTAIN RECREATIONAL CATCHES? .....</b>	<b>37</b>
3.1 WHAT TOOLS CAN WE USE TO MANAGE RECREATIONAL CATCHES? ..	37
3.1.1 Registration system – an essential monitoring tool .....	37
3.1.2 Explicitly managing the catch through a form of tag system.....	39
3.1.3 Restricting effort through closed seasons .....	40
3.1.4 Restricting effort through closed areas.....	42
3.1.5 Restricting effort through temporary corridor closures .....	43
3.1.6 Wilderness fishing areas .....	44
3.2 STRATEGIES TO SUPPORT NEW MANAGEMENT .....	46
3.2.1 Compliance and education requirements.....	46
3.2.2 Research data requirements.....	46
<b>REFERENCES.....</b>	<b>48</b>

## **EXECUTIVE SUMMARY**

---

The West Coast Bioregion is home to a variety of fish species that live on or near the bottom. These fish are termed “ demersal” species and include dhufish, pink snapper, baldchin groper, breaksea cod, queen snapper (blue morwong) and red snapper. These species are under increasing fishing pressure and the future management of demersal scalefish on the West Coast is now at the “crossroads”. Commercial and recreational fishing need urgent changes to management arrangements so that iconic species such as dhufish and pink snapper are available for future generations.

Significant over-fishing of dhufish and pink snapper stocks is occurring on the West Coast<sup>1</sup>. The number of older fish in the population has fallen and fishing now relies on a few dominant year classes (10 to 13 year-old fish). The decrease in older dhufish and pink snapper has been caused by high fishing pressure, combined with a number of years of poor recruitment, with few juvenile fish entering the fishery. Baldchin groper stocks at the Abrolhos Islands are also being overfished.

Recruitment for dhufish, pink snapper and baldchin groper depends on favourable environmental conditions. There can be a number of years between successful recruitment events. Successful recruitment for dhufish has happened only a few times over the past 20 years. Catches must therefore be controlled so breeding stocks are maintained and good recruitment occurs when conditions are again favourable. Current research indicates that fishing mortality needs to be reduced by about 50 per cent across the West Coast Bioregion.

The new management arrangements that are urgently required for the commercial and recreational fishing sectors need to reduce the current catch levels and maintain them at sustainable levels. Dhufish and pink snapper will be able to recover if the necessary management measures are put in place now to protect breeding stocks. Delaying management will only worsen the problem and future management will need to be more severe. It may also mean fish stocks collapse and the fishery being totally closed.

The Minister for Fisheries has announced significant changes to the management of commercial catches of demersal scalefish on the West Coast. The Metropolitan zone (from Lancelin 31°S to south of Mandurah 33°S) will be permanently closed to commercial fishing for demersal scalefish. This closure will involve the cessation of commercial fishing by line fishers and the demersal gillnet and longline (shark) fishery. The new managed commercial fishery, the West Coast Demersal Scalefish Fishery, will be a small viable line fishery targeting demersal scalefish across the Kalbarri, Mid-west and South-west zones<sup>2</sup>.

Commercial fishing effort will be tightly regulated to constrain the commercial component of the catch to sustainable levels. Other commercial fishers not in the West Coast Demersal Scalefish Fishery will not be permitted to take demersal scalefish while undertaking other commercial fishing activities (e.g. fishing for rock lobster), even for personal consumption.

However, changes to commercial fishing alone will not be sufficient to ensure that the total catch is at sustainable levels. Recreational catches reductions are also required; however, minor changes to the current recreational controls, such as bag and size limits, will not be sufficient to achieve the necessary reductions. A new management approach is required.

---

<sup>1</sup> Fisheries Research Report No. 163

<sup>2</sup> Fisheries Management Paper No. 224

This paper discusses the major issues around controlling the total recreational catch. It also considers some of the tools available to manage the catch to specific target levels. The sustainability of fish species must be a key driver. However, the impacts on the social amenity of recreational fishing must also be taken into account. Any particular tool, if used on its own and to its full extent, may be rather “blunt” in its application and its impacts unacceptable to large parts of the community. The most effective and acceptable management package will probably be a mix of tools, supported by effective education, compliance and monitoring programs.

The aim of this paper is to stimulate a broad level of community discussion and involvement in developing a way forward. The very nature of the changes required means that many individual fishers will have to modify their current fishing practices. By participating in this discussion, people have an opportunity to help develop new and innovative management options while minimising major impacts on the important social values of recreational fishing. Ultimately however, new measures must be introduced if we are to ensure the sustainability of key demersal fish species.

I encourage input from a wide range of interested individuals and organisations. This will be valuable in developing a dedicated and effective management package. With it we ensure future generations can continue to enjoy high quality recreational fishing experiences along the West Coast of Western Australia.



P J Millington  
**Chief Executive Officer**

## **CONSULTATION PROCESS**

---

An extensive consultation process will follow the release of this discussion paper and the research reports on the status of demersal fish stocks off the West Coast.

The aims of the consultation process will be threefold:

1. to promote community understanding of the sustainability issues;
2. to develop community understanding and discussion of the various management tools available that can effectively contain recreational catches in the long term; and
3. to gain an understanding of community views on preferred management approaches.

During the public comment period, meetings will be held in key population centres. These meetings will provide people with an opportunity to receive a briefing on the research conducted to date and how the fishery may be managed in the long term. They will also provide an opportunity to provide feedback to the Department of Fisheries on your thoughts and ideas. The details of these meetings will be publicised through print and electronic media.

Following the public comment period, a set of detailed proposals will be developed for the long-term management arrangements for the recreational fishery. These proposals will take into consideration the latest research findings and feedback from this discussion paper.

These proposals will be detailed in a Fisheries Management Paper that will be released for further public input on a new way forward for managing recreational fishing. It is anticipated this paper will be released early next year.



## **MAKING A SUBMISSION**

---

The release of this discussion paper for public comment provides an opportunity for you to express an opinion on how recreational fishing for demersal species on the West Coast should be managed.

Points to consider for submissions:

To ensure your comments are as effective as possible, please:

- Clearly and briefly describe each separate subject you wish to address.
- Refer to the different sections in the discussion paper.
- Tell us whether you agree/disagree with the ideas.
- Suggest alternative ways to resolve the issues raised in this paper or identified by you.

### **Where to send your submission**

The closing date for submissions is **16 November 2007**. Please send your submission along with your full name and address to:

Recreational Fishing Review  
Department of Fisheries  
Locked Bag 39  
Cloisters Square Post Office  
PERTH WA 6850

Alternatively you can enter your submission online by visiting the Department of Fisheries' website address at **[www.fish.wa.gov.au](http://www.fish.wa.gov.au)**

## SECTION 1 SETTING THE SCENE

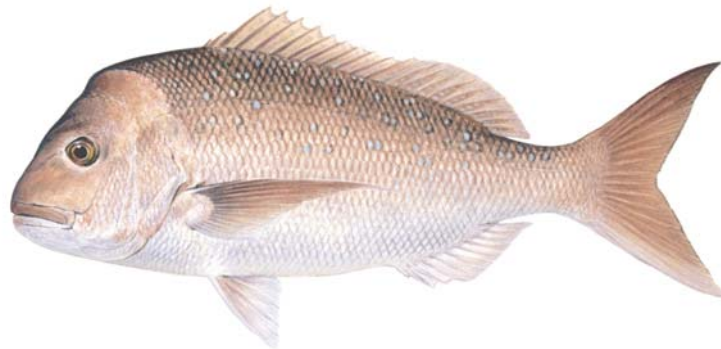
---

### 1.1 PROFILE OF THE WEST COAST DEMERSAL SCALEFISH FISHERY

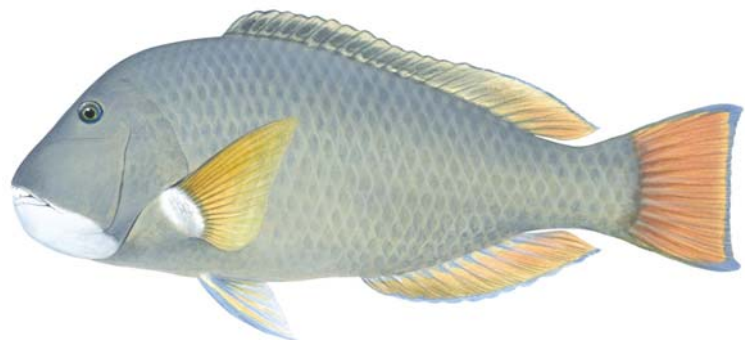
The West Coast Demersal Scalefish Fishery (WCDSF) extends from north of Kalbarri (27° south latitude) to Black Point (115° 30' east longitude), near Augusta (Figure 1). The West Coast Bioregion is home to a variety of fish species that live on or near the bottom. These fish are termed “demersal” species and include dhufish, pink snapper, baldchin groper, breaksea cod, queen snapper (blue morwong) and red snapper.



**West Australian dhufish (*Glaucosoma hebraicum*)**



**Pink snapper (*Pagrus auratus*)**



**Baldchin groper (*Choerodon rubescens*)**

Recreational fishing for demersal scalefish in the West Coast Bioregion is mainly from boats. Anglers typically use rods and reels or handlines, although a small proportion of demersal scalefish (less than 1 per cent) are taken by spear fishers, generally operating in water less than 20 metres deep.

The West Coast Demersal Scalefish Fishery comprises four zones:

<b>Zone</b>	<b>Typical catch</b>
Kalbarri	Pink snapper, sweetlip emperor
Mid-west	Dhufish, baldchin groper, pink snapper
Metropolitan	Dhufish, breaksea cod, pink snapper
South-west	Dhufish, pink snapper, breaksea cod, queen snapper, red snapper

Charter fishing is undertaken throughout the region, with 138 charter operators licensed to conduct tours in the West Coast Bioregion. These tours are conducted from key population centres, with the Abrolhos Islands being a focal area for tours in the Mid-west zone. Some charter activity targets pelagic (surface swimming) species such as mackerel but catch returns indicate the vast majority of charter fishing activity is focused on demersal species.

### **1.1.1 Recreational fishing**

The first 12-month survey of recreational boat fishing in the West Coast Bioregion, including the Metropolitan area, was conducted during 1996/97<sup>3</sup>. This survey provided comprehensive data on the recreational boat-based catch for the West Coast Bioregion.

The 1996/97 survey indicated fishing effort is highest within a 30km radius of available launching points. The Metropolitan area has the greatest number of registered boats. This indicates a higher level of fishing pressure is being exerted on stocks within this area. The recreational catch of dhufish in the West Coast Bioregion was highest in the area between Lancelin and Port Gregory (north of Geraldton). The majority of the catch is taken over summer, autumn and spring. Most angling events for demersal scalefish are single-day trips where anglers launch in the early morning and retrieve their boats in the afternoon, often with the onset of the sea breeze.

A repeat of the creel survey was undertaken in 2005/06<sup>4</sup>. The 2005/06 creel survey results show distinct changes in both the level and distribution of recreational fishing effort. People are now travelling greater distances to fish over a far wider area (Figure 2). There are still peaks in fishing effort around key launching sites; however, there is now considerable fishing pressure being exerted out to the 200m isobath. This trend is due to the growth in ownership of larger, faster boats and people travelling greater distances to catch fish.

Fishing pressure is now being applied by recreational fishers over the full habitat range of key species such as dhufish, which primarily occur in water less than 100 m.

A comparison of the total estimated recreational boat-based line fishing effort and catch of dhufish and pink snapper shows significant changes between the two surveys (Table 1). A comparison of the distribution of dhufish and pink snapper catches between the 1996/97 and 2005/06 creel surveys is contained in Figures 3 and 4. The proportion of the total dhufish and

<sup>3</sup> Sumner and Williamson 1999

<sup>4</sup> Fisheries Research Report No. 163

pink snapper catch taken by recreational fishers in the West Coast Bioregion has also increased between 1996/97 and 2005/06 (Figures 5 and 6).

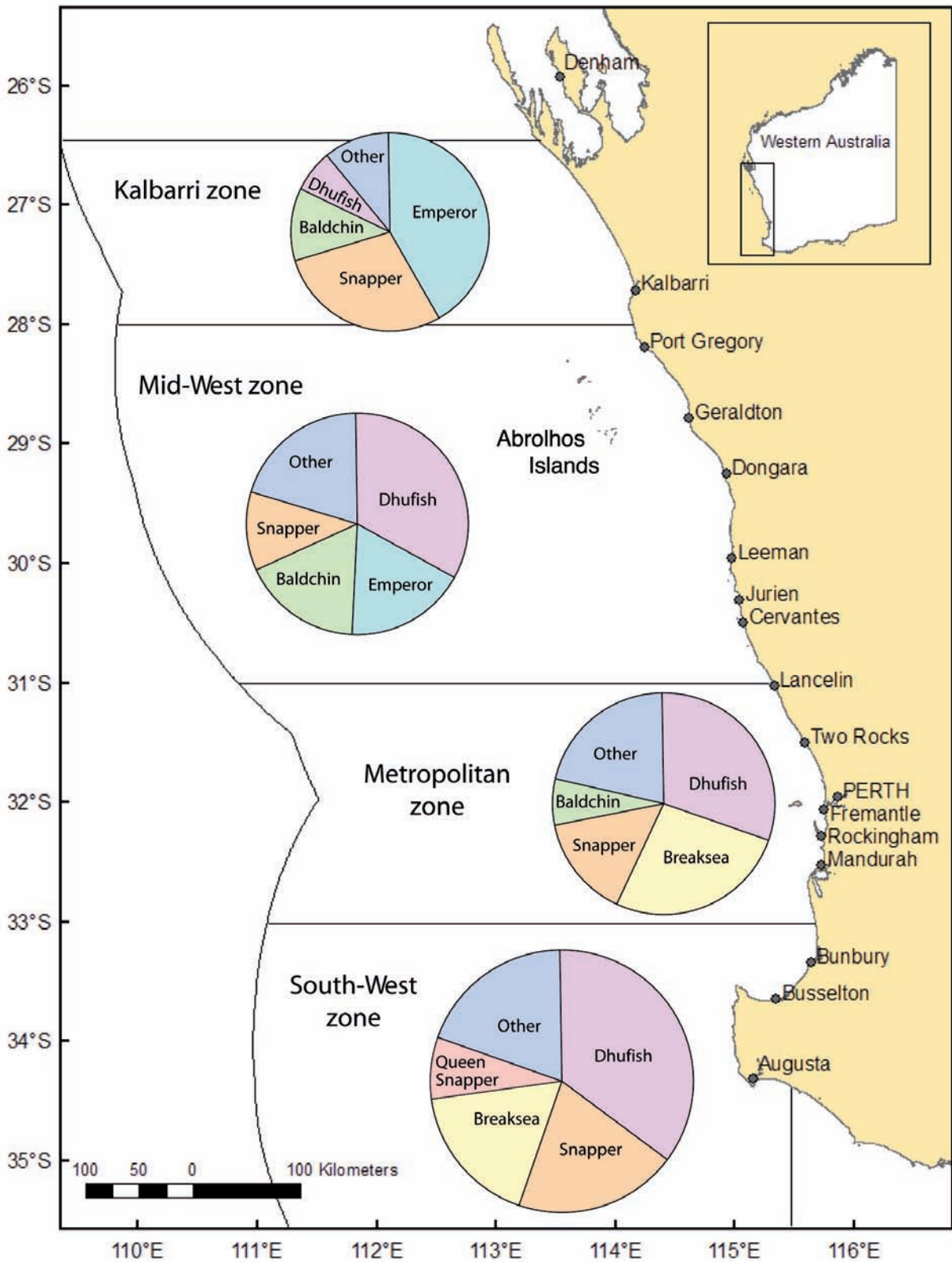
**Table 1.** Recreational oceanic boat-based catch and effort for dhufish and pink snapper in the West Coast Bioregion for 1996/97 and 2005/06 (excludes charter catches)

<b>West Coast Bioregion</b>				
<b>Years</b>	<b>Boat based fisher hours</b>	<b>Boat based fisher days*</b>	<b>Dhufish catch (tonnes)</b>	<b>Pink snapper catch (tonnes)</b>
1996/97	1,348,000	269,600	125 (48 Metro)	25 (10 Metro)
2005/06	1,557,000	311,400	186 (58 Metro)	40 (13 Metro)

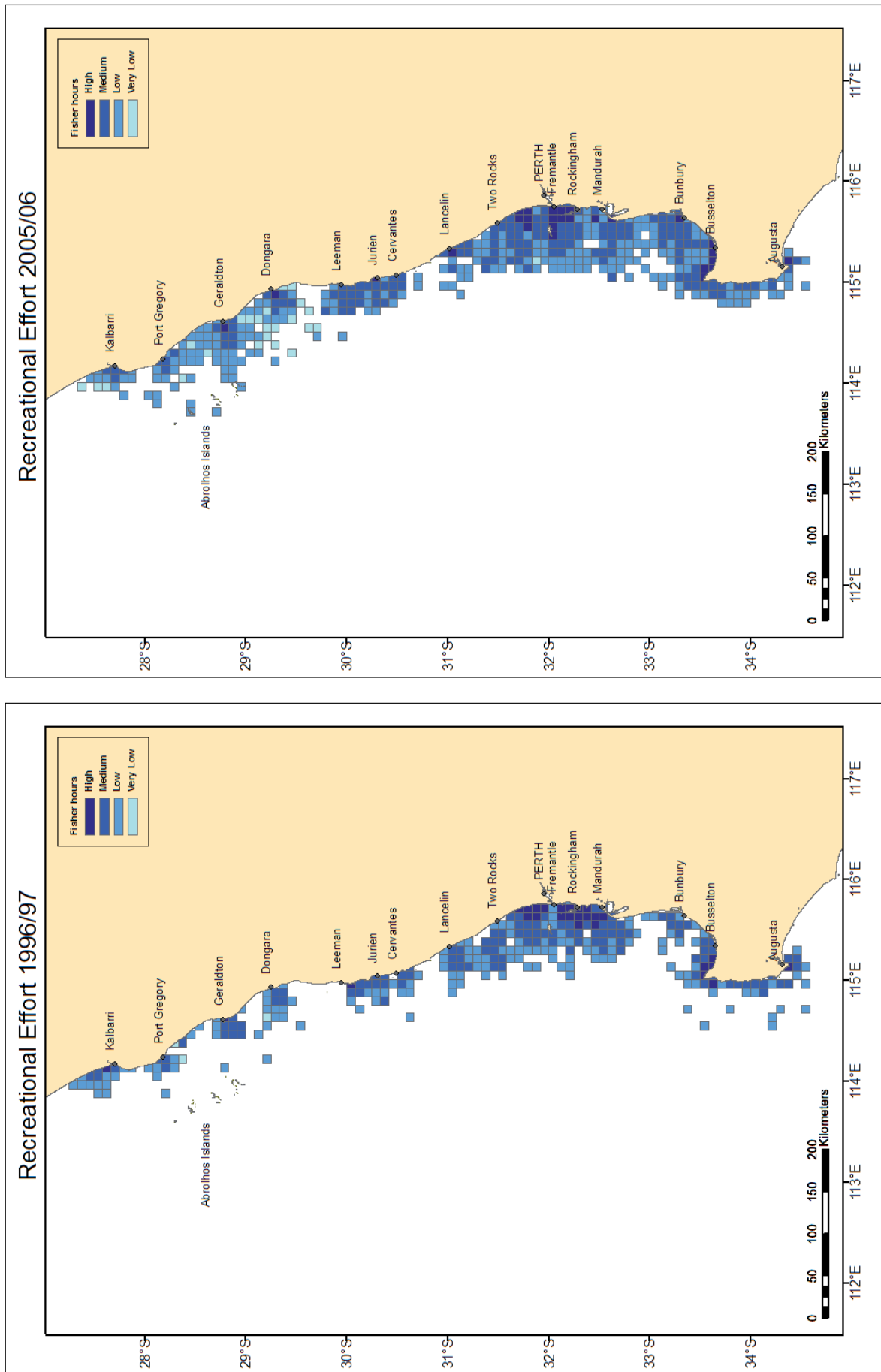
\* Assumes a five-hour average boat-based fishing day

### Summary – Recreational fishing

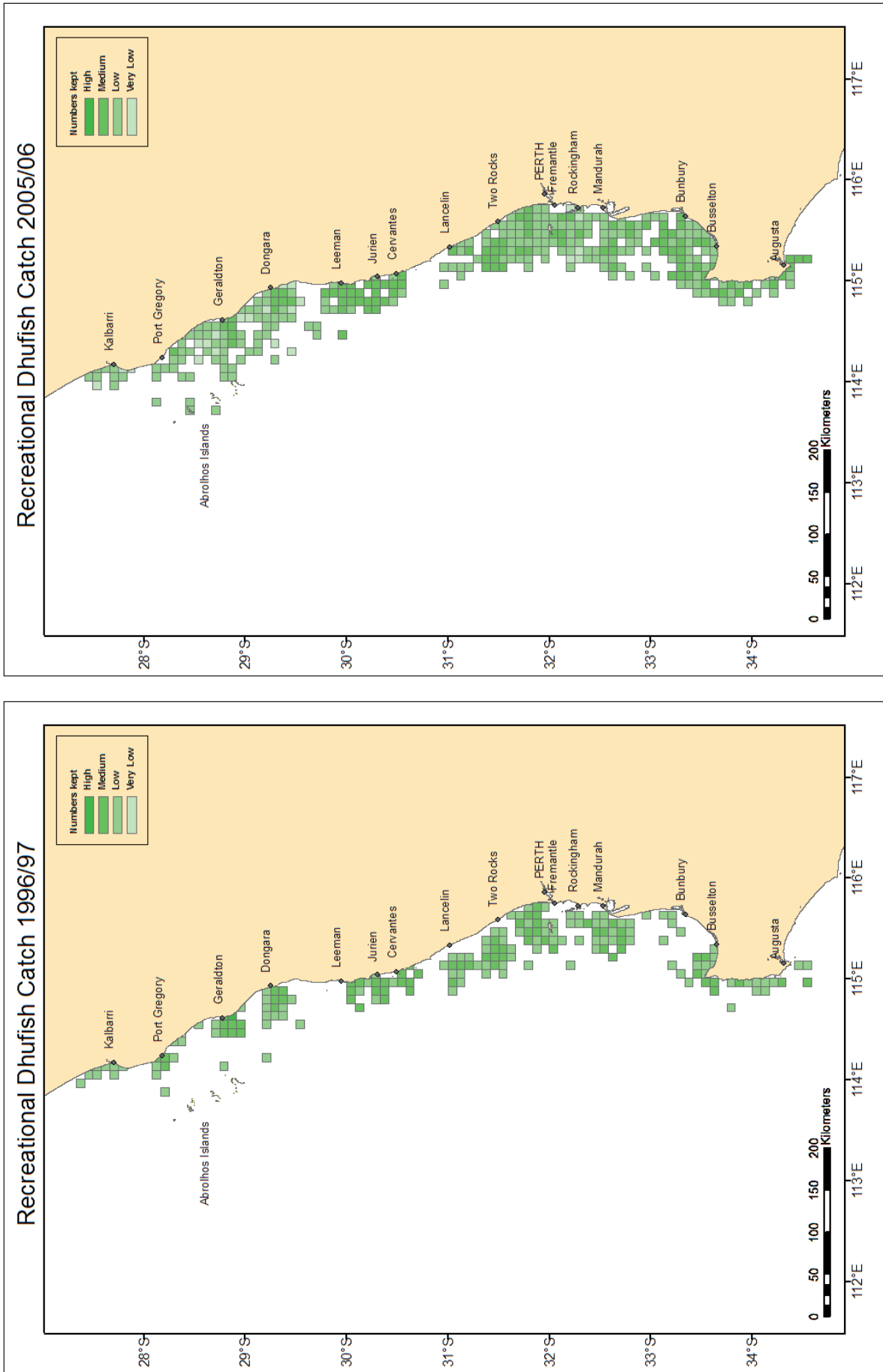
- Recreational catch and effort is increasing.
- The recreational catch of dhufish has increased from 125 tonnes in 1996/97 to 186 tonnes in 2005/06.
- Recreational boat-based line fishing effort has increased from 269,600 days\* in 1996/97 to 311,400 days\* in 2005/06.



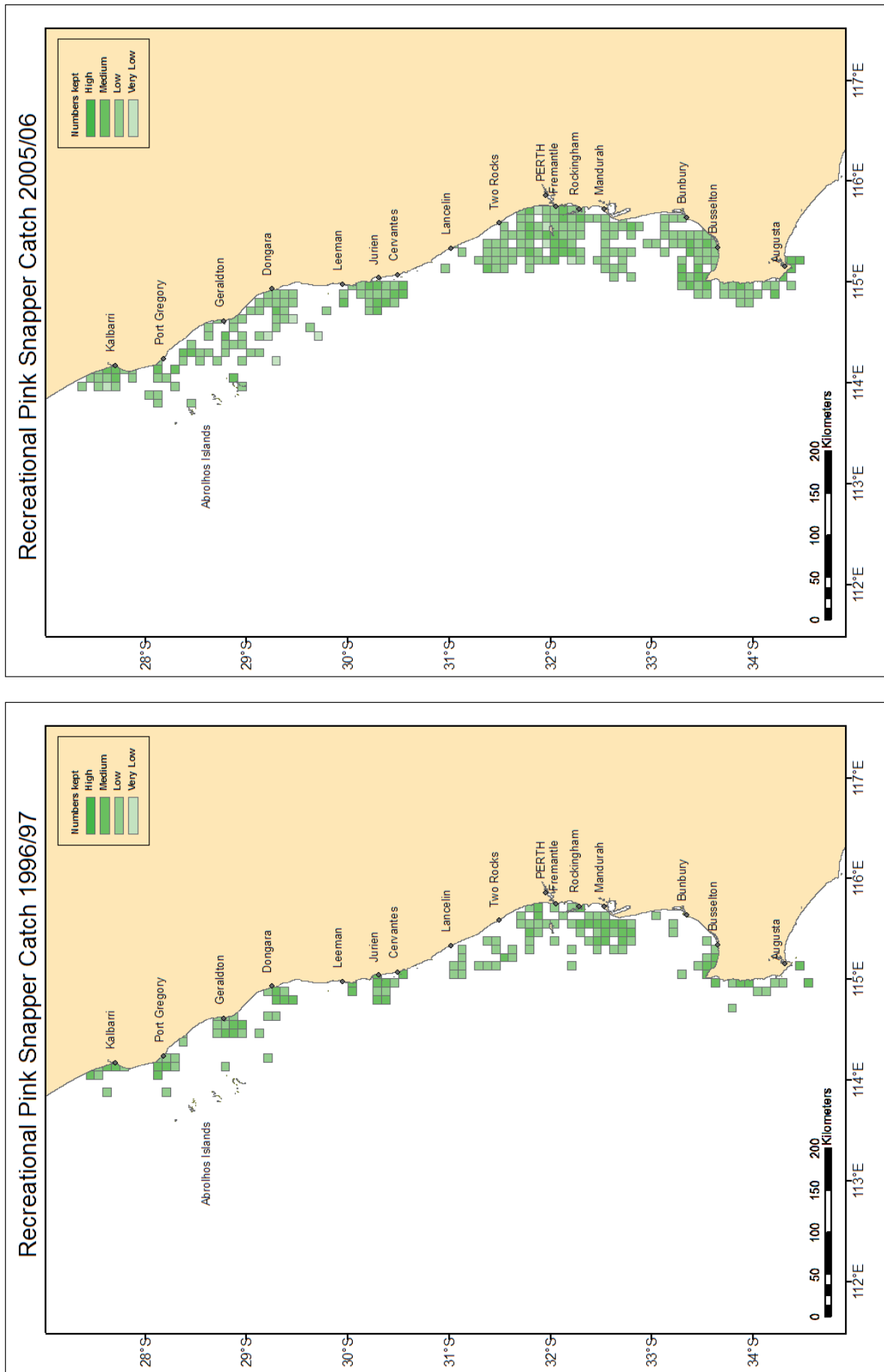
**Figure 1.** The West Coast Bioregion showing relative composition of key demersal scalefish taken by recreational fishers – 2005/06



**Figure 2.** Estimated boat-based recreational line fishing effort using boat ramp creel surveys in the West Coast Bioregion for 1996/97 and 2005/06

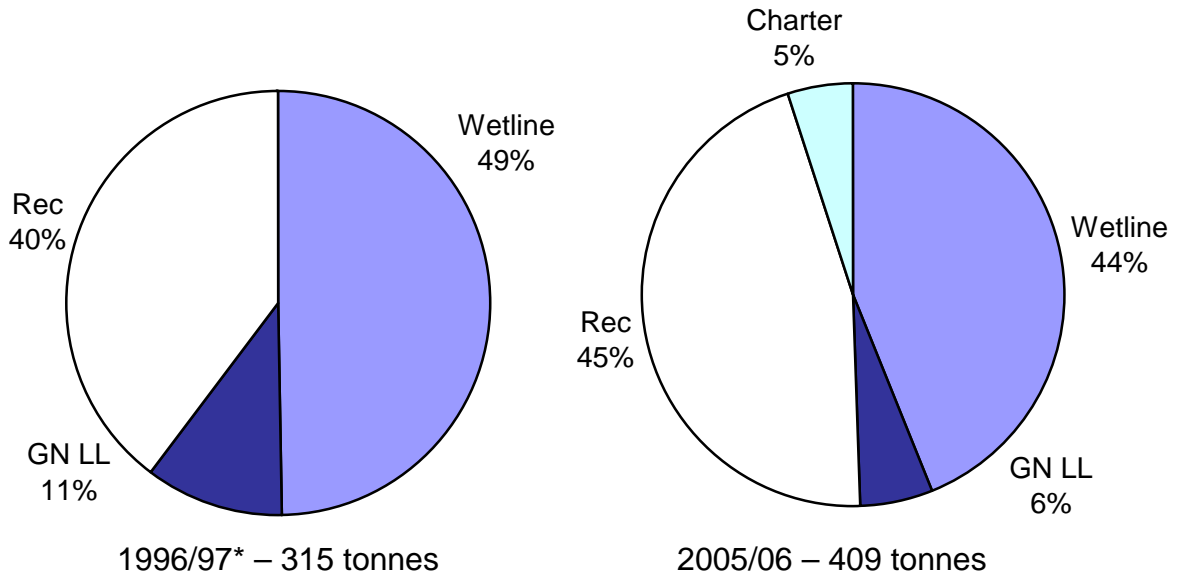


**Figure 3.** Estimated boat-based recreational dhufish catch using boat ramp creel surveys in the West Coast Bioregion for 1996/97 and 2005/06

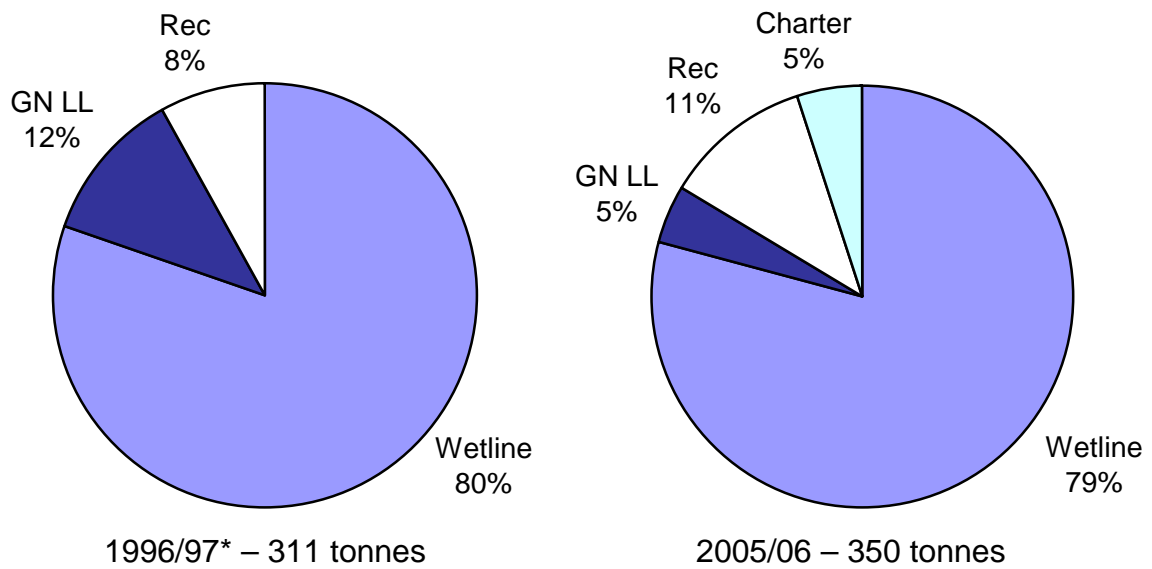


**Figure 4.** Estimated boat-based recreational pink snapper catch using boat ramp creel surveys in the West Coast Bioregion for 1996/97 and 2005/06





**Figure 5.** Proportional Dhufish catch by sector in the West Coast Bioregion in 1996/97 and 2005/06



**Figure 6.** Proportional Pink snapper catch by sector in the West Coast Bioregion in 1996/97 and 2005/06

\* Charter catch not available - logbooks introduced in 2001  
 # GN LL – denotes Demersal Gill Net and Long Line (Shark) Fishery

### 1.1.2 Charter fishing

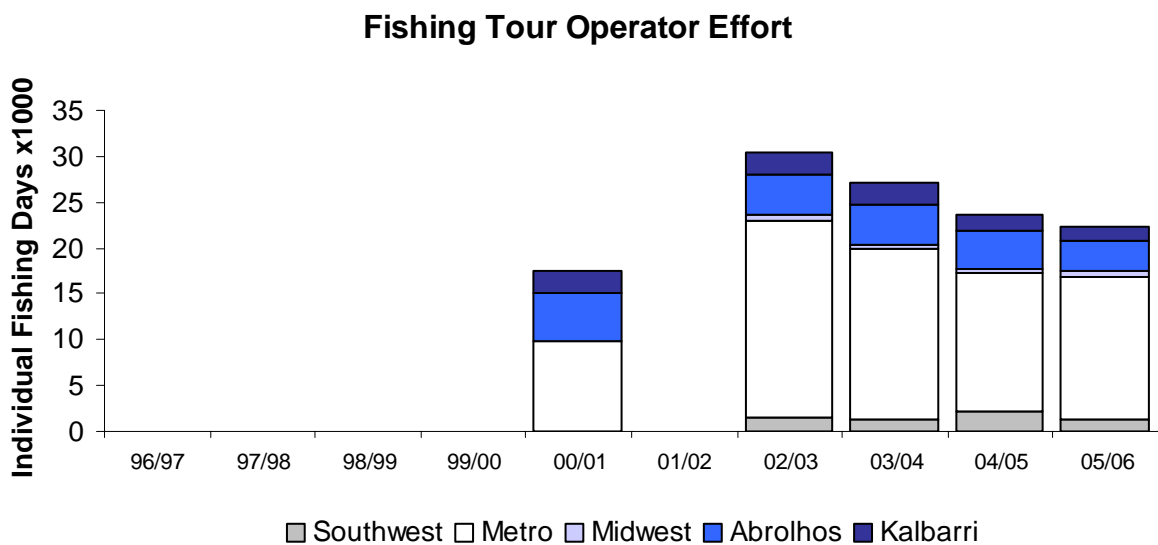
The West Coast Bioregion has the highest number of licensed fishing tour (charter) operators in the State. At the end of June 2006, there were 138 fishing tour operators, plus 23 restricted fishing and/or eco-tour operators licensed in the region. In 2005/06, 39 per cent of these licences were inactive in the West Coast Bioregion (i.e. they did not undertake fishing tours during that year).

Since 2002/03 when logbooks became compulsory, there has been an overall contraction in the total effort and operational area of charter activity in the West Coast Bioregion (Figures 7 and 10). This could be due to a number of factors such as a rationalisation of the industry after a limited entry licensing framework was introduced in 2001, increasing operational costs and rising fuel prices, or growth in recreational boat ownership. Charter effort has been consistently high off Perth, Kalbarri and at the Abrolhos Islands.

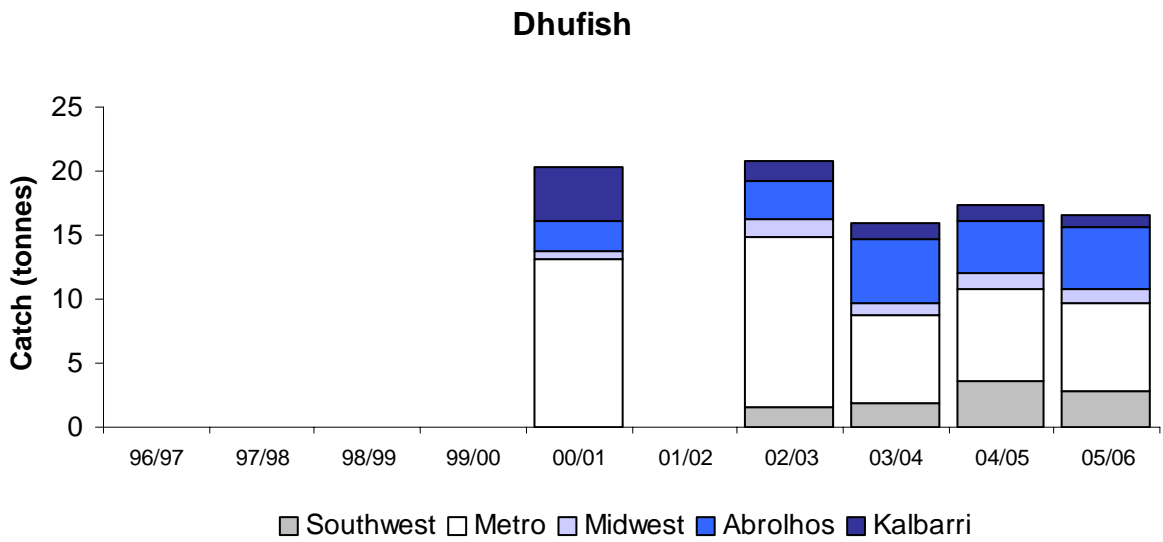
The charter catch of dhufish has remained stable throughout the West Coast Bioregion, with the exception of the Metropolitan zone, which has dropped from 13.4 tonnes in 2002/03 to seven tonnes in 2005/06 (Figures 8 and 11). The charter catch for pink snapper in the West Coast has also remained stable, except for 2004/05 where the catch rose to 24.6 tonnes (Figures 9 and 12).

#### Summary – Charter fishing

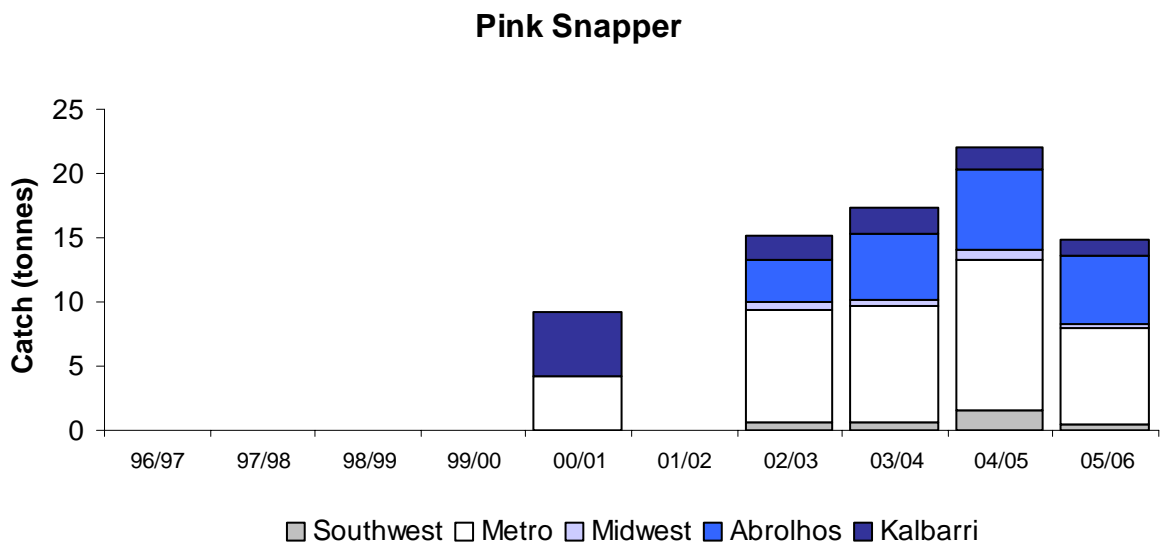
- Between 2002/03 and 2005/06 fishing effort in the charter fishery has decreased and charter catches of dhufish and pink snapper have remained stable.
- In 2005/06 the charter sector took about 10 per cent of the total recreational catch of dhufish and about 30 per cent of the pink snapper catch.



**Figure 7.** Tour Operator effort (individual fishing days) in the West Coast Bioregion. (Note: National recreational fishing survey data - 2000/01)



**Figure 8.** Dhufish catch (t) from Tour Operators in the West Coast Bioregion



**Figure 9.** Pink snapper catch (t) from Tour Operators in the West Coast Bioregion

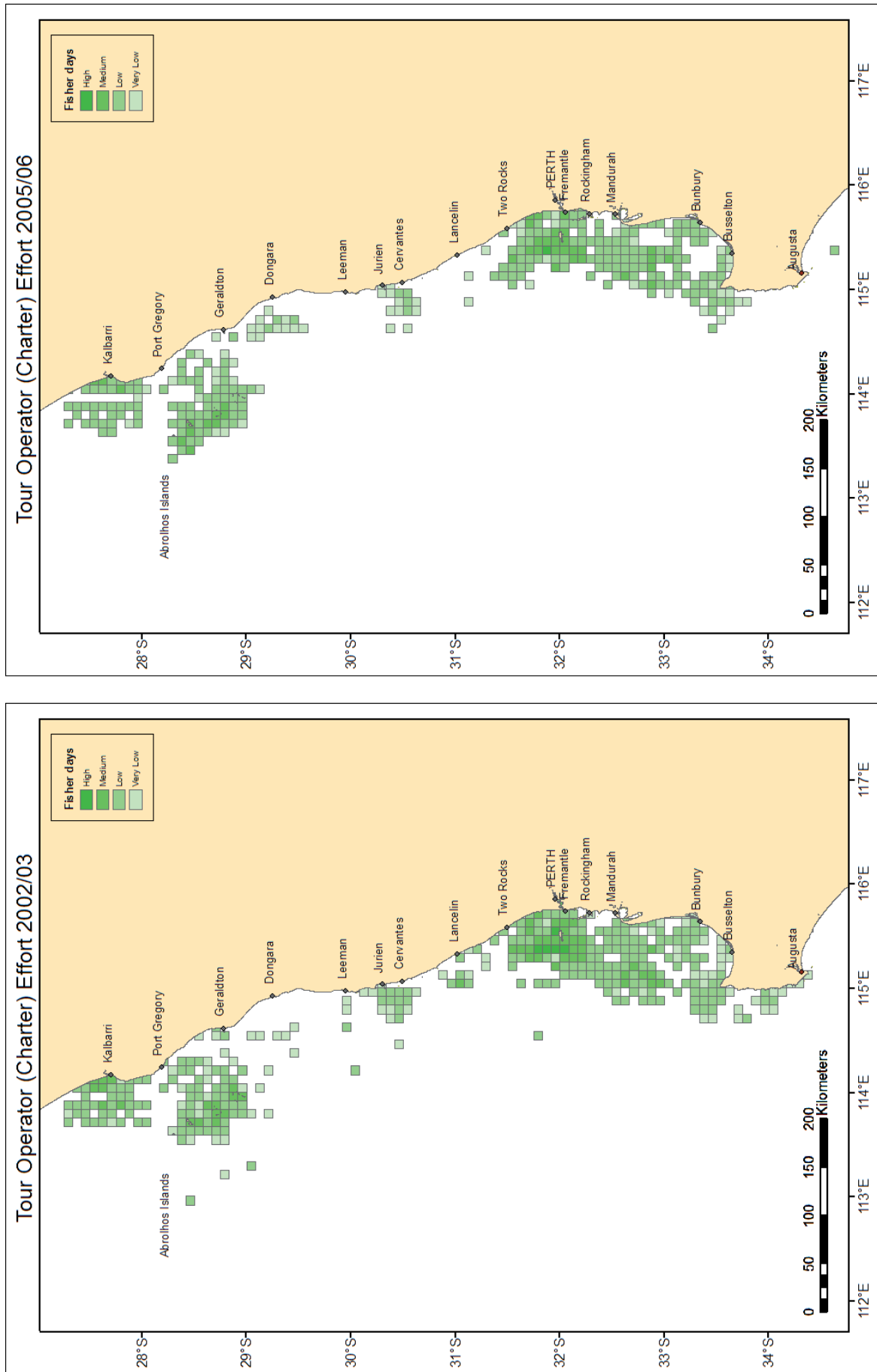


Figure 10. Tour operator (Charter) effort in the West Coast Bioregion for 2002/03 and 2005/06

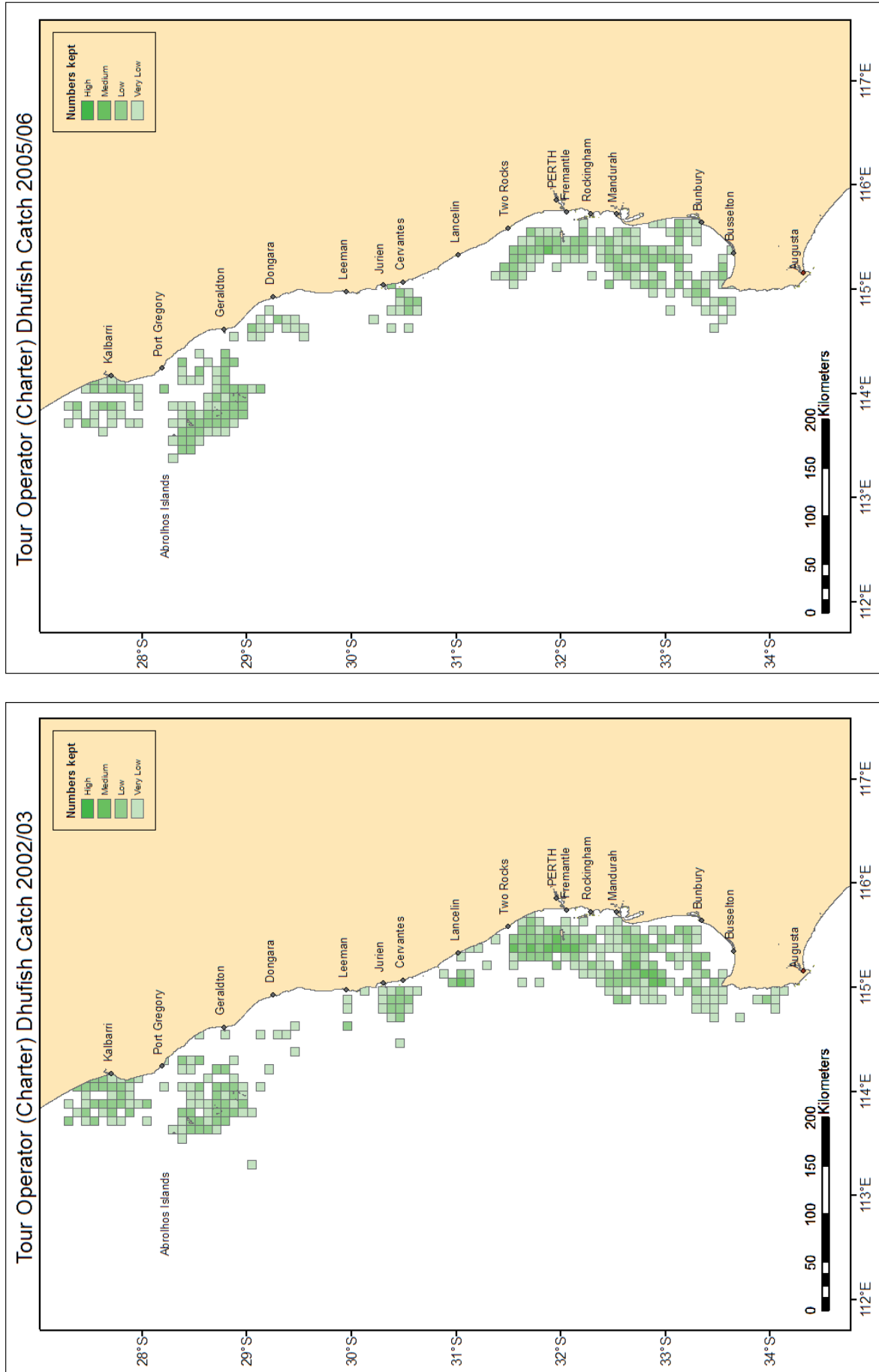


Figure 11. Tour operator (Charter) dhufish catch in the West Coast Bioregion for 2002/03 and 2005/06

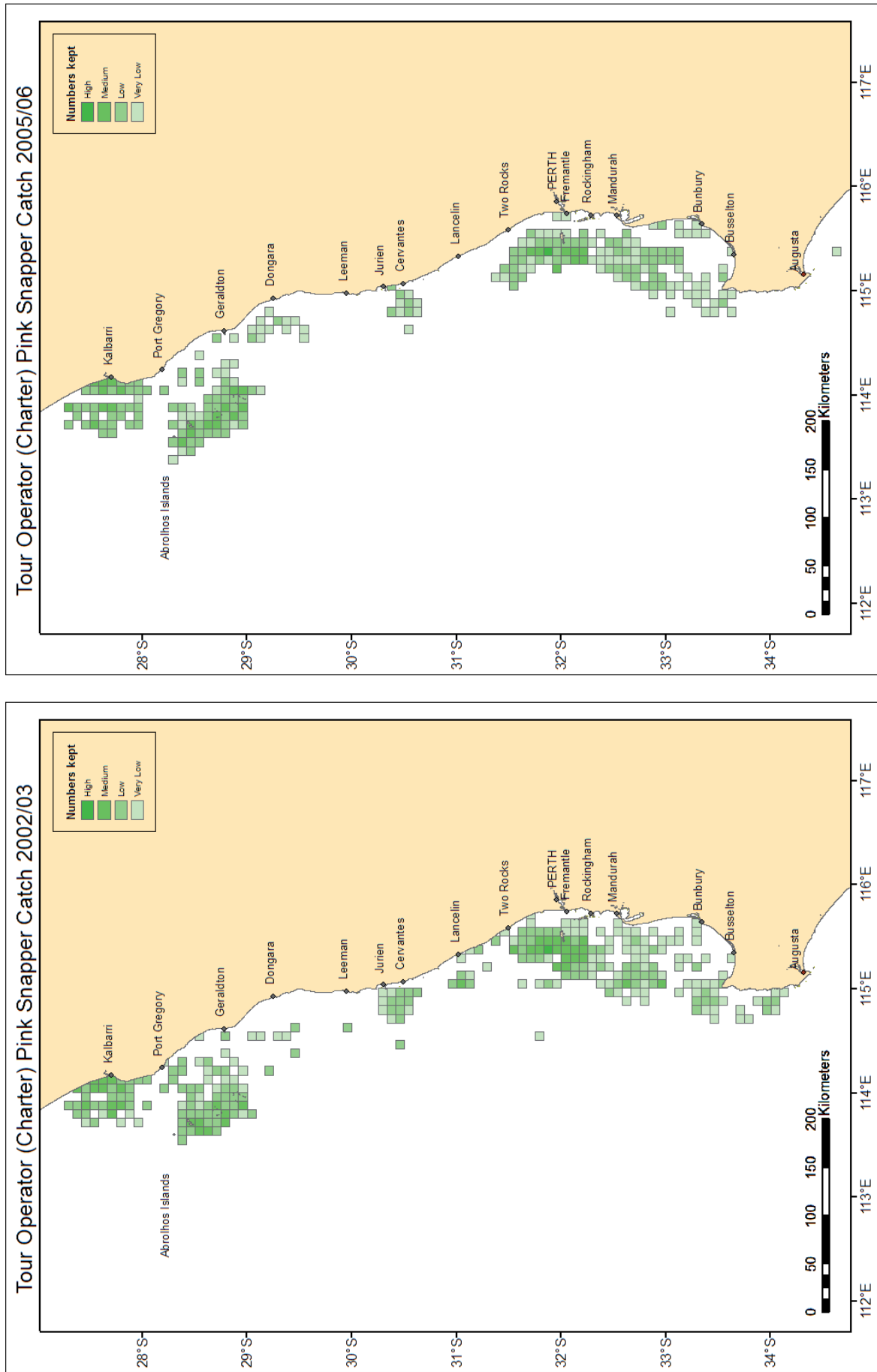


Figure 12. Tour operator (Charter) pink snapper catch in the West Coast Bioregion for 2002/03 and 2005/06

## 1.2 BIOLOGY AND ECOLOGY OF KEY DEMERSAL SPECIES

### 1.2.1 Dhufish

Dhufish are found only in Western Australian waters, generally between Shark Bay and the Recherche Archipelago. Like many demersal fish, dhufish are relatively slow-growing and long-lived with female dhufish growing slower than males. Dhufish reach the minimum legal size limit (500mm) at six to seven years of age and the maximum age for dhufish is at least 41 years<sup>5</sup>.

Scientific and anecdotal information indicates that dhufish have a complex life history. Dhufish appear to exhibit social behaviour that implies some form of hierarchical social/mating during spawning. Unlike species such as baldchin groper, there is no evidence that dhufish change sex. Further investigation of their reproductive biology and behaviour is underway.

Dhufish spawn between November and April. The majority of spawning activity occurs between December and March. The size of the male gonads indicates that they probably undergo pair spawning. It is unlikely that dhufish form the large spawning aggregations that are common in species such as pink snapper. Anecdotally aggregations of 50 to 100 dhufish have been observed but this has yet to be substantiated.

Earlier research revealed that dhufish reach sexual maturity at lengths of between 300 and 350mm, by the end of their third year of life. Recent research has found that the smaller mature female dhufish do not effectively spawn throughout the entire spawning season. This relatively infrequent spawning, prior to the females reaching the current minimum size limit, results in a significantly lower level of egg production.

The older, larger fish in the population are very important to the reproductive dynamics of the population. Larger (older) females spawn more eggs, more frequently and over a longer period. They produce a substantially greater number of eggs per spawning season than younger, smaller fish.

It appears that large mature dhufish spawn during the summer breeding season. These larger dhufish may become more vulnerable to fishing during this time as they aggregate in groups.

Dhufish are susceptible to barotrauma (the effects of gas expansion in the body caused by rapid changes in water pressure) and release mortality is known to increase significantly with depth of capture (Section 2.2).

#### **Summary – Dhufish biology**

- The majority of dhufish spawn between December and March.
- It is unlikely that dhufish form large spawning aggregations.
- Dhufish are slow-growing and long-lived (maximum age 41 years).
- It takes six to seven years for dhufish to reach the current minimum size of 50cm.

<sup>5</sup> Hesp *et al* 2002

### 1.2.2 *Pink snapper*

Pink snapper are very widespread, occurring across the southern half of the continent, from Queensland on the east coast to Barrow Island on the northwest coast. They are similar to dhufish in that they are slow-growing and long-lived. On the West Coast pink snapper reach the minimum legal size limit of 410mm at approximately four years of age and the maximum age for pink snapper is at least 30 years.

The known major pink snapper spawning location in the West Coast Bioregion is in Cockburn Sound just south of Perth, which is also an important habitat for juvenile snapper (less than two years).

The legal minimum length is currently 410mm. This size was set following biological research on pink snapper stocks off Carnarvon. This research indicated that approximately 50 per cent of the stock was mature at 410mm. However, further biological studies have indicated that the size at maturity is approximately 100 to 200mm larger in the cooler waters of the lower West Coast<sup>6</sup>. That is, pink snapper in the lower West Coast appear to grow faster and mature at a larger size. Consideration may need to be given to reviewing the minimum size limit in the Mid-west zone and further south to provide adequate protection for breeding stocks.

It is likely that snapper in the Kalbarri zone are the same stock as those fish to the north in the Gascoyne Bioregion.

#### **Summary – Pink snapper biology**

- Pink snapper spawn between October and December.
- Pink snapper form large spawning aggregations (Cockburn Sound is the major known spawning area on the lower West Coast).
- Pink snapper are slow-growing and long-lived (maximum age at least 30 years).
- It takes four years for pink snapper to reach the current minimum size of 410mm.
- Pink snapper on the lower West Coast appear to grow faster and mature at a larger size than stocks of Carnarvon.

### 1.2.3 *Baldchin groper*

Baldchin groper are found only in Western Australian waters. They occur between Coral Bay and Geographe Bay. The Abrolhos Islands, situated off Geraldton in the Mid-west zone, form a focal point of abundance and major spawning ground for the baldchin population.

Baldchin groper are a slow-growing and long-lived species, reaching a maximum age of at least 20 years<sup>7</sup>. At the Abrolhos Islands they reach the current legal minimum length of 400mm at five to seven years<sup>8</sup>. Baldchin are also known to be protogynous hermaphrodites, meaning they change sex. They mature first as females when about 290mm in length and

<sup>6</sup> Fisheries Research Report No. 163

<sup>7</sup> Fairclough 2005

<sup>8</sup> Nardi *et al* 2007



three to four years and then change sex to become males when between 450mm and 550mm, at about 10 to 12 years.

Baldchin groper are known to spawn on a number of occasions over an extended spawning season from September to January at the Abrolhos Islands. Populations of baldchin are resident within reef systems with localised movements between shallow and deep water.

Baldchin groper are widely accepted as being extremely susceptible to barotrauma. Release mortality of fish is thought to be very high, even when captured in relatively shallow water.

#### **Summary – Baldchin groper**

- Endemic to WA with distribution centred around the Abrolhos Islands.
- Long-lived species that changes sex from female to male at 10 to 12 years.
- Thought to be extremely susceptible to barotrauma.

### **1.3 RESEARCH AND MONITORING**

#### **1.3.1 How do we monitor stocks?**

When assessing the status of fish stocks, there are two basic types of analyses commonly undertaken:

- examination of historical catch, effort and catch rate data; and
- examination of age structure data and other biological variables.

The first type of analysis attempts to gain information on the status of stocks. It determines if a clear relationship exists between the catch rates (number of fish caught over a period of time) and changes in the relative abundance of the stocks. The second type of analysis examines what impact fishing may have had on the demography of the fished populations. It examines key features such as the age composition within the stock, size/age at maturity, plus their natural rates of recruitment and mortality.

When both types of data are available these can be combined to develop an integrated age-structured computer model that can provide estimates of the current biomass of a species relative to the biomass before any fishing started. This approach has been successfully applied to the stock assessments in WA fisheries including the Shark Bay Snapper fishery and the various stocks within the Pilbara Trap and Trawl and the Northern Demersal Scalefish fisheries.

In fisheries where the data are limited (e.g. catch per unit effort or age structure data are not all available), it is not possible to develop computer models that can estimate biomass. In such circumstances, a “weight-of-evidence” approach is considered to be best practice to assess the current status of a stock. This approach individually examines any quantitative measures that may be available, such as estimates of fishing mortality. It then considers these along with the biological characteristics of the species (including age, growth, habitat requirements and reproductive biology), environmental influences and operational characteristics of the fishery.

In the case of the West Coast Demersal Scalefish Fishery, information is largely limited to monthly catch and effort data provided by the various commercial fishing operations. These data were extensively analysed but due to changes in fleet dynamics and fishing efficiency a reliable index of stock abundance could not be generated.

Data on boat-based recreational fishing in the West Coast Bioregion is limited to two surveys undertaken in 1996/97 and 2005/06. Charter fishing catch and effort has been collected since 2001 and is based on logbook returns from operators licensed to carry out charter fishing in the West Coast Bioregion. Given the limitations of the available data, a “weight-of-evidence” approach has therefore been used to assess the status of key demersal species.

### ***1.3.2 What is the current status of key demersal (bottom) species?***

Recently concluded research studies show that dhufish and pink snapper are being overfished across almost all zones of the West Coast Bioregion<sup>9</sup>. The studies also show that baldchin groper at the Abrolhos Islands are being overfished. While the studies have focused on dhufish, pink snapper and baldchin groper, these species are considered “key indicator species” for monitoring the approximately 100 species of demersal fish taken in the West Coast bioregion.

The studies themselves presented some significant challenges and the data available are in some cases limited. However, the methodology and analyses have been reviewed by Associate Professor Malcolm Haddon (University of Tasmania), an internationally recognised expert in fish stock assessments. Professor Haddon has confirmed that they were ‘best practice’.

The key piece of information available from the studies is ‘F’ – the fishing mortality. The value of F includes fish caught by commercial and recreational fishers. ‘F’ also includes the fish which are discarded as undersize and subsequently die from barotrauma-related injuries.

Where a species is being overfished, the age structure of the population is modified as fish are “cropped off” faster than they are produced. Older fish become uncommon in the population, which becomes dependent on fewer, younger age classes.

Fish age and size are not always well correlated. Large fish are not necessarily old fish, because for long-lived species such as dhufish and pink snapper, once individuals mature, growth rate slows markedly. So a fish of a given size can range from being relatively young to quite old. Age is determined by studying the otoliths (or ear bones) of the fish, which have marks in them similar to tree rings. Using this technique, the age structures of samples are determined. This analysis shows that the key indicator species on the West Coast are being overfished.

Another factor considered is the life history of the fish. Fast-growing, highly productive species can better withstand relatively heavy levels of fishing pressure. Slower-growing, less productive species (such as dhufish, pink snapper, baldchin groper and many other of the demersal species of the West Coast Bioregion) are much more vulnerable to overfishing and cannot withstand heavy fishing pressure.

---

<sup>9</sup> Fisheries Research Report No. 163

In some species, particularly dhufish, it appears that irregular recruitment adds a further complication. Successful recruitment “spikes” occur infrequently, generally as a result of favourable environmental conditions. This adds enormously to the vulnerability of these species. When a year class of fish resulting from a recruitment “spike” reaches legal size, catch rates and sizes of fish appear adequate, giving the appearance of a healthy stock. However, this can lead to false perceptions about the status of the stock.

Recent age structure information reveals that current dhufish catches are heavily reliant on 10 to 13-year-old fish. This population “spike” resulted from a period of successful recruitment between 1994 and 1997, when environmental conditions were thought to be favourable.

When fishing pressure is heavy, the “spike” (which contains the bulk of the breeding stock) can be rapidly fished down. Intensive fishing, coupled with unfavourable environmental conditions for recruitment can mean that the breeding stock is fished down to the point where it is unable to provide enough recruits to replenish the stock, even if the environmental conditions are favourable. The end-point of this scenario is a sudden stock collapse as the last of the “spike” is fish out.

The levels of fishing mortality of dhufish and pink snapper across all sections of the West Coast Bioregion (and for baldchin groper at the Abrolhos Islands) are above international benchmark standards. This indicates that these stocks are currently being overfished. Therefore under current levels of fishing pressure these stocks are probably being depleted to levels below those necessary to ensure their long-term sustainability. The current reliance of the dhufish catch on a single recruitment “spike” together with the significantly modified age structure for pink snapper (i.e. there are very few old fish remaining in the population) indicates that both of these stocks are particularly vulnerable.

Full details of the current stock assessment for West Coast demersal scalefish stocks are contained in *Fisheries Research Report No. 163 - Spatial Scales of Exploitation Among Populations of Demersal Finfish: Implications for management. Part 1: Stock status of the key indicator species for the demersal finfish fishery in the West Coast Bioregion (FRDC Project No. 2003/052)* (St John *et al.* 2007). A copy of the report can be found at [www.fish.wa.gov.au](http://www.fish.wa.gov.au).

While the currently available assessment only provides fishing mortality data, not the percentage of the spawning biomass, it appears highly likely that the stocks of these species are below (if not well below) a critical level. In order to maintain sufficient spawning biomass for the long-term sustainability of the key demersal fish stocks of the West Coast Bioregion, an immediate reduction in the level of fishing mortality on dhufish and pink snapper is necessary. Current research indicates a reduction of at least 50 per cent in fishing mortality is needed. This requires an immediate reduction in the overall catch (including discards) of these species.

The commercial and recreational fisheries currently involved in the exploitation of these resources are all capable of having considerable impacts on these stocks. There is an inherent high risk in leaving any of these sectors unmanaged. Consequently, comprehensive and effective management restrictions/limitations of all sectors will be required. The aim is to ensure sufficient breeding stock is maintained over periods of poor recruitment so that when breeding conditions are suitable, adequate breeding stock will be available to replenish the fishery.

Because of the inconsistent nature of dhufish recruitment, an initial reduction in effort/catch (including a complete closure) may not result in a recovery of this species in the short term. To achieve long-term sustainability it is essential that an adaptive management approach is taken. This involves monitoring the fishery to determine if the initial reduction in catch and/or effort is achieving the desired reduction in fishing mortality and if not, implementing further changes.

**Summary – Stock status**

- Dhufish and pink snapper are being overfished across large parts of the West Coast Bioregion.
- Baldchin groper are being overfished at the Abrolhos Islands.
- Recruitment for demersal species is variable.
- Current dhufish catches are heavily reliant on the last known recruitment “spike” which occurred between 1994 and 1997.
- There are very few older pink snapper and dhufish in the population.
- Current research indicates that fishing mortality for dhufish and pink snapper needs to be reduced by about 50 per cent across the West Coast Bioregion.

## **SECTION 2 KEY ISSUES FOR RECREATIONAL MANAGEMENT**

---

### **2.1 HISTORY OF RECREATIONAL FISHERIES MANAGEMENT**

Recreational fisheries in Western Australia have historically been managed on socially acceptable limits based upon a “fair day’s catch” rather than on the status of fish stocks or their vulnerability to over-exploitation. This historical nature of “social” scalefish management is perhaps understandable, as Western Australia has a vast coastline that had been sparsely populated outside of Perth. The vastness of our coastline is however misleading, as WA’s waters are nutrient-poor and comparatively unproductive for fish stocks.

The Recreational Fishing Advisory Committee (RFAC) developed the first management framework for recreational fisheries in Western Australia during a major two-year review between 1989 and 1991. The review took a State-wide approach as the first step in bringing the complete recreational fishery under a management framework. It established community consensus on the need for control of recreational fishing and the major strategies that should be adopted.

The first detailed catch survey of recreational boat fishing in WA was undertaken in the West Coast Bioregion in 1996/97. These results showed for the first time that the combined individual catches of recreational fishers formed a significant part of the overall catch of certain species<sup>10</sup>.

During the mid to late 1990s planning began to shift management to a bioregional approach. This approach is better linked to the distribution of fish stocks and fishing activity, and capable of developing better targeted and more flexible responses to significant management issues.

During this period, the fishing and aquatic tour (charter) industry, previously an “open access activity”, came under licensing and management arrangements. This sector is commercial in the sense that it is a fee-for-service industry; however, as the activity provides a platform for recreational fishing it is managed as a component of the broader recreational fishing sector.

The adoption of separate recreational fishing management strategies for each of the four bioregions, the Pilbara/Kimberley, Gascoyne, West Coast and South Coast, also saw the replacement of the previous bag limit categories. The old categories - prize fish, reef fish, key angling and sport fish, table fish and bread and butter fish - were replaced with three new simplified categories (Category 1, 2 and 3 fish). The new three-tiered system was based on a risk assessment framework, which took into account the level of risk (to sustainability) for each species.

The planning process for the development of the West Coast recreational fisheries management strategy recognised the growth in recreational fishing as a major issue for future management<sup>11</sup>. As a consequence, a number of precautionary reductions were made to bag limits for many targeted recreational species.

Notably, key demersal species were identified as high-risk species and included in Category 1 with a combined bag limit of seven fish. The individual daily bag limits for a number of key species were also reduced, including dhufish (from four to two), pink snapper (from eight to

---

<sup>10</sup> Sumner and Williamson 1999

<sup>11</sup> Fisheries Management Paper No. 153

four) and baldchin groper (from eight to four). Many recreational fishers saw these reductions as a “halving” of the recreational catch share. In their eyes this was inequitable, as despite the commencement of the “wetline” review, no changes in commercial management had yet been implemented.

At the same time some recreational and commercial stakeholders, and fisheries scientists and managers became more concerned about escalating catches of key demersal species such as dhufish and pink snapper. The Department of Fisheries was successful in gaining funding from the Fisheries Research and Development Corporation for three research projects on dhufish in the West Coast Bioregion. These projects focused on stock assessment, release mortality and spawning behaviour.

In 2004, Recfishwest (the peak body advocating for the interests of recreational fishers) organised a dhufish workshop, bringing together fisheries scientists, managers, recreational and charter fishers and some commercial fishers to discuss known information. The workshop concluded that a new approach to the way dhufish (and other demersal scalefish stocks) are managed will be required in the near future to protect the species for future generations<sup>12</sup>.

Another catch survey of boat-based recreational fishing on the West Coast was undertaken in 2005/06<sup>13</sup>. These results found that despite the bag limit reductions implemented at the beginning of 2003, the recreational catches of key demersal species had increased. Dhufish catches had risen from 125 to 186 tonnes, pink snapper from 25 to 40 tonnes and baldchin groper from 23 to 33 tonnes.

#### **Summary - Milestones in management of demersal species**

- The first major State-wide review of bag and size limits was undertaken from 1989 to 1991.
- The first creel survey for boat-based fishing in the West Coast Bioregion was undertaken in 1996/97.
- The charter fishery came under management in 2001.
- In 2003 new rules were implemented for the West Coast Bioregion, including a halving of bag limits for dhufish, pink snapper and baldchin groper.
- A dhufish workshop was held in 2004 to review known information.
- A second boat-based creel survey was undertaken in the West Coast Bioregion in 2005/06.
- 2007 saw the completion of dhufish and pink snapper stock assessment on the West Coast.

## **2.2 HIGH MORTALITY OF RELEASED FISH**

Many demersal scalefish species are susceptible to barotrauma when taken from deep water. Barotrauma is the effects of gas expansion in the body caused by rapid changes in water pressure and is akin to “the bends” in divers. Release mortality for captured dhufish is thought to be one of the highest recorded for key demersal species on the West Coast. This reflects

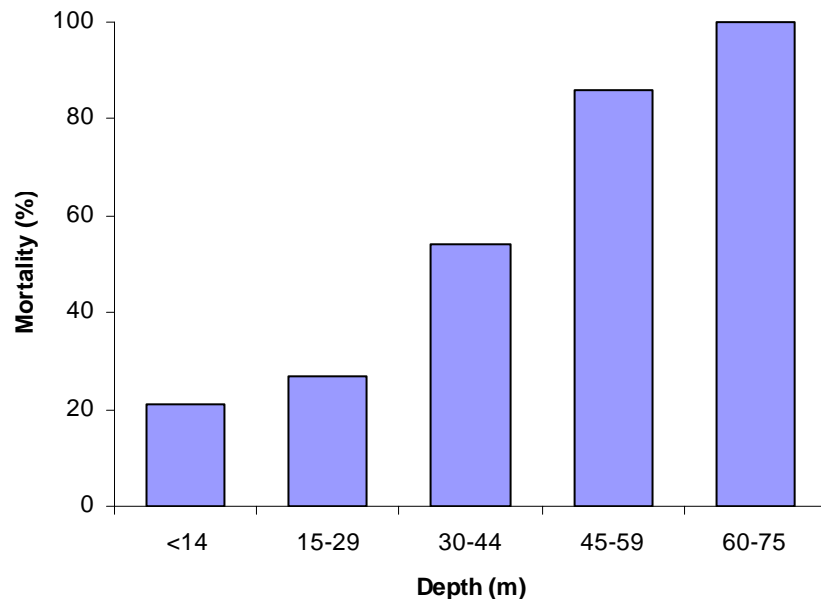
---

<sup>12</sup> Pagano and Fuller 2006

<sup>13</sup> Fisheries Research Report No. 163

their extreme susceptibility to barotrauma (mortality 86 per cent in water depths greater than 45m). This is an important issue as discard rates (unwanted fish returned to the water typically because they are undersize) of dhufish are high across all sectors (commercial – 21 per cent, charter – 40 per cent, recreational – 43.5 per cent). Fishing mortality is probably significantly higher than the recorded levels of catch retained by all sectors.

The effects of barotrauma were examined in caging experiments where captured fish were released into cages back to the depth in which they were taken<sup>14</sup>. The mortality of dhufish increased significantly with depth of capture (Figure 13).



**Figure 13.** Mortality of WA dhufish caught at five depths

A Fisheries Research and Development Corporation funded tagging study on demersal scalefish on the West Coast is underway, coordinated by the Australian National Sportfishing Association (ANSAWA) and supported by Recfishwest. It has also been evaluating the level of release mortality of key species. A preliminary analysis of the recapture data from this study supports the increasing trends in mortality with depth for demersal scalefish. Very few dhufish recaptures are recorded from depths greater than 50m. This data will be fully analysed by the end of 2007.

While not immune to barotrauma issues, pink snapper are shown to be more robust than dhufish with some reported recaptures from over 100m in depth. Baldchin groper, on the other hand, are thought to seriously suffer from barotrauma issues with very few individuals surviving capture from comparatively shallow depths.

The biological attributes of demersal scalefish and their vulnerability to barotrauma may diminish the value of any measures that rely on the increased use of releasing captured fish (e.g. tags, changes to minimum legal sizes and changes to bag/boat limits). Therefore, the primary management goal for all sectors must be to develop arrangements that limit the total numbers of demersal scalefish that are captured.

<sup>14</sup> St John and Syers 2005

### **Summary – Mortality of released fish**

- Mortality associated with barotrauma is a significant issue for many demersal species.

## **2.3 MULTI-SPECIES NATURE OF FISHERY**

Recreational bottom fishing methods are relatively indiscriminate. The types of gear typically used to target key species such as dhufish and pink snapper are just as likely to catch individuals of a suite of other demersal fish species. The multi-species nature of the West Coast Demersal Scalefish Fishery, coupled with barotrauma issues in deep water, means it is not practical to manage a particular species in isolation.

Taking a multi-species approach to management is particularly important when considering management measures such as closed seasons, closed areas, tags or licences. The optimal time and place for a closure to protect spawning pink snapper may not match the biological requirements of dhufish or other demersal species.

### **Summary – Multi-species fishery**

- The multi-species nature of the demersal scalefish fishery means that individual species cannot be managed in isolation from one another.

## **2.4 CONTINUAL IMPROVEMENT IN FISHING EFFICIENCY**

Improved technology including Global Positioning Systems (GPS) and high-quality colour echo sounders have dramatically increased angler efficiency in the targeting of demersal species such as dhufish and pink snapper. Anglers are also taking advantage of improvements in angling gear, such as chemically sharpened hooks, low-stretch gelspun and braid lines and fishing rod and reel designs, which have improved catch efficiency, particularly in deep water.

The popularity of web-based fishing forums has also provided relatively inexperienced fishers with instant access to generations of local fishing knowledge. While this trend is good for anglers and their catch rates in the short term, the current exploitation rate is not sustainable in the long term.

Weather forecasting is also becoming more of an exact science with increased accuracy up to seven days in advance. This assists in the planning of fishing trips days well in advance, which may result in more effort days in the fishery.

Fishing technology in the future is likely to further improve the accuracy with which anglers can target fish. Ongoing mapping of benthic communities, improvements in digital imaging equipment, the adoption of underwater video technology and other advances will greatly increase the transparency of the ocean, and continue to make the finding of fish easier.

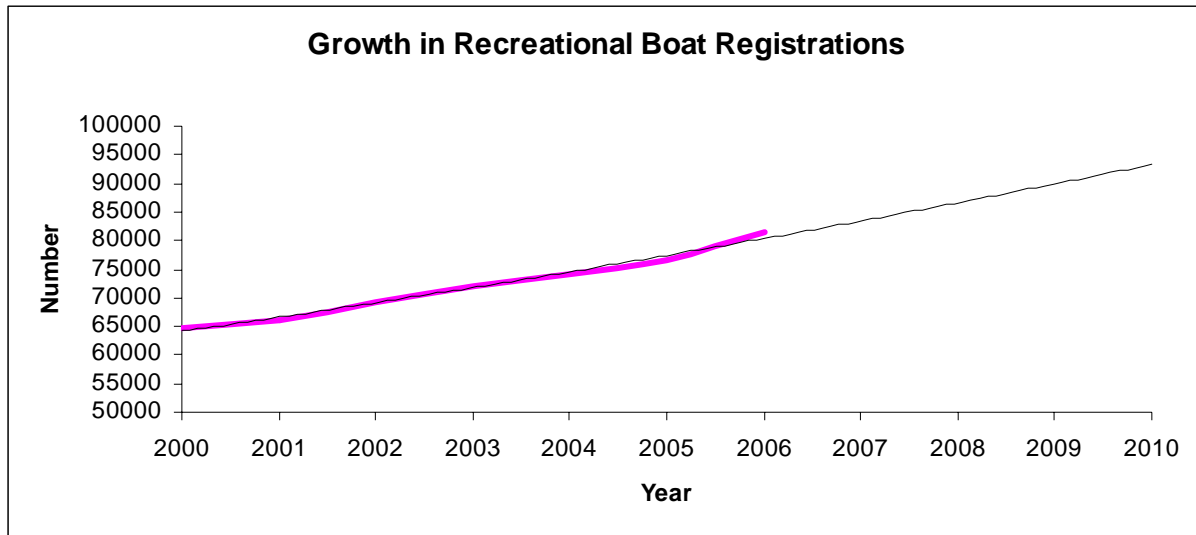
### **Summary – Improvements in fishing efficiency**

- Technology improvements have resulted in significant increases in fishing efficiency that in turn is placing increasing pressure on fish stocks.



## 2.5 INCREASING BOAT OWNERSHIP

Boat registration information from the Department for Planning and Infrastructure shows a steady increase in the number of new boats registered across all size classes each year. In 2002 a total of 69,166 boats were registered in WA. By 2006 this total had grown to 81,417 with over 50 per cent of these based in the Metropolitan area alone. This represents an average growth in new boat registrations of approximately 2,450 per year, although it is recognised that not all boats are used for recreational fishing. Based on projected growth rates in 2010 there will be over 90,000 registered boats in WA (Figure 14).



**Figure 14.** Historical and projected growth in boat ownership in Western Australia

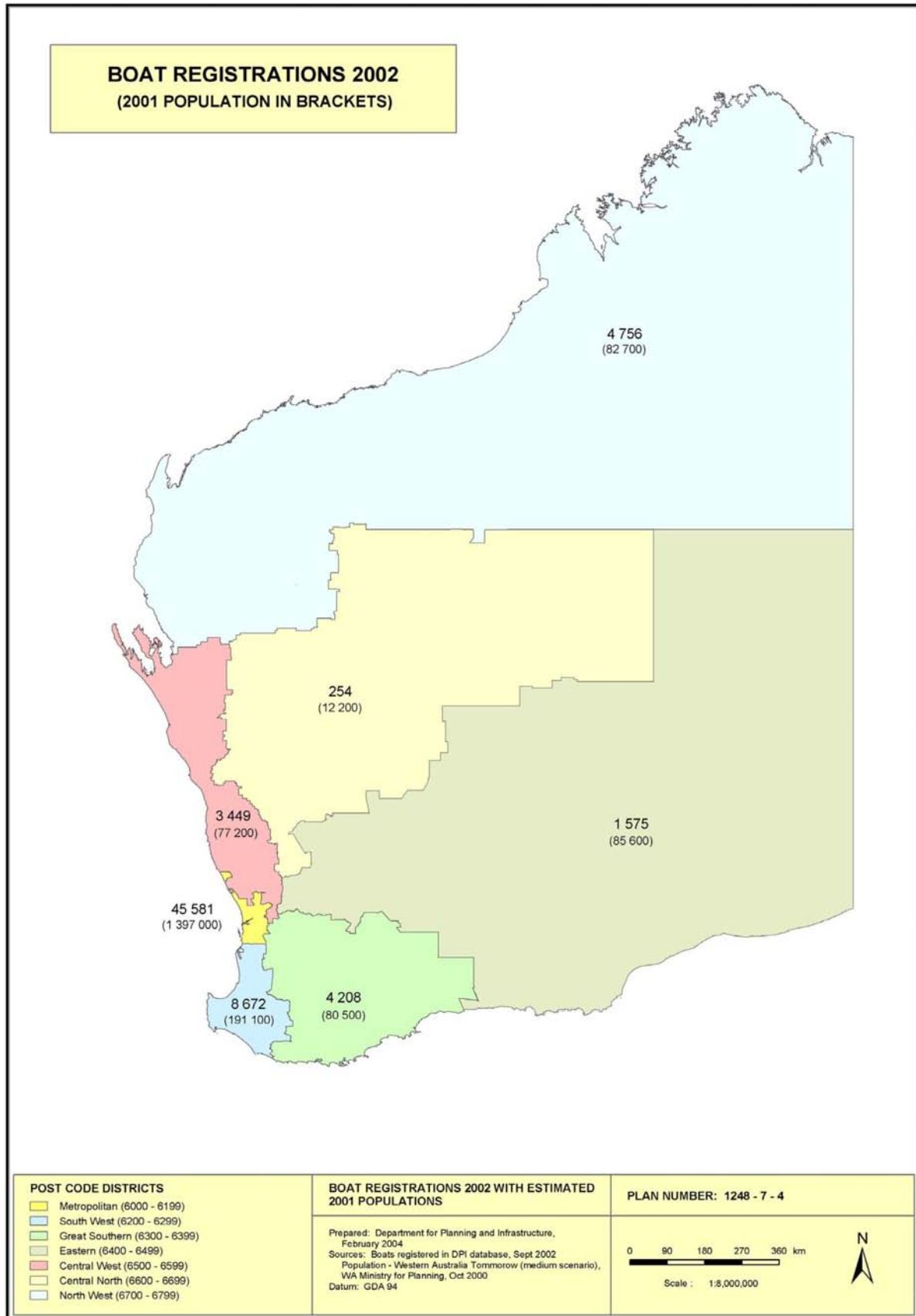
In 2002, the distribution of registered boats in WA was closely correlated to the population distribution (Figure 15).

In recognition of the anticipated increases in recreational boating ownership in the Metropolitan area over the next 20 years, the Minister for Planning and Infrastructure has recently released the draft Perth Recreational Boating Facilities Study<sup>15</sup>. This study identified the need for a major increase in both boat ramps and boat pens along the 120km coastline between Two Rocks and Singleton to improve recreational access.

### Summary – Boat ownership

- The combination of increased boat ownership and proposed additional launching facilities is likely to place further pressure on fish stocks.

<sup>15</sup> Department for Planning and Infrastructure 2007



**Figure 15.** Distribution of boat ownership in Western Australia in 2002 (Department for Planning and Infrastructure 2004)

## 2.6 NEED FOR DETAILED INFORMATION ON RECREATIONAL FISHING

More detailed information on recreational fishing participation, effort and catches is essential to develop new management measures and to monitor and review their effectiveness. This type of information is essential for understanding what is being caught by the recreational sector, monitoring the status of stocks and assisting in resolution of fisheries management and resource sharing issues.

The existing information on recreational catches and fishing effort is provided by bioregional creel surveys. These surveys require considerable resources to undertake and only two surveys have been conducted on boat-based activity on the West Coast in 1996/97 and 2005/06. A gap of almost 10 years between surveys does not permit changes in recreational fishing to be monitored or assess the impact of recreational fishing on targeted fish stocks.

The Department of Fisheries has trialled the use of voluntary recreational angler logbooks on several occasions since the 1990s. These data provide important trend information on the relative levels of abundance of key indicator species over time. However, voluntary logbooks have a limited application in estimating total catch and effort or helping to assess the overall status of the stock.

Recreational fishing information needs to be collected on a continual basis to give better data on catches of the key indicator species such as dhufish and pink snapper. These data can either be collected via ongoing creel surveys or a survey of participants in the fishery that are determined through a registration system.

### Summary – Need for more information on recreational fishing

- Recreational fishing information needs to be collected on a continual basis to give better data on catches of the key indicator species such as dhufish and pink snapper and evaluate the effectiveness of management.

## 2.7 SPATIAL SCALES FOR MANAGEMENT

Dhufish are found from Shark Bay to the Recherche Archipelago, with their primary range being from Kalbarri to Augusta. Pink snapper are more widespread and can be found across the entire southern half of the State.

Across the range of these species, stock abundance and biological attributes vary. Fishing pressure also varies with recreational creel surveys indicating that the highest level of recreational fishing pressure is currently in the Metropolitan zone (Lancelin to south of Mandurah). The West Coast Bioregion runs from Kalbarri to Augusta. This raises questions about the best spatial and biological scales of management – is it species, stock, bioregion or ecosystem – or a smaller scale? Recreational fishing currently is managed on a bioregional basis.

In recent times community expectations regarding appropriate scales of management have been expressed in the fishing media and on prominent recreational fishing websites, with some stakeholders calling for a separate zone of management in the Metropolitan area. This reflects the high levels of recreational participation and effort and the pressure these fish stocks are under in the Metropolitan zone.

Overfishing of pink snapper and dhufish stocks is occurring across the bioregion. Therefore management action will be needed to reduce catches across the entire West Coast Bioregion. This approach does not, however, preclude taking specific management action within a smaller zone of management if warranted.

#### **Summary – Spatial scales for management**

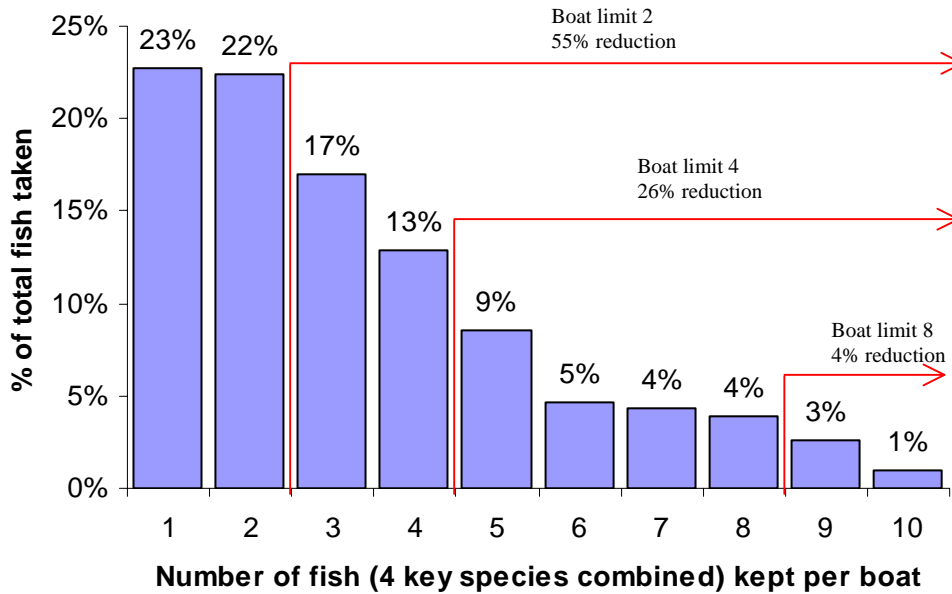
- While increased management of demersal scalefish stocks is required across the West Coast Bioregion, specific management action within a smaller zone of management may be warranted.

## **2.8 LIMITATIONS OF CURRENT BAG, BOAT AND SIZE LIMITS**

The current recreational bag limits that apply on the West Coast were established following the bioregional review of recreational fishing in 2003. However, recent catch estimates from the 2005/06 creel survey highlight the limitations of bag limits as an effective management tool, particularly in the face of significant increases in fishing effort and technology gains in fishing efficiency. For example, during the 1996/97 creel survey, when a daily bag limit of four dhufish applied, an estimated 125 tonnes of dhufish were kept by recreational fishers. Despite a halving of the bag limit (from four to two) in 2003, the 2005/06 creel survey showed that total recreational catch had increased to 186 tonnes.

The bag limits for some individual species may have also reached a practical or socially acceptable limit. For example the current daily bag limit for blue groper and coral trout is one and the bag limit for dhufish is two.

Boat limits can potentially be used to reduce catches by restricting the total number of fish that can be taken by all anglers on a boat during a specific fishing trip. Based on the 2005/06 creel survey data, the total number of key demersal scalefish captured (dhufish, pink snapper, baldchin groper and breaksea cod combined) in the Metropolitan zone could, theoretically at least, be reduced by a varying amount by introducing a boat limit. For example, a boat limit of eight key demersal fish may have only reduced catches by 4 per cent; a boat limit of four may achieve a reduction of about 26 per cent and a limit of two by 55 per cent (Figure 16).



**Figure 16.** Percentage of the total number of key demersal scalefish (4 species) captured per boat in the Metropolitan zone on trips where one or more fish was kept (2005/06)

However changes in management arrangements can also lead to changes in fisher behaviour. Therefore the intended consequences of a new rule may not always achieve the intended result.

Setting minimum legal size limits is another tool that has been used to protect juvenile fish. Legal size limits are typically set above the size at maturity to enable fish to spawn at least once before legally being taken. Technically they are used as a part of a management package to help protect a sufficient proportion of the breeding stock from fishing. However, their effectiveness as a management tool is limited in fishing activities that have a high fishing mortality of discarded, undersize fish.

Maximum size or slot limits can be useful for protecting large breeding fish, or reducing the take of highly prized, and often rare, large specimens. Like minimum size limits, the effectiveness of maximum size limits or slot limits is species and habitat dependent and related to the survival of released fish and on the number of fish living long enough to reach that size.

Under the current WA fisheries law, minimum size limits apply equally to the recreational and commercial sectors. The development of the Integrated Fisheries Management initiative highlighted the fact there may be a case for different rules, including size limits, to apply in each sector<sup>16</sup>.

<sup>16</sup> Fisheries Management Paper 165

**Summary – Bag, boat and size limits**

- Bag limits have a limited capacity to manage the recreational component of the catch where effort is unlimited.
- Boat limits can be used to manage recreational catches; however, their effectiveness over time can also be reduced when effort is unlimited.
- Size limits are used to protect a proportion of the breeding stock from fishing; however, their effectiveness as a management tool is limited in fishing activities that have a high fishing mortality of discarded, undersize fish.

## **SECTION 3 HOW CAN WE CONTAIN RECREATIONAL CATCHES?**

---

### **3.1 WHAT TOOLS CAN WE USE TO MANAGE RECREATIONAL CATCHES?**

The key to the long-term management of the recreational fishery is to find a combination of tools that can meet the sustainability requirements for the fishery while still allowing an enjoyable experience for the majority of fishers. Clearly the use of various tools will affect individual fishers in different ways and it is not always possible to meet everyone's expectations. What is the optimal mix of tools that meet the needs and expectations of most recreational fishers while maintaining a sustainable fishery?

The key requirements of a new management approach must therefore be threefold:

1. to be able to contain total recreational catch within target levels needed for sustainability;
2. to be able to monitor recreational participation, effort and catch on an ongoing basis; and
3. to be able to provide a quality recreational fishing experience.

The new management arrangements will need to be supported by effective education, compliance, and monitoring programs.

The following section outlines some of the options that are available and how they could be used to manage the recreational catch within the fishery.

#### ***3.1.1 Registration system – an essential monitoring tool***

A registration system involves establishing a record or “register” of all people who wish to participate in the fishery. A registration system can be used to effectively monitor recreational catch and effort and accurately assess how many people fish, how often they fish and where they fish. This type of information has previously been obtained through the two recreational creel surveys and smaller annual phone surveys.

While creel surveys can provide comprehensive information on recreational catch and effort, they have only been able to be undertaken twice on the West Coast to date (1996/97 and 2005/06) due to resourcing constraints. To effectively monitor catches, this information needs to be collected much more frequently, ideally on an annual basis.

The Department of Fisheries also undertakes an annual community survey that provides basic information on Statewide recreational fishing participation. In the absence of a specific list or “database” of recreational fishers, this method relies on a relatively small number of random telephone interviews, and often results in highly variable estimates of participation.

A registration system is seen as an essential component of any future management strategy to provide more accurate, timely and cost-effective information on recreational participation and effort. A registration system not only provides accurate information on how many potential participants there are in the fishery, but also provides a ready made “database” to effectively target recreational fishers during telephone or mail surveys to obtain catch and effort information.

A registration system could also be structured to provide information on a smaller spatial scale. For example, when registering a person could be required to specify which areas they will fish in (e.g. Metropolitan area, Abrolhos Islands etc). Their responses to this question will provide extremely valuable information on the distribution of fishing effort and catch.

Undoubtedly, discussions of the merits of a registration system will lead to comparisons with previous debates over a general recreational angling licence. In the past the introduction of a general marine fishing licence has not been supported by some members of the recreational fishing community due to concerns over registration costs, the use of the revenue, as well as equity issues with pensioners, children and people who may only fish once or twice a year.

However, a registration system could be structured in such a way that only those people who wish to fish for vulnerable species of demersal scalefish or fish from a boat would be required to be registered. Registration fees could be developed in much the same way as the existing recreational fishing “licence” fee structure, with concessions for pensioners and children.

A registration system that offers variable time periods for participating in the fishery (e.g. days, weeks or all year) would provide important information on patterns of effort across the fishery (e.g. how many people fish year round, in summer months or only occasionally on annual holidays or ‘one-off’ fishing trips). Under such a system, registration fees could vary according to the time period required and people who only fish occasionally may not have to contribute as much towards management as someone who fishes all year round.

Government could potentially pick up the costs for management; however, there would be no incentive for people to register only for the time or area they intended to fish. This lack of incentive would reduce the capacity of a registration system to effectively evaluate recreational fishing participation on both a temporal (time) and spatial (area) scale.

To ensure all revenue generated through a registration system is used only in the management of recreational fishing, any funds raised would be paid into the Recreational Fishing Fund (RFF) established under Section 239 of the *Fish Resources Management Act 1994* (FRMA). All existing recreational licence fees<sup>17</sup> are already placed in the RFF and can be expended only on matters relating to recreational fishing, including management, research and compliance costs. Any unexpended balances at the end of a financial year are carried over to the following year.

### **Summary – Registration system**

#### **Positives**

- Allows for the tracking of participation and effort over time.
- Provides a database to contact anglers to obtain more detailed and cost-effective information on effort and catch and timely management research information.
- Any funds raised through the registration system can be used for recreational fishing research, compliance and monitoring.

---

<sup>17</sup> A recreational licence is currently required to fish for rock lobster, abalone, marron, southwest freshwater angling and netting in Western Australia.



### Negatives

- Requires all fishers to take out a registration before fishing.
- Cost for fishers to pay a registration fee, although this could be structured to allow for weekly, monthly or annual registration.
- Can require significant compliance resources to police.

### 3.1.2 *Explicitly managing the catch through a form of tag system*

A tag system is one measure that can be used to manage a recreational fishery to an explicit catch target. A tag system requires an angler to hold a tag if they intend to catch and retain a certain species. The tag must then be affixed to the fish immediately upon capture.

Under such a system, the number of tags issued is determined using the total target catch for the species and the average weight of fish caught. For example if the target catch for a species was 100 tonnes, and the average weight of fish taken by recreational anglers was 5kg, this would result in 20,000 tags being available for recreational fishers targeting that species each year.

In considering a tag system it is important to recognise that recreational fishing activity is targeted at a range of demersal species, including dhufish, pink snapper, breaksea cod, baldchin groper, queen snapper and red snapper. Given the multi-species nature of the fishery and mortality issues resulting from barotrauma for many of these species, a tag system may need to incorporate all demersal species. This may make it difficult to determine the number of tags that should be made available unless a more complicated system, such as using a range of species-specific tags, was implemented.

In the case of demersal scalefish, it is likely the demand for tags would far exceed the number of tags that would be made available (based on the sustainable catch). Therefore, to ensure the tags were distributed in an equitable manner, a lottery-type system may be needed where people have the opportunity to apply for tags, but only a certain number may be successful in the lottery and offered tags. If there is a high demand, the number of tags issued to each individual may need to be limited.

A tag system has been successfully used to manage the recreational and commercial take of pink snapper to an explicit level in Freycinet Estuary (Shark Bay) since 2004. In this fishery, recreational anglers may only apply for up to two tags per year. However, this fishery differs significantly compared to the West Coast Demersal Scalefish Fishery in that fishers can effectively target a single species in relatively shallow water where the survival rates of released fish is high.

Limiting individual fishers to a discrete number of fish could also encourage “high grading”. Some fishers may be tempted to discard a fish if a larger fish is subsequently captured, adding to the total fishing mortality.

If a tag system were established this may replace the need for a registration system, as only people with a tag would be allowed to retain the specific species that the tag system applied to.

## **Summary – Tag system**

### **Positives**

- Allows for the catch to be managed to an explicit level.
- Provides a database of all fishers who are entitled to retain specific species.
- The database could be used to contact anglers and provide the latest management and research information.
- Any funds raised through the lottery system could be used for recreational fishing research, compliance and monitoring.

### **Negatives**

- A significant number of people may miss out on securing a tag.
- May lead to “high grading” where people only retain the largest fish. Barotrauma may increase the discard mortality.
- May impact on the quality of the recreational fishing experience.
- Cost associated with the production, distribution and purchase of the tags.
- Can require significant compliance resources to police.

### **3.1.3 Restricting effort through closed seasons**

Closed seasons can be used to restrict effort by only allowing fishing for specified periods. Seasonal closures of various time scales have been successfully used to manage many fisheries in Western Australia. Short closures lasting several weeks are usually introduced for a specific purpose such as protecting spawning aggregations of pink snapper in Cockburn Sound and Shark Bay. Seasonal closures can also be used effectively to manage effort and catch; however they may need to extend over a significant proportion of the year depending upon the level of fishing effort and catch reduction required.

Examples of temporal closures designed to manage effort and/or catch include a four-and-a-half month closed season for the rock lobster fishery, a 23-day open season (or a 342-day closed season) for the recreational marron fishery and a six-day open season (or a 359-day closed season) for the West Coast recreational abalone fishery. In the case of marron and abalone, the combination of closures and bag limits has proven a successful management option in restricting catches to sustainable levels.

In examining the appropriateness of a seasonal closure it is first important to understand the current catch levels and management objectives.

For example, the management objective for the Metropolitan zone is based on research advice indicating that overall fishing mortality (catches) needs to be reduced by 50 per cent. In 2005/06 the total catch in the Metropolitan zone for dhufish was 107 tonnes and pink snapper 61 tonnes (Table 2).

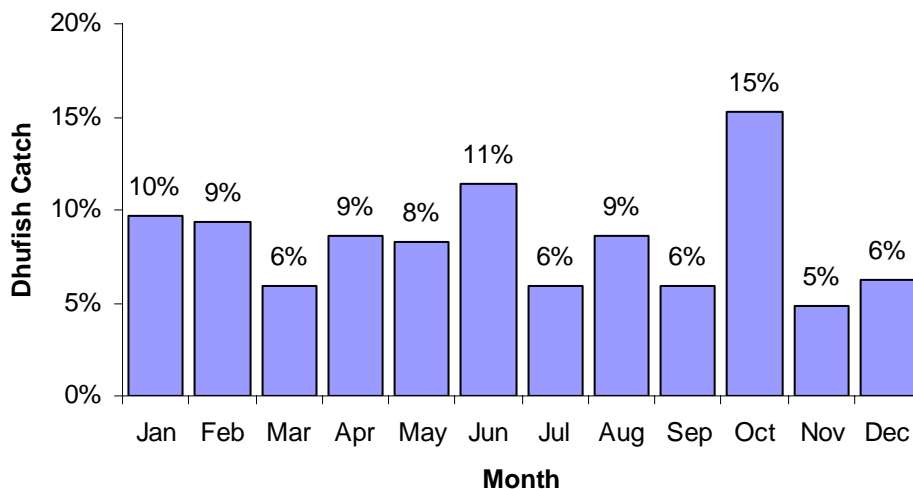
**Table 2.** Commercial (wetline and gillnet/longline) and recreational (including charter) catches of dhufish and pink snapper in the Metropolitan zone in 2005/06.

Zone	Species	Commercial (t)	Recreational (t)	Total (t)
Metro	Dhufish	42	65	107
	Pink snapper	41	20	61

Using this example, catches of dhufish will need to be reduced by 53 tonnes (50 per cent) and pink snapper by 30 tonnes (50 per cent) in the Metropolitan zone.

The closure of the Metropolitan zone to commercial fishers for demersal scalefish has the potential to reduce the total pink snapper catch by 41 tonnes (approximately 67 per cent of the total catch). This measure alone exceeds the management requirement to reduce catches by 50 per cent (provided the recreational catch does not increase in the absence of commercial fishing).

The commercial closure will also deliver significant reductions in the dhufish catch of 42 tonnes (approximately 39 per cent of the total catch). However, an additional 11 per cent reduction in dhufish mortality is required. If this was to be achieved the fishery would need to be closed for a period over which approximately 11 per cent of the annual catch of dhufish is taken (Figure 17).



**Figure 17.** Estimated % of annual recreational dhufish catch taken each month in the Metropolitan zone – 2005/06

Given the multi-species nature of the fishery and mortality issues arising from barotrauma, any closure would have to cover all species likely to be caught while bottom fishing (e.g. dhufish, pink snapper, breaksea cod and baldchin groper).

The usefulness of a closed season could be undermined by a shift of effort to other areas or other times, although the extent to which this may happen is hard to predict. This highlights the need for an ongoing monitoring program to assess whether management changes are having the desired effect.

The appropriate timing of a temporal closure also needs to be considered in order to achieve the desired effect on catch. Factors such as peak spawning periods (e.g. December to March for dhufish and October to January for pink snapper) as well as seasonal variations in fishing activity need to be taken into account when considering the most appropriate timing for a temporal closure.

### **Summary – Closed seasons**

#### **Positives**

- Can protect aggregations of fish.
- Can restrict catches by reducing effort.
- Allows for a quality fishing experience during the open season.
- Easy to administer.

#### **Negatives**

- Some fishers may fish harder prior to the start of the closed season and after the fishery re-opens. This may require the fishery to be closed for longer to deliver the required reductions in catches.
- Increasing fishing efficiencies and growing participation may require the seasonal closure to be extended to maintain catches at target levels.
- People may shift effort to open areas, requiring increased management of these areas.
- Long closures may impact on the recreational experience and industries reliant on this activity, e.g. charter, tackle, and tourism.
- Can require significant compliance resources to police.

#### **3.1.4 Restricting effort through closed areas**

Permanently closing certain areas to fishing can be used to either reduce catches (by limiting the areas that people can fish) or to protect breeding stocks. Permanent closures may be particularly beneficial for sedentary species that do not move outside the area. In such cases a closure may enable a proportion of the fish population to grow older and larger in the absence of fishing pressure. This could potentially benefit a fishery in two ways: firstly, the number of eggs a female is capable of producing each spawning event increases significantly with size, and secondly the older a fish becomes the more breeding seasons it would have contributed to, adding to the overall level of egg production across the fishery.

To be effective, spatial closures would need to be located in “meaningful” areas of a sufficient size that can provide protection for a significant proportion of the breeding stock. However, it is likely that an area that is important for one species will be different to that of other species.

There is no doubt that permanently closed areas can result in an increase in the local densities of some fish species, specifically those that are not highly migratory. However, many of the marine species subject to fishing are highly mobile either as adults, juveniles or both. This mobility greatly reduces the value of spatial controls for management at a stock level. It is

therefore unclear whether establishing large permanent closures will help improve the quality of fishing for demersal species in the areas left open along the WA coast.

In order for a closure to be effective in reducing overall catch levels, it would need to be of significant size to provide adequate levels of protection for stocks. If the area to be closed is already a popular fishing area, the re-direction of fishing effort may reduce the local abundance of species in nearby areas. This may impact on fishing quality and negate the benefits obtained from the closure. In such circumstances, additional management controls in these adjacent areas are likely to be required.

It is therefore important to recognise that permanent closures must be considered as part of an overall management package, and cannot provide a solution on their own.

### **Summary – Closed areas**

#### **Positives**

- May contribute to reducing catches if established on a large enough scale.
- Can provide increased protection for species if located in key areas such as spawning grounds.
- For some sedentary species, may create a reserve of mature fish that may contribute to the spawning biomass.

#### **Negatives**

- Depending on the location, permanent spatial closures have the potential to impact on some sections of the recreational fishing community more than others if the closure is established on local or favourite fishing locations.
- May not reduce catch if effort is transferred to other areas and could result in a detrimental impact on stocks in open areas that may require management.
- May lead to increased competition in open areas, which may reduce the quality of the fishing experience.
- Can require significant compliance resources to police.
- Assumes eggs generated in closed areas will contribute proportionally in subsequent recruitment.

### **3.1.5 Restricting effort through temporary corridor closures**

A series of temporary “rotating” area or corridor closures is another tool available for recreational fishing management. Under this concept multiple areas of the fishery are closed to fishing for a specified time period (e.g. one to five years), after which they are re-opened and a series of new areas become closed to fishing.

Corridor closures have a capacity to reduce effort in much the same manner as permanent closures and are viewed by some fishers as being more equitable as they can “share” the impact of a closed area through the region.

However, given that successful recruitment may only occur once every several years for vulnerable demersal species such as dhufish, short-term corridor closures may prove of limited value in rebuilding and sustaining healthy stocks. If the area were reopened prior to it experiencing favourable conditions for successful recruitment, the previously protected breeding stock would become subject to “harvesting” and could quickly be lost to fishing mortality.

### **Summary – Corridor closures**

#### **Positives**

- Temporary “rotating” closures may reduce catch to some extent.
- May provide additional protection for fish stocks over the specified time period.

#### **Negatives**

- Once an area is reopened the residual stock would become subject to “harvesting” and the benefits of having older and larger fish in the population could quickly be lost to fishing mortality.
- Given that successful recruitment may only occur once every several years for vulnerable demersal species such as dhufish, short-term corridor closures may prove of limited value.
- Effort may be transferred to other areas, reducing the capacity to manage total catch.
- Concentrating effort in open areas may reduce the quality of the fishing experience.
- Will require significant compliance resources to police.

### **3.1.6 Wilderness fishing areas**

While not falling into the category of managing through effort reductions or explicit management of catch, there is the possibility of managing some areas as “very low take areas” or “Wilderness Fishing Areas”. These areas are often remote and usually visited by people conducting extended trips.

If these areas have substantial fish stocks which contribute in a meaningful way to the overall spawning biomass, it may be possible to limit the take from these areas by allowing people to take only a small quantity of fish that must be consumed during the trip.

Within the West Coast Bioregion one area, which could be considered as a “no take-away area”, is the Abrolhos Islands. Under this approach people could visit the Abrolhos Islands and the surrounding waters, fish and consume fish, but not take large quantities of fish back to the mainland. This approach could deliver substantial cuts in catches and prove to be more acceptable to the community than closed seasons or tags.

**Summary – The impacts of Wilderness Fishing Areas**

**Positives**

- Can restrict catches by allowing people to retain only what they can eat immediately.
- Can provide different types of quality fishing experiences within a region.
- Easy to administer.

**Negatives**

- May cause transfer of effort to other areas, which could result in a detrimental impact on stocks, requiring revised management.
- Can require significant compliance resources to police.

## **3.2 STRATEGIES TO SUPPORT NEW MANAGEMENT**

The implementation of new management arrangements for recreational fishing for demersal scalefish will need to be supported by additional education and compliance resources.

### ***3.2.1 Compliance and education requirements***

The Department of Fisheries recently completed a State-wide compliance risk assessment for recreational fishing for marine scalefish from boats. Recreational boat fishing was rated as a high risk due to the increasing population, participation in recreational fishing and the concerns around the sustainability of demersal scalefish stocks. For compliance to be effective, the Department should be achieving a contact rate appropriate for the management measures introduced for the fishery. To achieve this, an increase in the order of 15 additional Fisheries and Marine Officers will be required; however, this may vary depending whether compliance is primarily focused at the point of landing such as checking registrations, or at sea such as policing closure boundaries.

The proposed changes to the management arrangements for demersal scalefish stocks across the State are also likely to require an increase in resources to provide community education. There will be a need to develop and implement community education and interpretation programs to minimise the impact of recreational take, promote and establish conservation and environmental values in recreational fishers and provide information and advice to assist with compliance with recreational rules.

The Department is currently seeking additional resources to fund compliance and education programs associated with the management of demersal fish stocks on the West Coast.

### ***3.2.2 Research data requirements***

The ability to evaluate whether the management package is having its desired effect and to monitor stock recovery and its status in the longer term must be a fundamental part of the management strategy. To achieve the required levels of evaluation and monitoring, there is a need to collect ongoing research data on recreational catches and obtain the necessary biological information to undertake meaningful stock assessments.

Given the significance of this fishery to recreational and commercial fishers alike, and the vulnerable nature of these species, it is imperative that ongoing research is undertaken to monitor the stock status of key indicator species (dhufish and pink snapper) and assess the effectiveness of management changes.

At a minimum, this research should include an ongoing fish frame-sampling program (to continue to monitor age structure of dhufish and pink snapper populations) and recreational catch surveys to improve our understanding of the quantity of fish taken by recreational fishers and to assess the impacts of management changes. Additional studies on the reproductive processes, behaviour and environmental impacts on recruitment success would also be extremely valuable. Such studies would inform fisheries managers and the general community about the way in which particular management measures would affect reproductive and recruitment success.



Additional monitoring will be necessary to improve our scientific understanding of stock status to make clear decisions about the success of the package and ongoing recruitment levels and will require a significant level of additional funding. The ongoing monitoring of the key indicator species in the West Coast Bioregion is essential to evaluate whether the management package is achieving the required level of reductions in fishing mortality. It is likely to take three to five years before a robust evaluation could determine whether the package has been successful. During this period, with a suitably designed sampling program, it should also be possible to determine whether the lack of dhufish recruitment since the 1994 to 1997 "spike" has continued. If this turns out to be the case, an earlier reassessment of the package will be required.

## REFERENCES

---

- Department for Planning and Infrastructure (2004). Recreational Boating Facilities Scheme – Five Year Review. Final report v3. Perth, Western Australia.
- Department for Planning and Infrastructure (2007). Perth Regional Boating Facilities Study. Technical Report No. 444. Perth, Western Australia.
- Fairclough D.V. (2005) The biology of four tuskfish species (Choerodon: Labridae) in Western Australia. PhD Dissertation, Murdoch University.
- Hesp S.A., Potter I.C. and Hall N.G. (2002) Age and size compositions, growth rates, reproductive biology and habitats of the West Australian dhufish (*Glaucosoma hebraicum*) and their relevance to the management of this species. Fishery Bulletin, U.S. 100: 214-227.
- Nardi K., Newman S.J., Moran M.J. and Jones G.P. (2006) Vital demographic statistics and management of the baldchin groper (*Choerodon rubescens*) from the Houtman Abrolhos Islands. Marine and Freshwater Research 57: 485–496.
- Pagano, M. and Fuller, T. (Eds) (2006). Proceedings of the Western Australian Dhufish Workshop 2004, Murdoch University, Western Australia, June 12, 2004. Fisheries Occasional Publication No. 34, Department of Fisheries, Perth, Western Australia.
- St John, J., Keay, I., Wise, W., Gaughan, D. and Lenanton, R. (Eds) (2007). Spatial Scales of Exploitation Among Populations of Demersal Finfish: Implications for management. FRDC Project No. 2003/052). Fisheries Research Report No. 163, Part 1 and 2, Department of Fisheries, Perth, Western Australia.
- St John, J. and Syers, C.J. (2005). Mortality of the demersal West Australian dhufish, *Glaucosoma hebraicum* (Richardson 1845) following catch and release: the influence of capture depth, venting and hook type. Fisheries Research 76, 106-116.
- Sumner, N.R. and Williamson, P.C. (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, Fisheries WA.