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## SPOTTED MACKEREL

### Assessing the fishery



By Gavin Begg (CRC Reef) & Michael O'Neill (DPI&F)

**Spotted mackerel (*Scomberomorus munroi*) are sometimes referred to as 'lesser' or 'small' mackerel, but this is no indication of their importance to fishing on the east coast of Queensland and northern NSW. In 2002, there were growing concerns from all stakeholders about the sustainability of the spotted mackerel fishery. These concerns arose for a number of reasons. Firstly, some characteristics of the species make it potentially vulnerable to overfishing and secondly there were increases in both catch and effort in the fishery. These concerns prompted an assessment of the fishery by the CRC Reef and DPI&F Southern Fisheries Centre.**

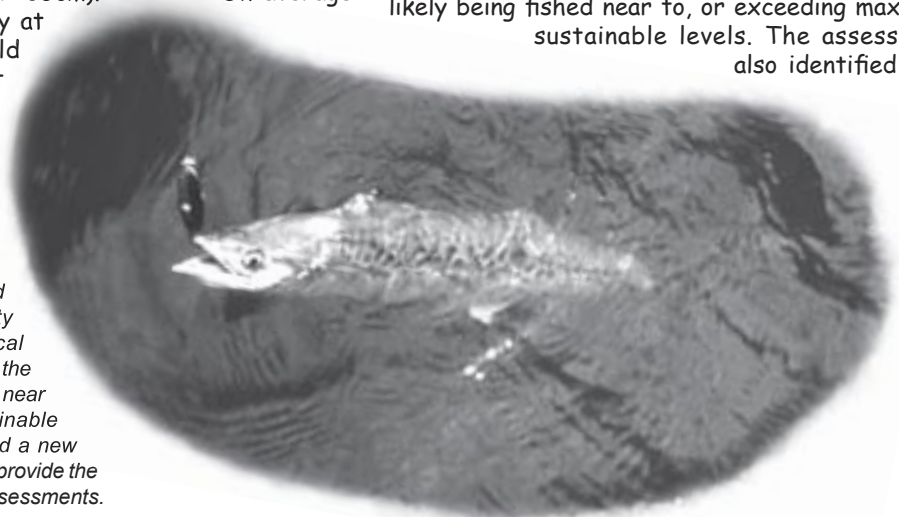
Spotted mackerel are a schooling fish with predictable movements along the east coast of Australia. This behaviour results in large numbers of fish targeted by fishers at predictable times. Spotted mackerel generally spawn between August and October in north Queensland waters, before they move to southern Queensland and northern NSW waters to undertake summer feeding. They return north again in autumn to late winter. Spotted mackerel have been aged up to 7 years old (at about 105cm). On average they reach maturity at about 1-2 years old when they are about 52cm as males or 60cm as females.

*An assessment of the spotted mackerel fishery by CRC Reef and DPI&F found that, while the quantity and quality of historical information is uncertain, the fishery was being fished near to its maximum sustainable yield. This research and a new monitoring program will provide the basis of future stock assessments.*

Significant catches of spotted mackerel are taken by both the commercial and recreational fishing sectors. Anecdotal information suggests that targeted commercial fishing for spotted mackerel began in the 1960's, with catches gradually increasing to a peak in 2000. However, catch data for spotted mackerel for both sectors come from various sources and show large yearly variation. This indicates that there is some uncertainty as to the completeness and accuracy of these data sources that must be considered with the outputs from the assessment.

With growing concern for the fishery, and increasing catch and effort up to 2000, DPI&F introduced new management regulations as a precautionary measure to protect the fish stock. These included total allowable catch for the commercial sector and reduced bag limits for the recreational sector.

Results from the assessment of the fishery, with careful consideration of the input data quality and quantity, indicated that the fishery in 2002 was most likely being fished near to, or exceeding maximum sustainable levels. The assessment also identified that



a new, more stringent monitoring program was required for continued data collection to enable future assessments of the fishery.

This research is the most comprehensive attempt to assess the status of the spotted mackerel fishery. Future research, based on more comprehensive data from a robust monitoring program that has recently been introduced will enable the effectiveness of new management regulations to be assessed.

# PROJECT UPDATE:

a word from the project leader: **Gavin Begg**

Mackerel, genetics, sharks and tagged fish are just some of the research projects covered in this newsletter; all of which are providing advice to the sustainable use of our tropical marine resources. Potential outcomes from these projects include sustainable levels of spotted mackerel catches, appropriate management units of grey mackerel, population structure of coral trout, biological characteristics of inshore sharks, and codes of best practice for releasing line-caught reef fish.

All of these research projects emphasise the importance we place on developing and undertaking work that is of specific interest to you as fisheries stakeholders. With more and more pressures being exerted on marine resources, fishers, and their management, as well as the available funds for conducting the research, it is critical that we continue to stay in tune with what research is relevant. To this end we endeavour to maintain our contacts with many of you and are always interested in hearing what is going on in the fisheries.

One of our long standing researchers in the F&F team who was in regular contact with many of you, Gary Carlos, has now unfortunately left us to explore opportunities in the States. In turn, I welcome Ann Penny and Leanne Currey to the team, who will soon be enjoying the catch surveys that I know Gary will surely miss.

On a final note, I would like to congratulate another long standing member of our team Ross Marriott for completing his PhD and thank those of you who were involved in supporting Ross over the past years.

## Genetics: International collaboration studies coral trout genes

**Genetics is a science that investigates how DNA is inherited from one generation to the next and how it affects the characteristics of their offspring. Research on genetics has mainly focused on human health and criminology, but scientists are now using these techniques to study questions for fisheries science and management.**

Fish, like humans, have genes made up of DNA that are passed to their offspring. Fish ear bones (otoliths) collected over the last 10 years for the ELF Project are providing a unique historical record of fish genetics on the GBR. The DNA can be extracted from these otoliths, and the genetic structures of fish populations can then be constructed.

Professor Daniel Heath, a Canadian geneticist from the University of Windsor, in collaboration with Dr. Jennifer Ovenden from the Southern Fisheries Centre of Queensland DPI&F, and F&F researchers will conduct a series of projects investigating the genetic diversity and population structure of common coral trout, the major commercial fish species in the GBR Line Fishery.

The genetic structures of the common coral trout populations will be compared across four regions, from Lizard Island (north of Cooktown) to Storm Cay (between Gladstone and Mackay) between 1996 to 2004 to see if genetic structure has been stable over time, and to estimate effective population size of common coral trout in the GBR. Comparing rates of genetic change over this time between reefs that are opened and closed to fishing will also provide an insight to the potential effect of fishing on genetic diversity.



By Lou Dong Chun  
(CRC Reef)



Jennifer Ovenden  
(DPI&F)



Dan Heath  
(University of Windsor)



*Prof. Dan Heath (pictured left) from the University of Windsor and Dr. Jennifer Ovenden (pictured right) from DPI&F are using DNA extracted from historical samples from the ELF Project to investigate the effects of fishing on genetic diversity of common coral trout. Photo courtesy of DPI&F.*

The outcomes of these genetic projects will provide a better understanding on the genetic diversity and structure of coral trout populations on the GBR while, potentially, also providing useful information for managing fisheries in the region.

# Team movements:

## Farewell



The F&F team was sad to lose one of its long standing team members recently. Gary Carlos was the lynch pin in organising and running our annual catch surveys for many years. He also designed and maintained a number of our databases essential for recording and storing the huge amount of data from the F&F project. Unfortunately for us, the lure of overseas opportunities has seen Gary depart. We wish Gary all the best on his future endeavours.

## Welcome



The F&F team has recently welcomed two new staff members. Ann Penny and Leanne Currey join the team to assist with analysing the backlog of biological samples. Ann will be concentrating mainly on samples from the ELF Experiment, while Leanne will be focussing on samples from the Torres Strait fisheries. The relevant technical expertise they bring to the team will be put to good use. Their assistance with processing biological samples from the various F&F projects, and helping out on the upcoming catch surveys will be invaluable to the ongoing progress of our research.

Ann Penny (left) and Leanne Currey (right) will provide technical assistance to the F&F team.

## Congratulations



It is with great pleasure that we offer our congratulations to Ross Marriott on acceptance of his PhD thesis 'Forecasting fishing impacts on the population biology of the red bass, *Lutjanus bohar*'. Ross has been a member of the F&F team for many years as a staff member and more recently as a masters and PhD student. His research investigating various biological characteristics of red bass has provided managers and other stakeholders with essential information on this slow-growing, later-maturing tropical reef snapper.

# Grey Mackerel:

Ear-bones, parasitic worms and DNA will be used to investigate the grey mackerel populations in the tropical waters of northern Australia, as

part of a new research project coordinated by the CRC Reef Research Centre and funded by the Fisheries Research and Development Corporation. The commercial and recreational catch of grey mackerel in the Gulf of Carpentaria is growing, and fisheries managers are worried that without more information to manage the fishery sustainably it could experience a dramatic fall in catch. A collaborative research project between CRC Reef, Fisheries Western Australia, Northern Territory Department of Primary Industry Fisheries and Mines, Queensland Department of Primary Industries and Fisheries, and The University of Queensland aims to provide some of this information.

Scientists suspect that there may be several different populations of grey mackerel in northern waters, and that they may even migrate long distances from Queensland to Northern Territory waters. With the help of commercial fishers, who will be providing the researchers with access to their mackerel catch, three research techniques will be trialled to find out if this is the case.

Professor Bob Lester from The University of Queensland will use tiny parasitic worms carried by the fish to find differences between groups. These parasites are harmless to humans as they are not on the parts of the fish that people eat, but the difference in numbers and species of parasites can give us a clue to where the mackerel have lived.

## Fish forensics investigation



By Gavin Begg

Grey mackerel ear-bones, or 'otoliths' could also show where the fish have been living, and what they have been eating. These clues emerge from trace elements in the otoliths, which will be investigated by scientists from Fisheries Western Australia.

Queensland Department of Primary Industries and Fisheries will analyse DNA extracted from the fish to discover whether there are genetically separate populations of grey mackerel in northern Australia.

The project is expected to run for three years and aims to use these techniques to discover where grey mackerel populations live, and if they migrate to different areas. This information will then be used to define appropriate management frameworks for grey mackerel to be used by Queensland and Northern Territory fisheries agencies.



A collaborative research project coordinated by CRC Reef scientists will investigate where grey mackerel live and if they migrate between areas. This information will be essential for appropriate management of this important fish species.

# Coastal Sharks in the Great Barrier Reef World Heritage Area

By Stuart Hyland DPI&F  
Northern Fisheries Centre

The Asian demand for shark fins has seen an increase in commercial catch and effort for shark in recent years. Since 1994, reported annual commercial landings of sharks from the GBR World Heritage Area have ranged from 319 to 1200 tonnes. However, there is very little information about their biology or population dynamics to aid managers in managing this fishery, indicating that a precautionary approach to their management is wise. Researchers from the Department of Primary Industries and Fisheries (DPI&F) are helping to collect urgently needed biological information for stock assessment and sustainable management.

Researchers from DPI&F Northern Fisheries Centre and CRC Reef Research Centre have been investigating inshore shark populations in the northern and far-northern regions of the GBR World Heritage Area using mainly fisheries-independent net surveys supplemented with samples provided by commercial operators and recreational fishers.

They have identified 24 species of shark during investigations of inshore shark populations in the GBR World Heritage Area. Twenty of these species are whaler sharks, two are hammerhead species and two are weasel shark species. An additional six species of Batoids (rays, shovel nose sharks, and wedge or guitar fish) were also found in small numbers. While many shark species appear to utilise intertidal and adjacent shallow waters as well as deeper coastal waters, some species such as the spinner shark (*Carcharhinus brevipinna*), whitecheek shark (*C. dussumieri*), spot-tail shark (*C. sorrah*) and black tip shark (*C. tilstoni*) appear mainly in catches from deeper coastal water. Surveys of sharks in the intertidal and adjacent shallow water habitats appear to be dominated by bull shark (*C. leucas*), blacktip shark (*C. limbatus*), sharpnose shark (*C. taylori*) and scalloped hammerhead (*Sphyrna lewini*).

A major contribution already made by the study has been to provide guidelines for the development of a Long Term Monitoring Program for sharks in Queensland. An overview of available information on sharks in Queensland waters including resource monitoring has recently been produced for use by fisheries managers.



A grey reef shark. Photo: A. Ballagh.

Further work is required to assess the take of sharks in the commercial and recreational sectors of the reef line fishery. As well, determining appropriate monitoring procedures for shark populations in areas closed to fishing presents a special challenge for assessors. Monitoring the effectiveness of initiatives aimed at reducing fishing effects on at-risk or threatened shark species must also be accommodated in long term assessment programs. For more information contact Stuart Hyland at DPI&F Northern Fisheries Centre Stuart.Hyland@dpi.qld.gov.au, PO Box 5396, Cairns 4870, Ph (07) 4035 0100.

## Tagged fish tell tales of survival

An important part of the post release survival of line-caught reef fish project involves collecting information about the long-term survival of released fish from a tag-release study conducted through the well established Suntag Program. This research project, being run by researchers from CRC Reef and DPI&F's Southern Fisheries Centre, is investigating the impacts of line fishing on the survival of some important reef fish species and is funded by the Fisheries Research and Development Corporation. Recreational, charter and commercial fishers involved in this study have been recording information about hook location, degree of barotrauma and release method for fish they have caught and tagged before release.

A huge amount of effort has gone into tagging these reef fish. It is now essential that fishers report information about recaptured tagged fish to gain maximum benefit from this important part of the project. If people have not seen tagged fish before, the tags will be located in the fish's back near the dorsal fin. Sometimes the tags will be covered in algae because of the time at liberty. Important information to record from a tagged fish includes tag number, date of capture, location of capture, fish species and fish length. This information should be reported via a free call to the 1800 077 001 phone number on the tag. To date, we have

recorded 3782 fish tagged for this project and 273 of these have been recaptured.

For more information on this project, and how you can be involved, please contact either: Amos Mapleston phone 07 47815247, e-mail amos.mapleston@jcu.edu.au or Mark McLennan phone 07 3817 9596, e-mail Mark.McLennan@dpi.qld.gov.au.



Fishers record the tag number of a soon-to-be-released red emperor for the post release survival of reef fish project. If you recapture a tagged fish, please record the tag number, date of capture, location of capture, fish species and fish length. This information should be reported via a free call to the 1800 077 001 phone number on the tag.