

mortality on their prey species. However, given the annual variability in tailor biomass, the fishing effect is likely to be similar in magnitude to other factors influencing prey availability. Overall the impact of the fishery is assessed as low.

SOCIAL EFFECTS

The annual summer–autumn appearance of tailor along metropolitan Perth beaches is targeted by thousands of shoreline anglers each year.

ECONOMIC EFFECTS

Not available

FISHERY GOVERNANCE

At this time, control of the exploitation rate is managed through a daily bag limit and a legal minimum size limit, however there is no limit on the overall catch taken by the

recreational sector. Commercial catch is limited to south-west estuaries and Shark Bay where strict licence and gear limits apply.

EXTERNAL FACTORS

The offshore distribution of the spawning stock in the Gascoyne region suggests that the Leeuwin Current which flows through this area may be a significant factor influencing the larval distribution south into the west coast bioregion. Further work to assess the significance of this environmental influence on the fishery will be undertaken when sufficient years of recruitment data from the west coast estuaries become available.

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 8% of the State's fishers or 50,000 fishers a year (Baharthah and Sumner 2002).

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. 2002) has confirmed that the Gascoyne is a major focus of recreational fishing, with 243,000 fisher days being recorded over the survey period. Of these, 89,000 fisher days were recorded within the Shark Bay Marine Park and 85,000 in the Ningaloo Marine Park. The majority of fishers came from Perth (44%) or rural Western Australia (34%), with 13% being based locally and the remainder (9%) from the Eastern States.

Charter activity, although not covered in the 1998/99 survey, is also significant, with 66 fishing tour licences and 7 ecotour licences issued for the Gascoyne bioregion.

A review of recreational fisheries management arrangements for the Gascoyne bioregion has been completed. A discussion paper 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

The Gascoyne coast bioregion has nine Fisheries Officers working out of three offices located at Denham, Carnarvon and Exmouth. The officers deal with a wide range of recreational fisheries within the region, encompassing boat and shore angling (including diving), rock lobster, netting, crabbing (mud crabs and blue swimmer crabs), and creek fishing.

Officers at Denham make extensive use of a 9 m patrol vessel (PV *John Brockman*) to conduct at-sea inspections throughout Shark Bay, while those at Exmouth use an 8 m vessel (PV *Gnulli*) to conduct at-sea operations and inspections within Exmouth Gulf and along the western side of the North West Cape. Additionally, several smaller craft are used to service protected waters and creek fishing activities. Carnarvon staff utilise small dinghies for inshore coastal and creek patrols, and have recently acquired a quad-bike to access certain mangrove creeks and beaches.

Recreational fishery compliance involves 'hands-on' checks of catches for compliance with bag, size and possession limits; observation and inspection of the gear and methods used and the areas accessed by anglers to take their fish; and extensive liaison with anglers regarding local rules and regulations.

As well as high-profile patrol activities aimed at maximising personal contacts with anglers, covert observation also plays an important role in ensuring high levels of compliance. While most recreational fishers are aware of and comply with the rules, some unscrupulous fishers are very careful to hide their illegal activities. Officers therefore regularly

discreetly observe fishers from a distance, particularly in response to information provided to them through the toll-free Fishwatch service.

Activities during 2000/01

During 2000/01, Fisheries Officers delivered 7,470 hours of compliance work to recreational fisheries in the Gascoyne coast bioregion (Gascoyne Coast Recreational Compliance Table 1), concentrating mainly on checking shore-based and boat-based anglers. As a result of these compliance activities, 25 infringement warnings and 20 infringement notices were issued, while 10 prosecutions were initiated for more serious offences.

During the same period (2000/01), a total of 85 Fishwatch calls were received. The Fishwatch system is a statewide 24-hour telephone hotline utilised by members of the public who wish to report instances of observed illegal fishing activity. While these calls may relate to matters of all kinds, traditionally the majority involve possible recreational fishing offences. Complaints received by the service in relation to the Gascoyne bioregion tend to focus on the taking of fish in excess of bag or boat limits, the taking of under-size or totally protected fish, and cases of people netting in closed waters or fishing in sanctuary zones in the Ningaloo Marine Park.

A VFLO program focusing on the education of recreational fishers supplemented the more formal compliance activities conducted by Fisheries Officers in the bioregion. The Gascoyne VFLOs are generally very keen anglers committed to protecting the aquatic environment and promoting the 'Fish for the Future' ethic.

In 2000/01, the Gascoyne Region VFLO program recorded 346 contacts for the year and involved approximately 8 volunteers. Community education activities conducted in the bioregion included attendance and presentations by Fisheries Officers and VFLOs at regional shows and expos, primary and high schools, and community group meetings.

Initiatives in 2001/02

During 2001/02 Fisheries Officers combined efforts with VFLOs, through joint patrols and activities, to place greater emphasis on educating Gascoyne communities and visitors on the need to adhere to the 'Fish for the Future' ethic and the rules and regulations.

This incorporated an extensive workshop at Coral Bay during school holidays. A range of hands-on activities provided attendees with education about minimum legal sizes, bag limits, possession limits and areas closed to certain fishing activities, as well as the promotion of the important 'Catch Care' message.

Fisheries Officers at the Carnarvon District Office also made use of a four-wheel motorbike to access areas of mangrove creek and coastline difficult or impossible to access by normal 4WD vehicles. This produced some excellent results and the incorporation of this bike into more recreational patrols throughout the Gascoyne bioregion will be continued during 2002/03.

GASCOYNE COAST RECREATIONAL COMPLIANCE TABLE 1

Summary of compliance and educative contacts and infringement types in recreational fisheries within the Gascoyne coast bioregion during the 2000/01 financial year.

CONTACT WITH THE RECREATIONAL FISHING COMMUNITY	NUMBER
Hours delivered in bioregion	7,470
Fisher field contacts by Fisheries Officers (6 months)*	3,626
District Office contacts by Fisheries Officers (6 months)*	931
Fisher field contacts by VFLOs	346
Fishwatch reports **	85
OFFENCES DETECTED	NUMBER
Infringement warnings	25
Infringement notices	20
Prosecutions	10

* These figures represent regional activities conducted between 1 January and 30 June 2001, following the introduction of a new, more comprehensive system for collection of regional activity data. Since this represents an incomplete year of data, collected while Fisheries Officers were still undergoing training in the system, figures should be treated with caution.

** This represents the total number of Fishwatch reports, both commercial and recreational, since the service provider reporting mechanism cannot currently differentiate between sectors.

Fisheries Officers at Denham continued to conduct a mix of high-profile at-sea and on-land patrols to remind locals and visitors of the need to protect local pink snapper stocks in both the western and eastern gulfs of Shark Bay, given the concern over the status of these two fish stocks.

Staff from the Exmouth District Office promoted the unique Ningaloo Marine Park experience to those they encountered, while reminding them of the specific requirements placed on those fishing in the area in relation to possession limits, landing limits, sanctuary zones and bag limits.

The finalisation of the Gascoyne Review, anticipated in 2002/03, will also bring a need for extensive educational and compliance patrols throughout the bioregion, and these are expected to involve both Fisheries Officers and VFLOs.

REGIONAL RESEARCH OVERVIEW

Scientific information to underpin management of recreationally important fish stocks in this bioregion in the past has been provided primarily from Department of Fisheries biological research conducted on commercial fisheries. This research has covered pink snapper (*Pagrus auratus*), emperors (Lethrinid species) and whiting (Sillaginidae), and more recently tailor (*Pomatomus saltatrix*) and Spanish mackerel (*Scomberomorus commerson*).

In addition, two dedicated studies are being carried out to provide specific information on the status of the inner Shark Bay stocks of pink snapper and black snapper (*Lethrinus laticaudis*). 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. 2002). This survey estimated the recreational catch and fishing effort for the region. The total recreation 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.

Important recreational species, in order of weight caught, were spangled emperor (*Lethrinus nebulosus*) (30,000 fish kept, or 79 tonnes); pink snapper (*Pagrus auratus*) (28,000 fish or 79 tonnes); mackerel (*Scomberomorus* spp.) (Spanish

mackerel 8,000 fish or 47 tonnes, other mackerel 8 tonnes); black snapper or grass emperor (*Lethrinus laticaudis*) (33,000 fish or 34 tonnes); golden trevally (*Gnathanodon speciosus*) (6,000 fish or 20 tonnes); sweetlip emperor (*Lethrinus miniatus*) (13,000 fish or 16 tonnes); Chinaman cod (*Epinephelus rivulatus*) (23,000 fish or 10 tonnes gilled and gutted); western yellowfin bream (*Acanthopagrus latus*) (10,000 fish or 5 tonnes); tailor (*Pomatomus saltatrix*) (7,000 fish or 5 tonnes); and whiting (Sillaginidae) (34,000 fish or 5 tonnes).

The 1998/99 survey also provided 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 2000/01. The results from this latter study will become available during 2002/03.

INNER SHARK BAY RECREATIONAL FISHERY

Management Summary

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 2 pink snapper (*Pagrus auratus*) 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 4 and a limit of 2 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 2 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 reduced the recreational catch in the western gulf and provided protection for at least one year-class of mature snapper. However, adult stock levels in both Freycinet Estuary and Denham Sound are well below appropriate biological reference points, and a further review of management will be undertaken in 2002/03.

The eastern gulf will remain closed to the take or landing of pink snapper until the initial biological reference point of 100 tonnes spawning biomass is reached. Following that, management will need to ensure that the recreational and

commercial catch of snapper is maintained at a level which allows continued rebuilding to 40% of the estimated unfished spawning biomass.

The recreational catch of black snapper or grass emperor (*Lethrinus laticaudis*) comprises a significant part of the recreational catch in Shark Bay and other areas of the Gascoyne, and community concerns have been regularly expressed about transfer of effort to this species in the wake of tighter management of the pink snapper catch.

Existing fishing controls in Shark Bay constrain the take of this species to a maximum of 5 per person per day as part of a mixed daily bag limit, and in the eastern gulf a mixed species boat limit of 10 per day also applies. Within the Ningaloo Marine Park a mixed bag limit of 7 applies.

The Gascoyne regional recreational fisheries management strategy recommends a reduced bag limit of 6 for all *Lethrinus* species as part of a mixed species bag limit of 7 (down from 8) across the region. An increased minimum size limit of 320 mm (up from 280 mm) is also recommended for this species until biological and stock assessment research is completed.

Research Summary

Research to support the management of Shark Bay pink snapper 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, 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. 2002) 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 (*Pagrus auratus*) 58 tonnes, black snapper (*Lethrinus laticaudis*) 22 tonnes, Spanish mackerel (*Scomberomorus commerson*) 15 tonnes, spangled emperor (*Lethrinus nebulosus*) 7 tonnes, tailor (*Pomatomus saltatrix*) 4 tonnes, whiting species (Sillaginidae) 3 tonnes, western butterfish (*Pentapodus vitta*) 2 tonnes and mullet species (Mugilidae) 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 2000/01 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 2000/01. 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 2000/01.

INNER SHARK BAY PINK SNAPPER STOCKS STATUS REPORT

Prepared by G. Jackson and N. Sumner

FISHERY DESCRIPTION

Boundaries and access

Evidence from various stock identification studies carried out since the 1980s (genetics, tagging, otolith stable isotope analysis, variation in head shape, comparison of life-history parameters, hydrodynamic modelling of egg and larval dispersal) suggests that a number of reproductively isolated populations of pink snapper (*Pagrus auratus*) inhabit the inner gulfs of Shark Bay. Although further research (e.g. a DNA-based technique) is required to fully explain the genetic relationship between these snapper populations, management now recognises three fishable stocks in the inner gulfs. An eastern 'stock' is found in the eastern gulf, i.e. in waters approximately to the east of the Peron Peninsula and to the south of Cape Peron (Gascoyne Recreational Fishing Figure 1). In the western gulf, separate 'stocks' are found approximately to the north (Denham Sound) and south (Freycinet Estuary) of a line running west from Goulet Bluff to Heirisson Prong. Research advice is provided on the basis of these divisions.

Although commercial fishing for pink snapper has historically been undertaken in the inner gulfs, snapper in these waters have primarily become the target of recreational fisheries since about the 1980s. The eastern gulf snapper fishery, closed in June 1998 to allow the recovery of the spawning stock, remains closed. Bag/size limits and a seasonal spawning closure (Freycinet Estuary only) apply in the western gulf. Commercial snapper fishing in these gulf waters is now limited to the 11 licensed fishing units of the Shark Bay Beach Seine and Mesh Net Managed Fishery (also subject to the eastern gulf snapper closure).

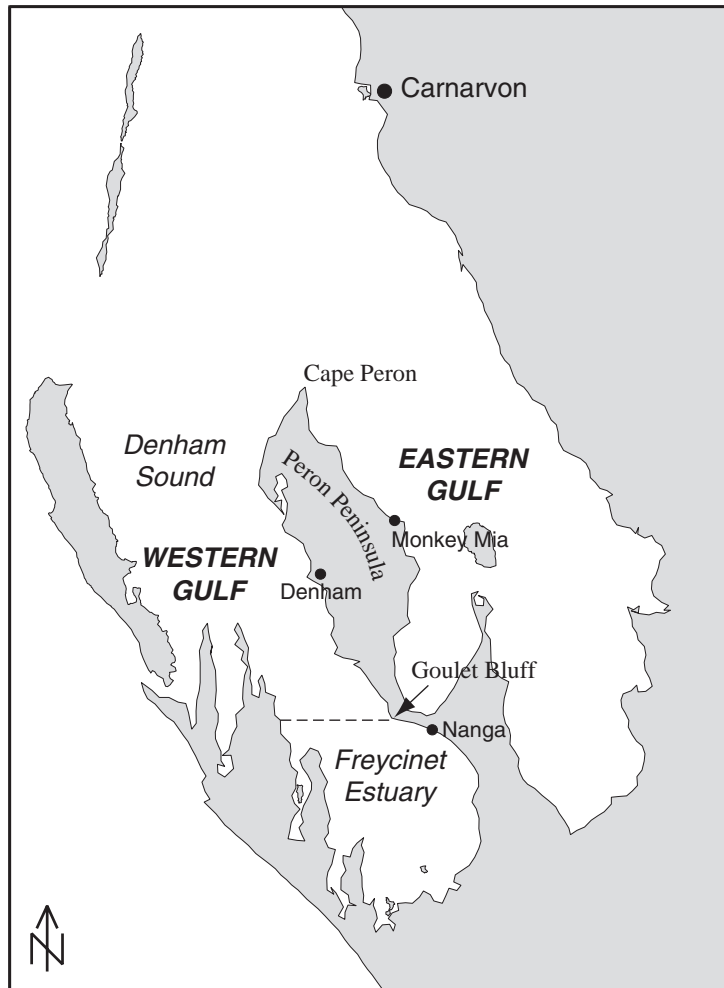
Main fishing method

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

RETAINED SPECIES

Recreational catch (season 2001): Eastern gulf closed
Western gulf:
Freycinet Estuary 22 tonnes (estimated)
Denham Sound 8 tonnes (estimated)

Following an aerial and boat ramp survey in 1983, the recreational catch of pink snapper in the inner gulfs of Shark Bay was estimated at approximately 7 tonnes from the eastern gulf, 12 tonnes from Denham Sound and 17 tonnes from the Freycinet Estuary. In 1998, the recreational snapper catches were estimated at approximately 3 tonnes from the eastern gulf (for the period April–June only, prior to the snapper fishery closure), 12 tonnes from Denham Sound and 26* tonnes from Freycinet Estuary. In 2000, the estimates were approximately 9 tonnes from Denham Sound and



GASCOYNE RECREATIONAL FISHING FIGURE 1

The recreational fishing areas of inner Shark Bay.

16* tonnes from Freycinet Estuary, with no catch in the eastern gulf. In 2001 (May 2001–April 2002), a further survey estimated the recreational snapper catch in Denham Sound to be approximately 8 tonnes and in the Freycinet Estuary approximately 22 tonnes (Nanga 17 tonnes, Tamala 5 tonnes), again with no catch in the eastern gulf. From the results of the most recent survey, 94% of all snapper caught in Denham Sound were released compared with 79% at Nanga and 88% at Tamala.

* It should be noted that, in both 1998 and 2000, the Freycinet Estuary estimates are for the Nanga boat ramp only and do not include Tamala, and therefore represent an under-estimate of the total catch. .

Fishing effort

The Gascoyne Recreational Fishing Survey of 1998/99 (Sumner et al. 2002) indicated that approximately 49,000 fisher days were expended in the inner gulfs in 1998 by boat fishers launching from public ramps, with approximately 80% of the effort in the western gulf and 20% in the eastern gulf (closed to the take of pink snapper in June 1998). Effort decreased in 2000, when 35,000 days were expended by boats fishing from the public ramps at Nanga, Denham and

Monkey Mia, with approximately 70% of the effort in the western gulf and 30% in the eastern gulf. From the most recent survey, effort was similar in 2001, with boat fishing effort from the same ramps estimated at 34,000 days, approximately 80% of which was in the western gulf and 20% in the eastern gulf.

Commercial share: Eastern gulf closed
Western gulf 6% (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 a peak of approximately 9 tonnes in 1997 (eastern gulf 3 tonnes, western gulf 6 tonnes). In 2001, as in 2000, there was no catch in the eastern gulf (fishery closed) and approximately 2 tonnes in the western gulf.

Stock assessment completed: Yes

The daily egg production method has been used to directly estimate the size of the snapper spawning stock in the eastern gulf, Denham Sound and the Freycinet Estuary each year since 1997. Research trawl surveys (1996 to the

present) and trap surveys (1998–2000) have been used to provide information on the abundance of 0+ age snapper in both gulfs, and thereby measure variation in recruitment. Preliminary results indicate that snapper recruitment is highly variable, particularly in the Freycinet Estuary.

In recent years these data, combined with estimates of commercial and recreational catches, have been used independently to determine the status of each inner gulf 'stock'. Information on the age composition of recreational snapper catches and estimates of the key biological parameters (growth rates, size/age at maturity) have now been incorporated into quantitative age-structure models to independently assess the status of each snapper 'stock', to investigate the dynamics of the fishery and evaluate alternative management strategies.

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 closure of the eastern gulf snapper fishery, management targets for the spawning stock in each area were agreed based on the limited information available at the time. More recently, following model-based stock assessments, these management targets have been re-evaluated. Given the uncertainty surrounding historical catch levels in this fishery, the stock levels from 1983 – the earliest reliable estimate – have been used as the nominal baseline. A biological reference point of 40% of the 1983 spawning biomass has therefore been adopted for each 'stock'.

Stock assessment modelling indicates that the eastern stock virgin biomass was greater than previously estimated, at approximately 400 tonnes. Although the adult stock has recovered steadily since the fishery was closed in 1998, the spawning biomass is currently estimated to be just below the biological reference point of 150 tonnes. In Denham Sound, although the spawning biomass is currently estimated to be well below the biological reference point of 110 tonnes, some recovery is apparent. The high proportion of under-sized snapper released by recreational fishers in this area indicates good recruitment in recent years. The Freycinet spawning biomass is estimated to be at a critically low level relative to the biological reference point of 120 tonnes. However, trawl surveys have indicated that particularly strong recruitment occurred in 2000, with the cohort expected to enter the fishery in 2003/04. Although this is likely to make a significant contribution to the breeding stock, it needs to be viewed in the context of the severely depleted state of the older age classes in the spawning population.

FISHERY GOVERNANCE

Management of the eastern 'stock' through a total closure has been successful in rebuilding the breeding stock. Some

level of fishing in the eastern gulf may be possible in 2003 although the catch will need to be limited to a sustainable level (approximately 10–12 tonnes) to achieve full recovery to the biological reference point by 2007. Management measures introduced in the western gulf in 2000 (increase in minimum size to 500 mm, further protection of fish > 700 mm, reduction of daily bag limit to 2 fish, six-week spawning season closure in Freycinet only) have had only a limited effect in reducing the snapper catch in Denham Sound and the Freycinet Estuary. Although further measures may not be required in Denham Sound provided the annual catch is maintained at the current level (10 tonnes) and the spawning biomass recovery continues, more drastic action is necessary immediately in the Freycinet Estuary to recover the spawning stock. A Snapper Working Group, recently appointed by the Minister, is currently considering the available scientific information and will be making recommendations in relation to a range of strategies to manage inner gulf snapper into the future.

EXTERNAL FACTORS

Information on inner gulf snapper 'stocks' obtained since 1996 suggests that annual recruitment, particularly in the Freycinet Estuary, may be highly variable, possibly due to the effect of environmental factors on the survival of snapper larvae and early stage juveniles. Such recruitment variability has been shown to be important in snapper fisheries elsewhere in Australia and New Zealand, where strong year classes resulting from high but infrequent recruitment can maintain a fishery through more numerous years of poor or average recruitment. Understanding these effects and the relationship between the size of the spawning stock and juvenile recruitment in the inner gulfs of Shark Bay is 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 the consequences for the recreational snapper fishery in this area. Research projects recently completed or currently under way, including bycatch reduction technology for prawn trawlers, identification of nursery areas used by snapper in the western gulf, and assessment of the interaction between prawn trawling and juvenile snapper in Denham Sound, will provide information on the potential significance of prawn trawling on the snapper population in that area.

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 to determine the level of stock separation of black snapper or grass emperor (*Lethrinus laticaudis*) in the gulfs of Shark Bay, indicates that samples of black snapper from waters of different salinity can be distinguished by their O¹⁸ 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

RECREATIONAL FISHERIES GASCOYNE COAST BIOREGION

original tag site). These results suggest that this species is not wide-ranging within the bay.

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 2001): 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. 2002).

Fishing effort

Not assessed for 2001.

Commercial share (season 2001):

Negligible

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 2001 commercial catch reported from the western and eastern gulfs was almost none.

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 fishing 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. The results from the black snapper research program should be available by the end of 2002 to assist with the sustainable management of this species.

North Coast Bioregion

REGIONAL MANAGEMENT OVERVIEW

In recent years the Pilbara and Kimberley regions have experienced significant growth in recreational fishing activity, with a booming fishing-based tour and ecotourism industry based around the region's reputation as remote and pristine.

Recreational fishing participation for marine waters between Onslow and the WA/NT border is estimated at about 12% of the State's recreational anglers, or some 70,000 anglers per year generating 1 million fishing days (Baharthah and Sumner 2002). Recreational fishing shows distinct seasonal peaks, with the highest number of visitors during the winter months.

A recent survey conducted between December 1999 and November 2000 (Williamson et al., in prep.) has confirmed that the Pilbara region is a major focus of recreational fishing. Detailed catch results from this survey will be found in the following pages.

Charter activity is also significant, with 85 fishing tour licences and 5 ecotour licences issued for the north coast bioregion.

Creek systems, mangroves and rivers, and ocean beaches provide shore and small boat fishing for a variety of species including barramundi (*Lates calcarifer*), tropical emperors (Lethrinidae), sea perches such as mangrove jack (*Lutjanus argentimaculatus*), trevallies (Carangidae), sooty grunter (*Hephaestus jenkinsi*), threadfin (Polynemidae), mud crabs (*Scylla serrata*), and cods (Serranidae).

Offshore islands, coral reef systems and continental shelf waters provide species of major recreational interest including many members of the demersal sea perch family (Lutjanidae) such as scarlet sea perch (*Lutjanus malabaricus*) and red emperor (*Lutjanus sebae*), cods, coral and coronation trout (*Plectropomus* and *Variola* spp.), sharks, trevally, tuskfish, tunas, mackerels and billfish.

Fishing charters and fishing tournaments are also areas of growth in the region, and have seen surges in popularity over the past five years or so. The Dampier Classic and Broome Sailfish tournaments are both State and national attractions, and Western Australia is gaining an international reputation for the quality of its offshore pelagic sport and game fishing.

The popularity of barramundi fishing and competition for available fish by different user groups places significant pressure on barramundi stocks. A working group formed in March 2000 developed a number of recommendations for