



Newsletter No. 33
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Welcome to the RAP Newsletter, providing feedback on the data you are collecting and keeping you informed about what is happening at the Research Division of the Department of Fisheries.

Shark Bay pink snapper recovery in focus

Shark Bay, a World Heritage Area, is renowned for its pink snapper fishery. Stocks of pink snapper in Denham Sound, Freycinet Estuary and the Eastern Gulf are genetically separate from each other and the wide-ranging ocean stock. The pink snapper populations of Shark Bay are very small by comparison with ocean fisheries elsewhere in Australia and New Zealand, and the sustainable annual take from these stocks is tens of tonnes rather than hundreds or thousands of tonnes. For these reasons, and given the area's high conservation value, pink snapper stocks in Shark Bay require careful management.

In the 1990s, first-time stock assessment surveys revealed pink snapper stocks were being overfished in the inner gulfs, mostly by recreational fishers. This triggered a major long-term recovery program, involving two decades of intensive scientific monitoring of the stocks and strong fishery management measures. With support from recreational and commercial fishers, the three stocks have all now recovered to above the target levels agreed to when the recovery program was first developed. As a result, recreational fishing rules have been reviewed and modified, giving more fishers the opportunity to access this iconic fishery and a better chance of taking a 'trophy' pink snapper, while ensuring the stocks remain at sustainable levels.

The Shark Bay pink snapper recovery story is a great example of how, with time, sound fisheries management, based on high quality scientific research and with strong community support, can restore a valuable aquatic resource back to good health.



Beautiful Freycinet pink snapper – make sure you follow the rules to ensure there will be plenty of them in the future. Photo: Ben Carlish

Fishery on the brink

With increases in fishing technology and more accessible roads into Shark Bay, the recreational fishing pink snapper catch from the inner gulfs rose from an estimated 40 tonnes of snapper in 1983 to an estimated 100-plus tonnes in 1995. These catch levels were far too high, seriously threatening the sustainability of the inner gulf pink snapper stocks.

Pink snapper are long-lived and slow growing. In the inner gulfs they take four or five years to reach maturity, but grow to very large sizes, reaching over a metre in length and 10 kilograms in weight. Fish of this size can be more than 30 years old.

By 1997, the science was showing that the Eastern Gulf pink snapper stock had collapsed: the spawning stock was down to less than 10 per cent of its estimated original size. There were signs that Freycinet Estuary and Denham Sound stocks were heading the same way. Urgent action was needed with a commitment to a long-term monitoring and management program to save this iconic fishery.

Cutting edge scientific monitoring

Obtaining extensive, good quality scientific information was the key to developing a management plan that could recover the inner gulf

stocks. Our researchers adopted the 'daily egg production method' to estimate the size of snapper breeding stocks. At peak spawning times, nets are used to collect plankton containing pink snapper eggs. This allows researchers to estimate average pink snapper egg production in the area surveyed. This is combined with information on spawning fish collected during the surveys to estimate the total weight (biomass) of the spawning stock. Fish samples are also used to provide age structure information on the pink snapper stocks. Combining all this information, our researchers can use mathematical models to estimate the pink snapper stocks' size and determine their sustainability.

A community-backed recovery

The whole Shark Bay community worked to help the inner gulfs' pink snapper stocks recover and remain sustainable with a comprehensive management and education program playing a key role in the recovery.

After commercial line fishing for pink snapper was stopped in the inner gulfs in 1996, the recreational fishing rules were also changed, including reduced recreational pink snapper daily bag limits, an increased minimum size limit and the introduction of a 'slot limit' (minimum and maximum size limit). Protecting larger fish as well as the smaller fish was important because as they grow larger, females produce more eggs each year and become an increasingly valuable part of the breeding stock. Research has shown that a 40 centimetre female can release 100,000 eggs in a single spawning, while a larger fish of 70 centimetres can release

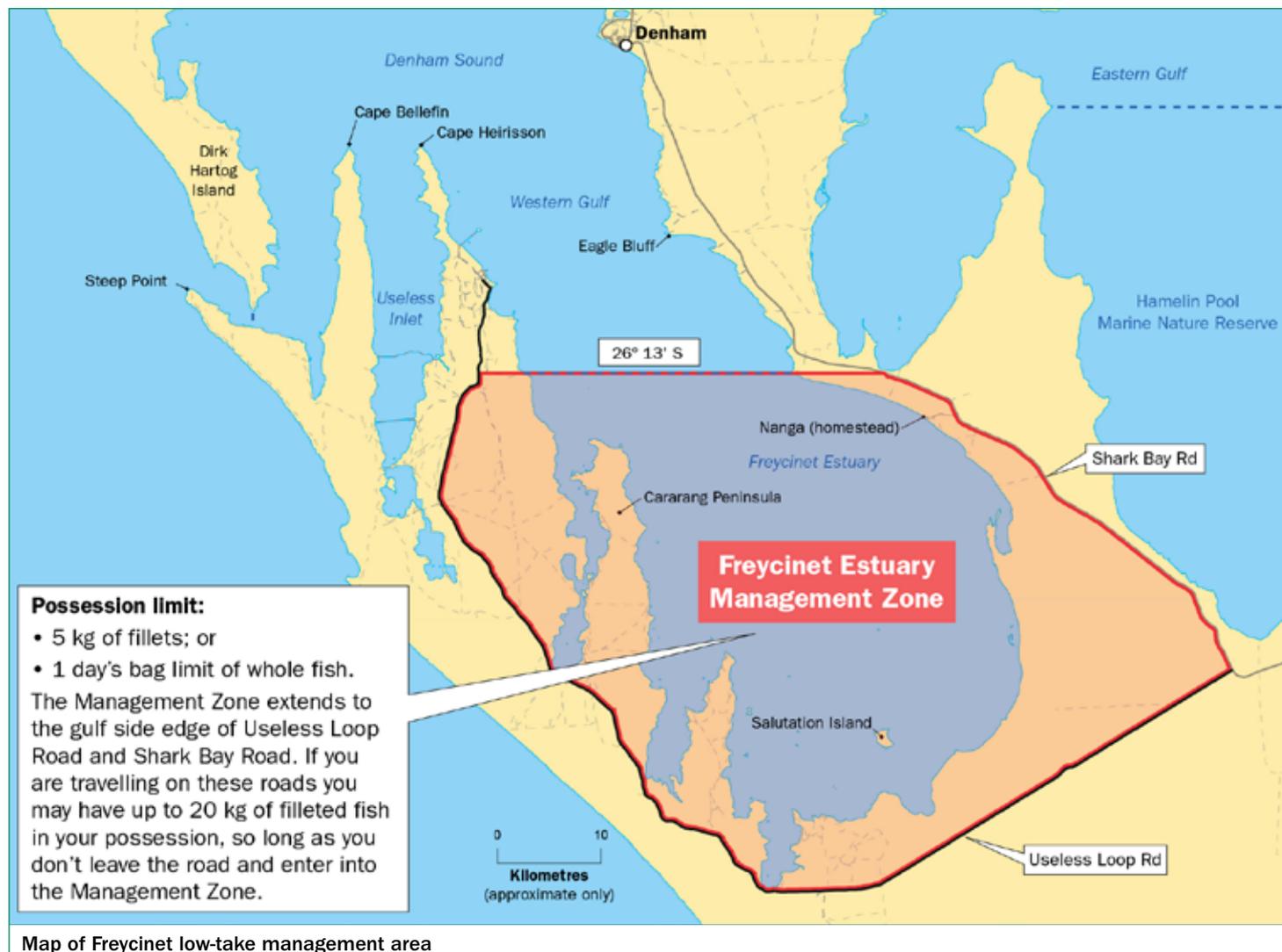
300,000 to 500,000 eggs at a time – which will add up to millions of eggs being produced over the entire season.

The Eastern Gulf was completely closed to fishing in 1998 to 2003 to allow the stock to rebuild and further changes were introduced in 2000, including a six-week spawning closure in Freycinet Estuary.

A ministerial working group was formed in 2002, before the re-opening of the Eastern Gulf snapper fishery, to review the research and develop management strategies. The interests of local government, commercial fishers, charter operators, Recfishwest and local tourism were all represented on the working group, which met every three years up to 2011.

In 2002, a pink snapper total allowable catch (TAC) was set for each stock with recreational fishers allowed to take 75 per cent of the catch. This was the first time a TAC had been set in a mostly recreational fishery in Australia. With the support and cooperation of recreational and commercial fishers, catches have been kept within the set TACs since 2003.

Spawning closures remained in place in the Eastern Gulf and Freycinet Estuary and in the Freycinet Estuary a tag system was introduced to limit the annual combined catch to below five tonnes a year. Recreational fishers required a special tag to take pink snapper in the Estuary. A limited number of tags were available annually through a lottery; if successful, fishers could obtain two tags each calendar year entitling them to take two legal-size fish.



Map of Freycinet low-take management area

The most recent stock assessment in 2015 showed that the Freycinet Estuary stock had recovered to the target level. As a result, the tag-based system was replaced by a five-kilogram possession limit for finfish fillets, or one day's bag limit of whole fish, in a newly designated Freycinet Estuary Management Zone, which is being managed as a 'low take' area. This management approach is designed to provide high quality recreational fishing experiences in a 'wild' and unspoilt environment. The emphasis now is on enjoying catching and eating fresh fish and not fishing for the freezer.

Fish for the future in Shark Bay

Shark Bay offers recreational fishers the opportunity to catch trophy pink snapper in an unforgettable setting. But the setting is what makes these stocks particularly vulnerable to overfishing. That is why it is essential that we continue with our comprehensive monitoring program of the inner gulf pink snapper stocks. We continue to develop innovative methods to assess catch rates in the inner gulfs to ensure the stocks will remain sustainable.

Our unique trout fishery

While standing in the cool streams of the south west of Western Australia, casting lures to tempt that elusive trout, have you ever wondered where they come from?

Trout are not native to Western Australia. They were introduced to provide recreational anglers some worthy freshwater fishing sport. There are a few known sites where natural spawning of trout (remnants of past stockings) occurs, so the population in those limited water bodies is self-sustaining. However, as the river systems of the South West are not typically conducive to natural spawning of trout, artificial propagation must be done each year.

Built in 1952 on the Lefroy River in Pemberton, the Pemberton Freshwater Research Centre (PFRC) is a Western Australian Government hatchery that produces trout, Western Australian native fish and marron. The PFRC produces over 600,000 rainbow (*Oncorhynchus mykiss*) and brown (*Salmo trutta*) trout fry and yearlings annually, which are stocked into rivers and impoundments for the fishing community. A small number of the trout are also sold for private stocking of farm dams and commercial growers.

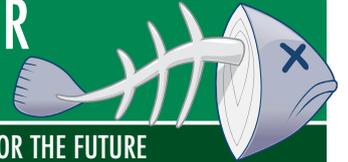
With over 60 years' experience in breeding trout, the PFRC staff have developed sound techniques to produce enough fry to stock waterways around the South West. As summer passes and the temperature and daylight hours decrease, the two-year-old rainbow and three-year-old brown broodstock naturally come into spawning condition. They are physically stripped of their eggs and milt, which are gently mixed together with a feather to aid fertilisation. As the eggs develop, they are intensively cared for by the hatchery staff for several weeks, developing from a fertilised egg to fully formed trout fry ready to hatch (known as alevin).

During this time, any unfertilised and dead eggs are removed by hand from the egg trays. If this is not done regularly, fungus forms on the dead eggs and spreads to

Send us your skeletons winners

Congratulations to the July-Sept 2015 quarterly *Send us your skeletons* winners – Grant Bird and Julian Jackson. The prizes for this quarter were a Fishing Western Australia Pro Tackle Gift Voucher, a *Western Angler* magazine subscription, Rapala hat and McCarthy soft plastics and freeze-dried bait.

SEND US YOUR SKELETONS



HELP ENSURE THERE'S FISH FOR THE FUTURE



the healthy eggs, jeopardising successful hatching. Once hatched, the alevin carry their yolk sac to feed on for the next week. After the yolk sac is absorbed, commercial fish feed is offered to the fry. When the fry reach about 50 mm long, they are released into streams and dams.

To help minimise any impact trout may have on the native fish populations, they are released where populations of the feral redfin perch (*Perca fluviatilis*) are also found. After spawning, the broodstock are brought back into good condition then released, usually in impoundments.

A 12-month \$40 freshwater license is required to fish in waters south of Greenough (29°S) and above the tidal influence. Open season for trout fishing is from 1 September to 30 June, with a minimum size of 300 mm and a daily bag limit per licensed angler of 4 mixed freshwater finfish (for example. 4 rainbow trout or 2 rainbow, 1 brown and 1 cobbler). Some water bodies are open all year round. See our website for more information. (www.fish.wa.gov.au/Species/Rainbow-Trout/Pages/Trout-Recreational-Fishing.aspx)

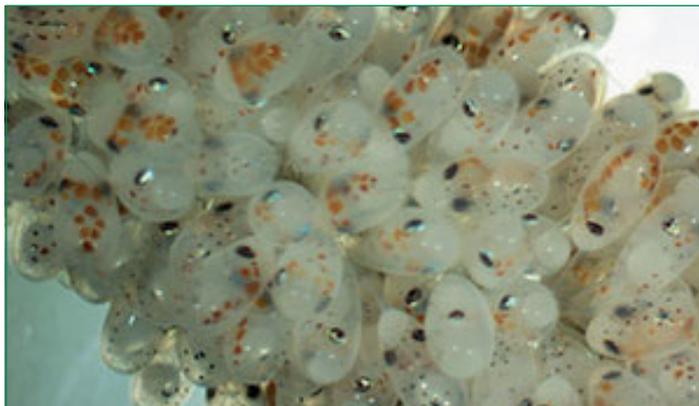
Researchers grapple with octopus

Fisheries Principal Research Scientist Dr Sagiv Kolkovski and brothers Craig and Ross Cammilleri from Fremantle Octopus Pty Ltd have recently completed a four-year Fisheries Research and Development Corporation (FRDC)-supported project to understand the behaviour and life cycle of *Octopus tetricus*, and analyse its commercial viability for aquaculture.

This is the most common species of octopus found along the WA coast and was once regarded as bycatch in the rock lobster industry or useful bait. Now it is a popular seafood, and demand far exceeds supply so the Cammilleri brothers wanted to move away from fishing into 'ranching', which involves wild-caught juveniles being raised in tanks or offshore cages.

The project has produced many world firsts in octopus aquaculture. Researchers discovered that octopus could be grown in tanks without hides. In aquaculture, hides are usually lengths of PVC pipe. In nature, an octopus hides somewhere, such as under a coconut shell or in a cave and then ambushes whatever passes by.

They also found that in high density, size-matched populations, the octopuses' behaviour was modified and switched from individual, aggressive, cannibalistic and territorial behaviour to behaviour resembling that in a school.



Octopus paralarvae

The amount of octopus harvested per cubic metre of water also broke records. In Spain, the maximum biomass harvested from aquaculture systems using hides was 15 kg per cubic metre. This project managed to produce 54 kg per cubic metre without the hides. This rate of harvest increased the commercial viability of farming octopus.

Heavy steel mesh is usually used in octopus farming to prevent octopuses hurling themselves out of the tank onto the floor. One aim of the project was to devise a simple mechanical method of preventing this.

At first a low voltage electric fence was tried, but the octopus still managed to escape. The simple solution was to use shade cloth. As shade cloth is made from a light and porous material, an octopus can't use suction to latch on to the surface of the cloth and climb over the top of the tank. Using shade cloth also made it much easier to feed the octopus and clean the tanks.

The biggest hurdle in octopus aquaculture has been in closing its life cycle. Hundreds of thousands of paralarvae in aquaculture tanks were produced but the project team only managed to rear one into a juvenile octopus. Dr Kolkovski says that one of the main issues with rearing paralarvae is that little is known about their nutritional requirements.

The Department is looking to begin a new project catching wild octopus larvae in plankton nets and analysing their gut content through DNA analysis to develop feeds suitable for the hatchery culture of octopus.



Juvenile octopus

Fisher of the month

The RAP 'fisher of the month' prizes were decided by randomly drawing one log sheet returned in each month.

Congratulations to the following 'fishers of the month':

January 2015	Scott Campbell	(West Coast)
February 2015	Ben Franklin	(West Coast)
March 2015	Anthony Federico	(West Coast)
April 2015	Gerhard Saueracker	(West Coast)
May 2015	James Hart	(West Coast)
June 2015	Shaun Rogers	(West Coast)

Each winner received one of our stylish RAP beanies.

Thank you for your ongoing support and happy fishing!

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Fish for the future