

## Gascoyne Coast Bioregion

### Regional Management Overview

Recreational fishing activity in the Gascoyne has increased significantly since the early 1980s. The estimate of recreational fishing participation in the region is 6% of the State's fishers or 40,000 fishers a year (Baharthah and Sumner 2001).

Fishing activity tends to peak between April and August each year. Most fishers stay an average of less than two weeks and intend to fish every day (Sumner and Steckis 1999). A recent survey conducted between April 1998 and March 1999 (Sumner et al., in press) has confirmed that the Gascoyne is a major focus of recreational fishing, with 243,000 fisher days being recorded over the survey period. The majority of fishers came from Perth (44%) or rural WA (34%), with 13% being based locally and the remainder (9%) from the Eastern States. Detailed catch results from this survey will be found in the following pages.

Charter activity, although not covered in the 1998/99 survey, is also significant, with 35 aquatic tour licence applications received for the Gascoyne coast bioregion, plus a further 71 'multi-zone' applications from operators seeking access to the Gascoyne and one or more other regions. A logbook system is being introduced which will provide catch data from this sector, and is expected to show that significant catches are taken.

As a result of excessive fishing pressure on the inner Shark Bay snapper stocks, a series of modifications have been made to the management arrangements in the area. In 1997 a bag limit of two pink snapper per person, a minimum size limit of 500 mm, and a maximum size of 700 mm were introduced for the eastern gulf. The eastern gulf was then closed to pink snapper fishing on 9 June 1998 to enable this stock to recover from several years of intensive recreational fishing effort leading to recruitment over-fishing. For the western gulf, a minimum size of 450 mm, a bag limit of four and a limit of two fish over 700 mm per person were introduced during 1998. Due to ongoing concerns for pink snapper stocks in the western gulf, revised regulations were introduced from 25 August 2000. These included a minimum size limit of 500 mm, bag limit of two and a limit of one fish over 700 mm per person. A closure in Freycinet Estuary (south of Goulet Bluff) between 15 August and 30 September, during the spawning period, was also introduced. The latest revisions have been more effective in protecting pink snapper stocks, and have reduced the recreational catch in the western gulf.

A review of recreational fisheries management arrangements for the Gascoyne bioregion is currently under way. A discussion paper (Fisheries WA 1999a) prepared by a community-based working group was released in May 1999 for public comment. The working group has reviewed public submissions and prepared a recreational fishing management strategy which is currently being considered by the Minister for Fisheries.

### Regional Compliance and Community Education Overview

Compliance and education programs for the Gascoyne are delivered through Fisheries WA offices in Denham, Carnarvon and Exmouth.

Regional Services staff undertook 7,469 hours of activities in the Gascoyne bioregion during 2000/2001. These hours were divided between rock lobster, net fishing, marine boat- and shore-based angling, and support for Recreational Fishing Advisory Committees and the Volunteer Fisheries Liaison Officer program.

Indicators of compliance levels include data collected during research creel surveys, data from VFLO observations, patrol contact sheets and reports completed by Fisheries Officers, and reports from members of the public.

As a result of Fisheries patrols, a total of 21 prosecutions, 13 infringement notices and 20 infringement warnings were given out in 2000/2001 for a variety of recreational fishing offences relating to under-size fish, illegal gear and catches in excess of bag limits.

Areas considered at highest risk of non-compliance included new regulations for pink snapper in Shark Bay, the take of under-size spangled emperor, and illegal netting.

Anecdotal information and reports from Fisheries Officers also indicated increased illegal activity in the recreational net fishery. This resembles patterns of non-compliance from the previous year.

Fishwatch reports indicated that the major area of public concern was illegal netting in Bush Bay just south of Carnarvon.

The 1998/1999 Gascoyne Recreational Fishing Survey (Sumner et al., in press) indicated a high level of compliance in the region, with very few (< 4%) of anglers keeping under-size fish or exceeding bag limits.

The highest levels of non-compliance with fishing regulations occurred in the Carnarvon and Point Quobba areas of the region (17% and 13% of those interviewed respectively).

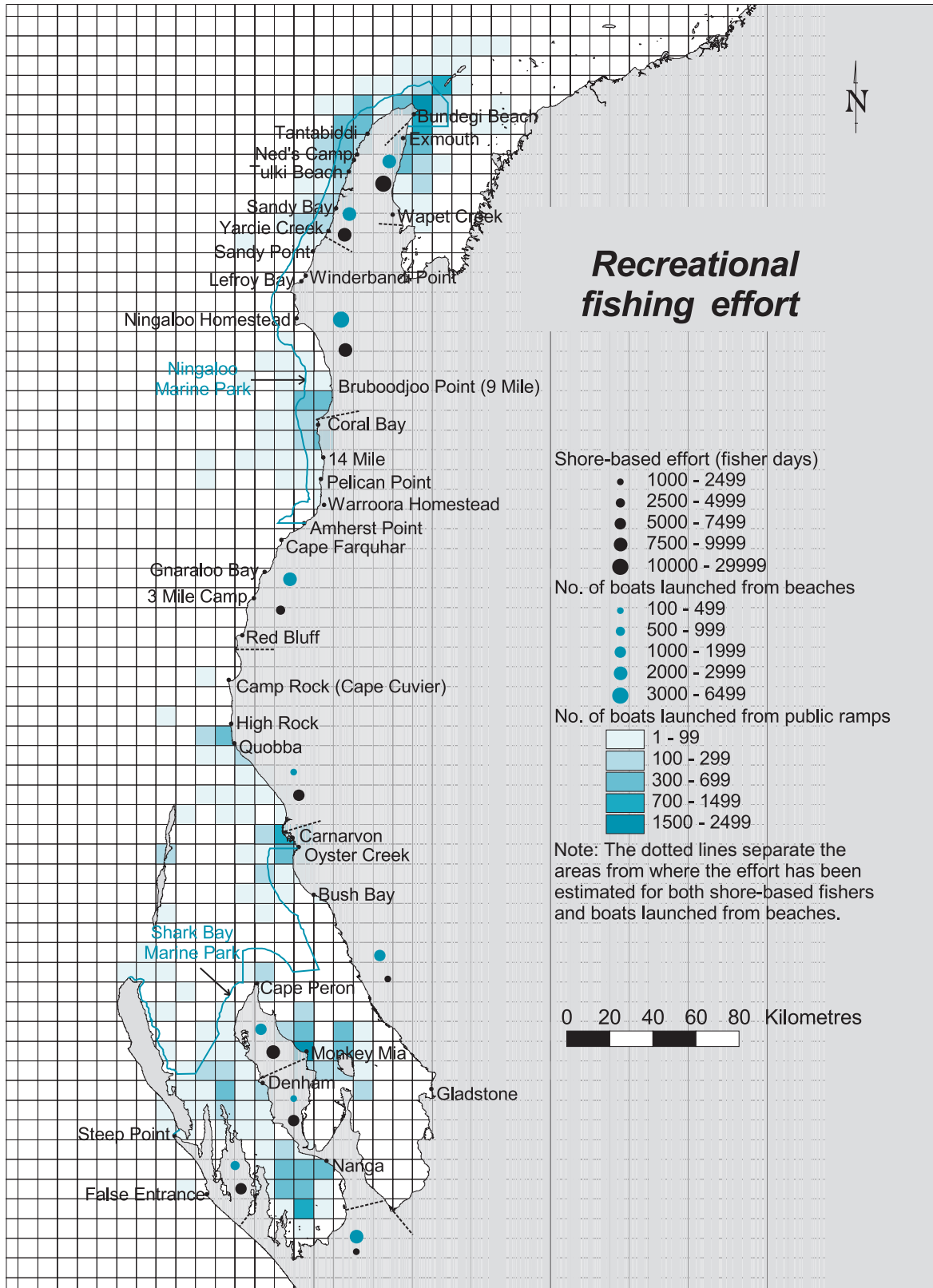
Other areas including Exmouth, Coral Bay and Denham all recorded low levels of non-compliance with the fishing regulations (between 3% and 4%).

The VFLO program was launched in Exmouth and Carnarvon in 1994, with the combined centres fielding a total of 10 volunteers in 2000/2001. VFLOs reported 373 contacts and 161 interviews during the year. Recruitment and training is ongoing, with the volunteer program to be launched in Denham by the end of 2001.

Fisheries Officers together with VFLOs have placed a greater emphasis on community education as a key strategy for combating non-compliance in recreational fishing. Gascoyne regional staff attend and present information in a variety of forums throughout the year, including school talks, sporting club presentations and community expos.



# Recreational Fisheries



**GASCOYNE RECREATIONAL FISHING FIGURE 1**

Spatial distribution of recreational fishing effort in 1998/99.

Both Fisheries Officers and VFLOs were involved extensively in the Shark Bay area during 2000/2001 to educate the public on the new fishing management arrangements for the inner bay stocks of pink snapper. Fisheries Officers conducted high-profile sea and land patrols to raise awareness of the new management strategies.

## Regional Research Overview

Scientific information to underpin management of recreationally important fish stocks in this bioregion in the past has been provided primarily from historical Fisheries WA biological research conducted on commercial fisheries. This research has covered pink snapper, emperors (Lethrinid species) and whiting. Biological information is currently being collected on tailor and on Spanish mackerel.

Owing to the increasing recreational pressure on inner Shark Bay fish stocks, two dedicated studies are being carried out to provide specific information on the status of the inner bay pink snapper and black snapper stocks. An individual stock status report has been prepared for each of these two snapper species.

Data on recreational catches have been collected previously in the Gascoyne region (Sumner and Steckis 1999), in Shark Bay (Moran 1983, unpub.) and at Ningaloo (Moran et al. 1996). The first full recreational creel survey for the Gascoyne bioregion, of recreational boat- and shore-based fishing from Steep Point to Exmouth Gulf, was undertaken in 1998/99 (Sumner et al., in press). The survey estimated the recreational catch and fishing effort for the region (as summarised below), providing extremely useful estimates of the recreational catch of key recreational species from within the inner gulfs of Shark Bay; the recreational catch of pink snapper from the western gulf was estimated at approximately 40 tonnes. A second survey to monitor the recreational catch of pink snapper and other species in Shark Bay was conducted from May 2000 to April 2001.

The National Recreational Fishing Survey has collected further information for this and other regions of the State during 2000/2001. The results from this latter study will become available during 2002.

## Gascoyne Recreational Fishing Survey

### RESEARCH SUMMARY

*Prepared by N. Sumner*

A 12-month creel survey of recreational boat-based and shore-based fishing in the Gascoyne region of Western Australia was conducted between April 1998 and March 1999 (Sumner et al., in press). In summary, the total annual recreational fishing effort for the Gascoyne region in 1998/99 was 243,000 fisher days. This comprised 113,000 fisher days by boats launched from public ramps, 53,000 fisher days by boats launched from beaches and 77,000 days by shore-based fishers (Gascoyne

Recreational Fishing Figure 1). Recreational fishing records from charter boats were not included in the survey; however, a logbook has been developed to collect catch and fishing effort information from tour operators, and this data will be provided in future years.

The total recreational catch of all finfish species for the region in 1998/99 was estimated at 350 tonnes, excluding charter vessel catches. This was approximately one-third of the commercial catch of 1,082 tonnes at the time. (For simplicity, the catch for each species is shown as a point estimate rather than an estimated range. Where commercial catches are quoted, the data are from the CAES records for the same year.)

The important recreational species (in order of weight caught), which together comprised 86% of the total catch by weight, were as follows.

#### Spangled emperor

Spangled emperor is an important species for recreational and commercial fishers. The estimated recreational catch for the region was 30,000 fish kept (79 tonnes). From the survey results, a further 3,000 fish were estimated to have been eaten by sharks. The commercial catch from the region for the same period was 81 tonnes. Spangled emperor was predominantly (95%) caught by boat-based fishers. Most of the catch was taken from within the Ningaloo Marine Park (76%). Most fish kept were between 410 and 529 mm in length. A small number of fish kept by anglers were below the minimum size limit at the time of 410 mm.

#### Pink snapper

Pink snapper was predominantly (99%) caught by boat-based fishers. The estimated recreational catch for the region during 1998/99 was 28,000 fish kept (79 tonnes). A further 600 fish were estimated to have been eaten by sharks. Most of the recreational catch was taken from Shark Bay (73%). Almost half of the recreational catch from the Gascoyne region (38 tonnes, or 48% by weight) was from the western gulf stock. The eastern gulf was closed to pink snapper fishing for most of the period when the survey was conducted. For this reason, the recreational catch of pink snapper for previous years was likely to have been greater than the catch estimated for 1998/99.

#### Spanish mackerel and other mackerel species

Spanish mackerel (narrow-barred) was predominantly caught by boat-based fishers (75%). The estimated recreational catch for the region was 8,000 fish kept (47 tonnes). A further 600 fish were estimated to have been eaten by sharks. The commercial catch for the combined west coast and Gascoyne regions during 1998 was 67 tonnes (Mackie 2000). This may be compared to a recreational catch of 59 tonnes from the same regions. The most common size class for fish kept was 950–999 mm. A small number of fish kept by anglers were below the minimum size limit at the time of 750 mm. Large fish of up to 1,600 mm were caught on occasions. A stock assessment of the fishery is presently under way.

Recreational fishers also caught 8 tonnes of other mackerel species. These were predominantly Queensland



# Recreational Fisheries

school mackerel (2,000 fish kept) and shark mackerel (1,900 fish kept). The commercial catch for the same period was 40 tonnes (Mackie 2000).

## Black snapper (grass emperor)

Black snapper, also known as grass emperor, is predominantly a recreationally caught species. The estimated recreational catch for the region was 33,000 fish kept (34 tonnes). Black snapper was predominantly (99%) caught by boat-based fishers. Most of the catch was taken from Shark Bay (76%). The most common size class for fish kept was 300–319 mm. Large fish of up to 660 mm were caught on occasions.

## Golden trevally

Golden trevally is predominantly a recreationally caught species. The estimated recreational catch for the region was 6,000 fish kept (20 tonnes). The commercial catch from the region for the same period was 1 tonne. Golden trevally was predominantly (63%) caught by boat-based fishers. Most of the catch was taken from within the Ningaloo Marine Park (74%). There was no minimum size for this species at the time of the survey.

## Sweetlip emperor

Sweetlip emperor is an important species for recreational and commercial fishers. The estimated recreational catch for the region was 13,000 fish kept (16 tonnes). The commercial catch from the region for the same period was 14 tonnes. Sweetlip emperor was predominantly (99%) caught by boat-based fishers. Most of the catch was taken from within the Ningaloo Marine Park (79%). Most fish kept were just above the minimum size limit of 280 mm at the time. Large fish over 450 mm were caught on occasions.

## Chinaman cod

Chinaman cod is predominantly a recreationally caught species. The estimated recreational catch for the region was 23,000 fish kept (10 tonnes gilled and gutted). The commercial catch from the region for the same period was 1 tonne. Chinaman cod was predominantly (99%) caught by boat-based fishers. Most of the catch was taken from within the Ningaloo Marine Park (85%). Most fish kept were between 281 and 340 mm in length. There was no minimum size for this species at the time of the survey.

## Western yellow-fin bream

Western yellow-fin bream is an important species for recreational and commercial fishers. The estimated recreational catch for the region was 10,000 fish kept (5 tonnes). This is exceeded by the commercial catch for the region of 10 tonnes. Western yellow-fin bream was predominantly (99%) caught by shore-based fishers. Most of the catch was taken from Exmouth Gulf (92%).

## Tailor

Tailor is an important species for recreational and commercial fishers. The estimated recreational catch for the region was 7,000 fish kept (5 tonnes). This is exceeded by the commercial catch for the region of 44 tonnes. Tailor was caught by boat-based (50%) and shore-based (50%) fishers. Most of the catch was taken from Shark Bay (87%).

## Whiting species

Whiting is predominantly a commercial species with a catch of 115 tonnes from Shark Bay during 1998. The estimated recreational catch for the region was 34,000 fish kept (5 tonnes). Present catch levels are considered to be sustainable. Whiting species were predominantly caught by shore-based fishers (88%). Most of the catch was taken from Shark Bay (64%). There was no minimum size for this species at the time of the survey.

## Inner Shark Bay Recreational Fishery

### RESEARCH SUMMARY

Research to support the management of Shark Bay pink snapper (*Pagrus auratus*) undertaken during the 1980s identified genetically separate stocks in each of the Shark Bay gulfs. Concerns about increasing recreational fishing pressure on the inner gulf stocks during the early 1990s, and the outcome of research surveys for juvenile snapper in November 1996 and February 1997, resulted in the development of a detailed research project commencing in June 1997. Since then this research has provided scientific assessments of the status of the inner bay snapper stocks for management of this key target species in the important recreational fishery within Shark Bay.

Research to support the management of the increasingly popular black snapper or grass emperor (*Lethrinus laticaudis*), the second most commonly taken recreational species in the inner gulf region of Shark Bay, commenced in July 1999. The specific objectives of this research are to examine stock delineation using stable isotope analysis of otolith carbonate, determine the age structure, growth rate and reproductive biology of black snapper, and use this information to develop a stock assessment model for black snapper stocks from the inner gulfs of Shark Bay.

Estimates of recreational catch and effort inside Shark Bay have been derived from results of creel surveys, undertaken initially in 1998/99 as part of a broader survey of the whole Gascoyne region, and more recently at key boat ramps inside Shark Bay between May 2000 and April 2001.

During the 1998/99 Gascoyne Recreational Fishing Survey (Sumner et al., in press) the entire Shark Bay Marine Park was surveyed, including sites on the east shore of the eastern gulf from Uendoo Creek (south of Carnarvon) to Gladstone. While almost all the fishing activity occurred within the boundaries of the Shark Bay Marine Park, the survey results include some catches from vessels which were launched within the marine park but also fished outside the park boundaries, for example in Denham Sound or west of Dirk Hartog Island. There are specific regulations that apply to pink snapper caught within Shark Bay. Statewide fishing regulations apply to other species.

The estimated annual recreational fishing effort for Shark Bay during 1998/99 (excluding the recreational charter operators who could not be surveyed) was 89,000 fisher days. This comprised 49,000 fisher days by boats

launched from public ramps at Nanga, Denham and Monkey Mia, 18,000 fisher days by boats launched from beaches within the marine park and 22,000 days by shore-based fishers.

The most common species kept by all recreational fishers in Shark Bay were (in order of estimated weight kept) pink snapper (58 tonnes), black snapper (22 tonnes), Spanish mackerel (15 tonnes), spangled emperor (7 tonnes), tailor (4 tonnes), whiting species (3 tonnes), western butterfish (2 tonnes) and mullet species (2 tonnes). The catch of pink snapper includes the inner gulf stock (41 tonnes) and oceanic stock (17 tonnes) landed in Shark Bay.

The recreational catch of pink snapper landed at Nanga and Denham during 2000/2001 was estimated as 8,000 fish kept (25 tonnes). A further 100 fish were estimated to have been eaten by sharks. Almost all the recreational catch landed at Nanga and Denham was from the western gulf stock rather than the oceanic stock. The catch of oceanic snapper landed at Peron Peninsula and Shelter Bay (South Passage) was not included in the inner bay estimates. The eastern gulf was closed to pink snapper fishing for the period when the survey was conducted.

The recently introduced management measures in the western gulf appear to have been effective in protecting pink snapper stocks by reducing the estimated recreational catch from 38 tonnes during 1998/99 to 25 tonnes in 2000/2001. Most of the reduction has occurred in the Freycinet Estuary where the catch was reduced from 26 tonnes in 1998/99 to 16 tonnes during 2000/2001.

## Inner Shark Bay Pink Snapper Stocks Status Report

*Prepared by G. Jackson*

### FISHERY DESCRIPTION

#### Boundaries and access

Separate stocks of pink snapper have been shown to inhabit the sheltered inner gulf waters of Shark Bay. The eastern stock is found in waters to the east of the Peron Peninsula and to the south of Cape Peron (the eastern gulf) (Gascoyne Recreational Fishing Figure 2). Two subpopulations of snapper are found in the western gulf, to the north (Denham Sound) and south (Freycinet Estuary) of a line running west from Goulet Bluff to Heirisson Prong. Although reproductively isolated from each other, these subpopulations are collectively known as the western stock. Research advice (stock assessment, recreational catch and effort) is provided on the basis of these divisions.

Both inner gulf snapper stocks have primarily become the target of recreational fisheries since about the 1980s. The eastern gulf snapper fishery is currently closed (since June 1998) to allow stock rebuilding. Bag/size limits and a seasonal spawning closure (Freycinet Estuary only) apply in the western gulf. Commercial snapper fishing in the inner gulfs is now limited to the 11 licensed fishing units of the Shark Bay Beach Seine and Mesh Net Managed Fishery, which are also subject to the current eastern gulf closure.

### Main fishing method

Recreational: Rod and line.  
Commercial: Handline, beach seine, haul net, gillnet.

### RETAINED SPECIES

#### Recreational catch (season 2000):

**Eastern gulf closed**  
**Western gulf 25 tonnes (estimated)**

Comprehensive data on recreational catches inside Shark Bay were lacking until recently.

A survey in 1983 indicated that recreational snapper catches were relatively low at that time, particularly in the eastern gulf. In 1998, based on results of the Gascoyne Recreational Fishing Survey (April 1998 – March 1999), the estimated catch of pink snapper in the eastern gulf was approximately 3 tonnes (for the period April to June only, prior to the fishery closure), and in the western gulf approximately 38 tonnes (Denham Sound approximately 12 tonnes, Freycinet Estuary approximately 26 tonnes). This survey indicated that 90% of all snapper caught in Denham Sound were released by fishers (assumed under-size) compared with 70% in the Freycinet Estuary, possibly indicating greater numbers of smaller/younger fish in the former area compared with the latter. In 2000 (May 2000 – April 2001), a second survey estimated the recreational catch of snapper in the western gulf to be approximately 25 tonnes (Denham Sound approximately 9 tonnes, Freycinet Estuary approximately 16 tonnes), with no catch in the eastern gulf because of the closure. During this period, 88% of all snapper caught in Denham Sound were released by fishers compared with 76% in the Freycinet Estuary.

#### Fishing effort

Results from the Gascoyne Recreational Fishing Survey indicated that approximately 49,000 fisher days were expended in the inner gulfs of Shark Bay in 1998 by boat fishers launching from public ramps (i.e. Nanga, Denham and Monkey Mia). The survey also indicated that the majority of pink snapper were caught by fishers in boats launched from the public ramps at Denham and Nanga, rather than by shore-based fishers or boats launched from beaches. Of this effort, approximately 80% was in the western gulf and 20% in the eastern gulf (closed to the take of pink snapper June 1998). A recreational survey in 2000 indicated that 35,000 days were expended by boat fishers launching from public ramps at Nanga, Denham and Monkey Mia, with approximately 70% of the total effort in the western gulf and 30% in the eastern gulf.

**Commercial share:** **Eastern gulf closed**  
**Western gulf 2 tonnes (approx.)**

The total commercial catch of pink snapper taken by the Shark Bay Beach Seine and Mesh Net Managed Fishery appears never to have been large, in more recent years rising from approximately 5 tonnes in 1993 (eastern gulf 3 tonnes, western gulf 2 tonnes) to approximately 9 tonnes in 1997 (eastern gulf 3 tonnes, western gulf 6 tonnes). In 2000, there was no catch in the eastern gulf (fishery closed) and approximately 2 tonnes in the western gulf.

**Stock assessment completed:** **Yes**

In the absence of a long time-series of recreational catch



# Recreational Fisheries

and effort data for inner gulf snapper stocks, the assessment method adopted has been to directly assess the status of the spawning biomass and recruitment to each stock within the fishery. The 'daily egg production method' (DEPM) involves plankton surveys to sample snapper eggs (used to estimate 'average' egg production across area of spawning) and, combined with information on the spawning condition of adult females, has been used to back-calculate the total biomass of spawning adults in each gulf. In addition, research trawl surveys (ongoing) and trap surveys (1998–2000) have been used to provide information on the abundance of 0+ age juvenile snapper in both gulfs.

Using results of DEPM surveys, the size of the spawning biomass in each year, 1997–2000, was estimated as follows:

1997:

Eastern gulf approximately 4 tonnes  
Western gulf Freycinet Estuary approximately 97 tonnes; no estimate for Denham Sound

1998:

Eastern gulf approximately 14 tonnes  
Western gulf approximately 95 tonnes\* (Freycinet Estuary and Denham Sound)

1999:

Eastern gulf approximately 45 tonnes  
Western gulf approximately 36 tonnes\* (Freycinet Estuary and Denham Sound)

2000:

Eastern gulf approximately 78 tonnes  
Western gulf approximately 94 tonnes (Freycinet Estuary and Denham Sound)

\* DEPM surveys in 2000 located some previously unidentified spawning areas in the waters of northern Denham Sound. Using this additional information, spawning biomass of pink snapper in Denham Sound has been re-estimated for 1998 and 1999; revised estimates are presented here and differ slightly from those previously presented in the *State of the Fisheries Report 1999–2000*.

**Exploitation status:** Eastern gulf closed  
Western gulf:  
Freycinet Estuary over-exploited  
Denham Sound over-exploited

**Breeding stock levels:** Eastern gulf inadequate but increasing  
Western gulf:  
Freycinet Estuary inadequate (locally depleted)  
Denham Sound inadequate but increasing

Following extensive community consultation in 1998 prior to the introduction of the current eastern gulf closure, management targets for rebuilding of the spawning biomass of both stocks were agreed at 100 tonnes and 200 tonnes for the eastern and western stocks respectively. The spawning biomass of each stock remains at a level below these targets.

In 2000, following experimental research trawls conducted in the Freycinet Estuary and trap surveys to

identify habitat type preferred by juvenile snapper across both gulfs, estimates of absolute abundance of 0+ juveniles in the eastern gulf and Freycinet Estuary were possible for the first time (similar data unavailable for Denham Sound). With data now available since 1996, results appear to indicate that recruitment of 0+ snapper in the inner gulfs can be highly variable, particularly in the Freycinet Estuary. In the eastern gulf, 0+ juveniles were less abundant in 2000 than in 1999 (and 1998), although still more abundant than in 1996 and 1997. In contrast, in the Freycinet Estuary, the highest numbers of 0+ juveniles were recorded since trawl surveys commenced in 1996, indicating a significantly higher level of recruitment, approximately four times greater than in the previous highest year (1997). Research into factors causing this recruitment variability will be a future priority.

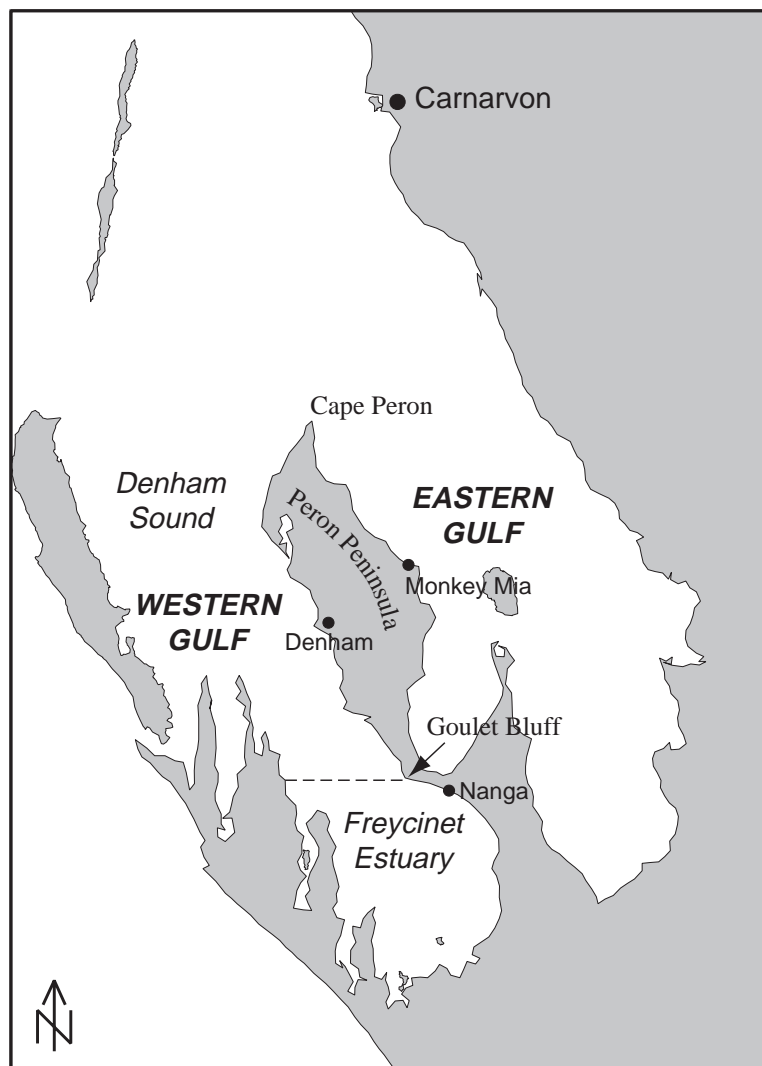
The overall assessment is that the eastern snapper breeding stock remains depleted but that rebuilding continues, while the western stock overall remains depleted, particularly in Freycinet Estuary, although significant recruitment to the breeding stock appears to have occurred in Denham Sound in 2000.

## FISHERY GOVERNANCE

The management of the eastern stock through a total closure continues to appear appropriate for rebuilding; biomass estimates since 1998 are in agreement with earlier model estimates that indicated a high probability that the 100 tonne management target would be reached sometime between 2002 and 2003. Additional management measures to protect the western stock, including an increase in minimum legal size to 50 cm, further protection of larger fish (> 70 cm), a reduction of the individual bag limit to two fish per day and a seasonal closure (to protect spawning aggregations) in the Freycinet Estuary, were introduced in August 2000. These measures have achieved some success, particularly in the Freycinet area where the 2000 recreational snapper catch was 60% of that estimated in 1998. However, further measures such as the introduction of a possession limit may be necessary to accelerate stock rebuilding and ensure long-term sustainability in the western gulf.

## EXTERNAL FACTORS

Comprehensive information on the inner gulf snapper stocks obtained since 1996 suggests that annual recruitment to these fisheries may be highly variable, very likely due to the effect of environmental factors on the survival of snapper larvae and post-settlement juveniles. Understanding these effects and the relationship between spawning stock biomass and juvenile recruitment will be critical to assessing sustainable catch levels for each stock and will be the focus of future research. There is also some local community concern regarding the potential impact of the seasonal prawn trawling in Denham Sound on juvenile snapper recruitment and subsequent consequences for the recreational fishery in this area. Research projects currently under way, including bycatch reduction technology for prawn trawlers and stock structure of Denham Sound snapper, will provide information on the potential significance of prawn trawling on local snapper stocks.



## GASCOYNE RECREATIONAL FISHING FIGURE 2

The recreational fishing areas of inner Shark Bay.

### Inner Shark Bay Black Snapper Stock Status Report

Prepared by S. Ayvazian

#### FISHERY DESCRIPTION

##### Boundaries and access

A stock discrimination study, using stable isotope analysis of otolith carbonate, is under way to determine the level of stock separation of black snapper or grass emperor (*Lethrinus laticaudis*) in the gulfs of Shark Bay.

Preliminary results indicate that samples of black snapper from waters of different salinity can be distinguished by their  $O^{18}$  values. Initial results of a recently conducted tagging study indicate that movement of the species within Shark Bay is localised (within 10 km of the original tag site).

Black snapper are taken primarily by recreational fishers in Shark Bay. Although the fishers in the Shark Bay

Beach Seine and Mesh Net Managed Fishery take some black snapper, it is not a target species for this fishery.

##### Main fishing method

Recreational: Rod and line.

Commercial: Beach seine, haul net and mesh net.

##### RETAINED SPECIES

##### Recreational catch (season 2000): Not assessed

Recreational catch estimates are not available for the current year. However, the Gascoyne Recreational Fishing Survey of 1998/99 estimated a total recreational catch of 30,000–37,000 black snapper retained (approximately 34 tonnes) and 40,000–50,000 released. This was the second most popular species caught (in order of number kept) after whiting. Essentially, all of the catch was taken by boat-based fishers, with catches from the Shark Bay Marine Park making up about three-quarters of the total regional catch (Sumner et al., in press).

# Recreational Fisheries

## Fishing effort

Not assessed for 2000.

### Commercial share: 1% (approx.)

Commercial catches of black snapper are taken in small quantities by the 11 licensed fishing units of the Shark Bay Beach Seine and Mesh Net Managed Fishery. The 2000 commercial catch reported from the western and eastern gulfs was 0.4 tonnes or about 1% of the overall catch in Shark Bay.

### Stock assessment completed: Not assessed

### Exploitation status: Not assessed

## Breeding stock levels:

Not assessed

## FISHERY GOVERNANCE

At this time, control of the exploitation rate is managed through a daily possession limit and a legal minimum size limit. The recreational catch limits for black snapper include a legal minimum length of 280 mm and a recreational daily bag limit described under the 'reef fish' category as a mixed bag of 8. The legal minimum length for commercial fishers is 280 mm. Community support for an increase in the minimum legal size for black snapper is being considered under the current review of recreational fishing management arrangements in the region.

## Oceanic Sector Recreational Fishery

### RESEARCH SUMMARY

Estimates of the recreational catch and fishing effort for the oceanic sector of the Gascoyne region have been derived from the results of the 1998/99 Gascoyne Recreational Fishing Survey (Sumner et al., in press).

The oceanic sector comprises all areas of the Gascoyne region other than Shark Bay and the Ningaloo Marine Park. This includes the area between Shark Bay and the Ningaloo Marine Park (Carnarvon, Quobba Station and Gnaraloo Station), the area west of the Ningaloo Marine Park boundary, the Muiron Islands and most of Exmouth Gulf.

The total annual recreational fishing effort for the oceanic sector during 1998/99 (excluding the recreational charter operators who could not be surveyed) was estimated at 69,000 fisher days. The recorded effort comprised 24,000 fisher days by boats launched from public ramps at Carnarvon, Quobba and Exmouth, 9,000 fisher days by boats launched from beaches within the marine park and 36,000 days by shore-based fishers.

The most common species kept by all recreational fishers in the oceanic sector were (in order of estimated weight kept) pink snapper (38 tonnes), Spanish mackerel (17 tonnes), spangled emperor (13 tonnes), golden trevally (5 tonnes), western yellowfin bream (4 tonnes), black snapper (3 tonnes), sweetlip emperor (2 tonnes) and chinaman cod (2 tonnes gilled and gutted).

Commercial fishers predominantly target the oceanic stock of pink snapper. The commercial catch of Shark Bay oceanic stock during 1999 was 450 tonnes (Moran 2000). The oceanic stock is beyond the reach of many recreational fishing boats; however, charter boats operating from Denham also target this stock. The commercial oceanic stock quota-managed fishery may be close to fully exploited (Moran 2000). The number of recreational fishing boats and charter boats targeting the oceanic stock may increase in future years and should be monitored.

## Ningaloo Recreational Fishery

### RESEARCH SUMMARY

Estimates of the recreational catch and fishing effort for the Ningaloo area have been derived from the results of the 1998/99 Gascoyne Recreational Fishing Survey (Sumner et al., in press).

The Ningaloo Marine Park encompasses 260 kilometres of coastline down the west coast of North West Cape from Bundegi to Amherst Point. The marine park includes most of the Ningaloo Reef. There are eight sanctuary areas within the marine park where fishing is not permitted, and specific fishing regulations for the areas where fishing is permitted.

The total annual recreational fishing effort for the Ningaloo Marine Park during 1998/99 (excluding the recreational charter operators who could not be surveyed) was estimated at 85,000 fisher days. The recorded effort comprised 40,000 fisher days by boats launched from public ramps at Coral Bay, Tantabiddi, Bundegi and Exmouth, 26,000 fisher days by boats launched from beaches within the marine park and 19,000 days by shore-based fishers.

The most common species kept by all recreational fishers in the Ningaloo Marine Park were (in order of estimated weight kept) spangled emperor (60 tonnes), golden trevally (15 tonnes), sweetlip emperor (13 tonnes), black snapper (9 tonnes) and chinaman cod (8 tonnes gilled and gutted).