GROWTH OF RARE QUEENSLAND JEWEL

Queenslanders may be seeing more of one of the state's iconic tropical reef fish with Australia's first ever juvenile coral trout bred and grown by Department of Primary Industries and Fisheries (DPI&F) scientists using aquaculture farming.

DPI&F principal scientist Dr Richard Knuckey, who led the team of researchers, said this breakthrough had the potential to significantly boost the live-fish export industry and follows advances made by the project in the culture of other tropical groupers.

"Given that international demand for most tropical reef species is increasing, the opportunity to reliably produce commercial numbers of reef fish using aquaculture farming is a great boost to Queensland's economic future," Dr Knuckey said.

"Industry partners together with the DPI&F are already growing tens of thousands of gold-spot and flowery grouper to test the new technology and hopefully develop the local market for these quality fish.

Coral trout, flowery grouper and gold-spot grouper are a few of Queensland's more prominent tropical fish and currently form the foundation of a multi-million dollar Queensland export industry into the Hong Kong market.

"Around 60 per cent of the international live reef-fish industry is exported to Hong Kong, worth in excess of AUD350 million, which makes this new technology an even greater asset to Queensland aquaculture farmers," he said.

Specific research into coral trout began 18 months ago, following identification by industry that it would be a priority species. Coral trout production will compliment the current focus of the Tropical Marine Finfish project to support the existing marine prawn and finfish aquaculture industry.

"Queensland is an ideal location for developing a diverse aquaculture industry," Dr Knuckey said.

"DPI&F is working to support this potential by facilitating the uptake of innovation and technology, encouraging investment in the aquaculture sector and minimising the risk of impact on fisheries resources."

For further information contact Richard Knuckey at:

richard.knuckey@dpi.qld.gov.au

Australia's first ever juvenile coral trout are being bred by DPI&F scientists using aquaculture farming.

REVIEW OF THE STATE OF MARINE CAPTURE FISHERIES MANAGEMENT IN THE PACIFIC OCEAN

The "Review of the state of world marine capture fisheries management: Pacific Ocean", published by FAO, provides trends in legal and administrative frameworks, management regimes and status of marine capture fisheries for twenty-nine countries in the Pacific Ocean.

In the chapter concerning "Small island developing states of the Southwest Pacific", it is highlighted that the development of fisheries management plans since 1998, with the support of FFA, has acted as a catalyst. Although the process has not always been smooth, there have been substantial benefits:

- The first experience of some countries at formally establishing fisheries policies and articulating management goals was during the process of formulating these plans.
- The plans have brought a degree of transparency to the fisheries management process,

which was somewhat nebulous in several countries.

- The stable and/or reliable set of policy measures promoted by the plans is crucially important for attracting domestic and foreign investors to the fisheries sector.

- In some countries the first government/sector consultative mechanisms in the fisheries sector are those established by the plans.

However, a table also indicates that no International Plans of Action (IPOAs on capacity management, conservation and management of sharks, IUU, etc.) have yet been implemented in National Plans of Action (NPOAs).

Sources

Review of the state of world marine capture fisheries management: Pacific Ocean.

FAO Fisheries Technical Paper. No. 488/1. Rome, FAO. 2007. 170 p.

http://www.fao.org/docrep/010/a1465e/a1465e00.htm

Chapter on Small island developing states of the Southwest Pacific.

ftp://ftp.fao.org/docrep/fao/010/a1465e/a1465e08.pdf

SELENIUM IN TUNA PROTECTS AGAINST MERCURY

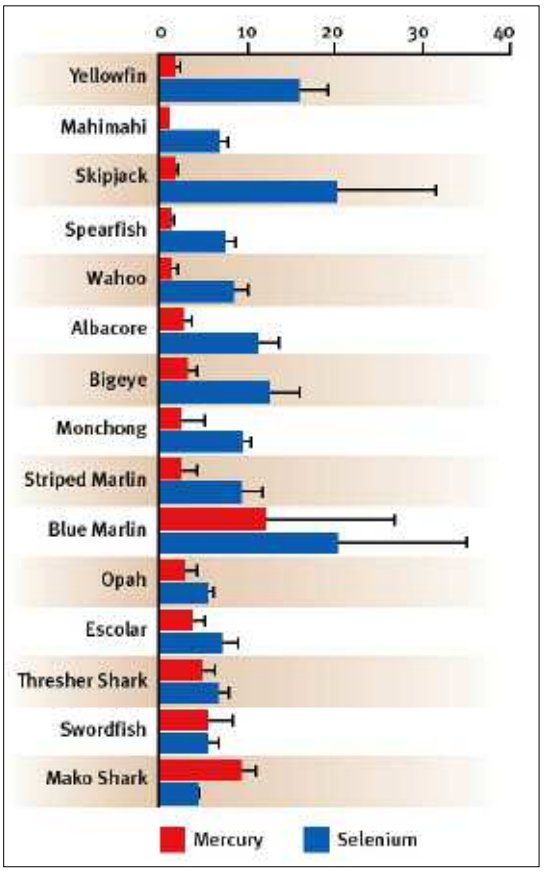
Yellowfin tuna was first shown in 1972 to protect against mercury toxicity, not cause it. Further studies by Dr Howard Ganther and his team at the University of Wisconsin led them to conclude that the rich levels of selenium in tuna were responsible for the protective effect.

Selenium, an essential element in our diet, is vital to the body's antioxidant system and proper immune system function. It has anti-cancer effects and is known to detoxify metals including mercury. It has been shown to protect against mercury in every animal model tested.

If the ratio of selenium to mercury determines if a food is safe, what are the ratios in Hawaii fish? In a Hawaii Seafood Project study supported by NOAA, Dr John Kaneko of PacMar Inc. in Honolulu and Dr Nick Ralston of the Energy and Environmental Research Center in North Dakota analyzed selenium and mercury in 15 pelagic fish species caught near Hawaii.

They found that all of the tuna and billfish species and most other pelagic fish species contained an excess of health promoting selenium over mercury content. Mako shark was the only fish in the study that had more mercury than selenium. For this reason, most Hawaii fish are not only a healthy source of high quality protein and omega-3 fatty acids, they are also excellent sources of selenium. Our favorite fish are more likely to protect against mercury toxicity, than cause it. The good news for Hawaii seafood lovers: the selenium is in every bite!

Source: Pacific Islands Fishery News, Winter 2008
www.wpcouncil.org



Regardless of the amount of mercury, if the selenium level is higher, the fish is safe to eat. In the figure to the right, molar concentrations of mercury and selenium in 15 Hawaii fish species are expressed as means ± standard deviations.

DOES FISHING ON DRIFTING FISH AGGREGATION DEVICES ENDANGER THE SURVIVAL OF TROPICAL TUNA?

Biologists talk of an ecological trap when individuals of a species, behaving in response to misleading signs generally associated with a human activity, colonize a habitat, which might be inappropriate for their survival. An IRD team studying tropical tuna fisheries aimed to establish if the use of drifting fish aggregation devices (FADs), a technique employed increasingly for industrial-scale tuna fishery, could act as just such an ecological trap for these species. Comparison was therefore made of biological indices in two tuna species caught under drifting FADs with those of individuals fished in free-swimming schools.

Examination revealed that the tuna species caught from under the floating objects had less plumpness and were therefore less healthy than those taken from free schools. Results suggested that the tuna, in following the artificial rafts fishermen use, move away from their usual migration routes, which leads them into ecologically less appropriate waters, with scarcer food resources. The scientists recommend that a simple restriction on the use of drifting FADs near the coasts, where tropical tuna juveniles concentrate, would in the long term minimize the danger to the survival of these species.

Fishermen hold empirical knowledge that tuna aggregate under floating objects, such as lengths of old rope, pieces of wood, or even large marine mammals. There is still no full explanation for this aggregation behaviour, but the past 20 years have seen purse seine fishery operators take advantage of the associated concentrations of fish. Fishermen cast off floating rafts equipped with buoys which act as FADs. An enormous purse seine net, deployed in a wide arc on either side of the vessel, encircles the school of tuna that come to shelter under the FAD. The lower part of the net is tightened, enclosing the fish in a hemisphere large enough to entrap a mass of tuna.

A sudden growth in the size of tropical tuna catches taken from under these artificial drifting objects was observed for the early 1990s. This was true especially for juveniles. Between 1996 and 2005 the average annual catch taken on FADs reached 1,115,000 tonnes, nearly a third of the global figure for tuna, all species considered together. In Japan, the fish processing industry furthermore had long reported that the flesh from floating-object associated tuna was less plump than that of specimens caught from free schools.

This prompted an IRD research team to investigate whether or not the practice of drifting FAD fishing could set up an ecological trap for the tropical tuna species. This trap concept is a notion from population biology used to describe situations in which the population falls following a sudden change in its environment, most often linked to human activity. An example is give by marine turtles which, after hatching on beaches, use the sparkle of moonlight on the sea surface to guide themselves back to the ocean. However, high light pollution levels on urbanized coastlines in certain regions disturbs their sense of direction. Young turtles therefore set off on a path that leads them to land, where they die from dehydration.

Over the past ten years, over 30% of world catches of skipjack (*Katsuwonus pelamis*), bigeye (*Thunnus obesus*) and yellowfin (*Thunnus albacares*) tuna, the three tropical tuna species which can be caught at drifting FADs, have been achieved using this fishing method. For the skipjack amounts taken under drifting FADs reached even as high as 72% of all catches. To check if the large-scale deployment of drifting FADs could present an ecological trap for these species, a range of biological (fish plumpness, growth rate, stomach fullness) and ecological (migration pattern and distance) indices were determined on yellowfin and skipjack captured under FADs in the Atlantic and Indian Oceans.

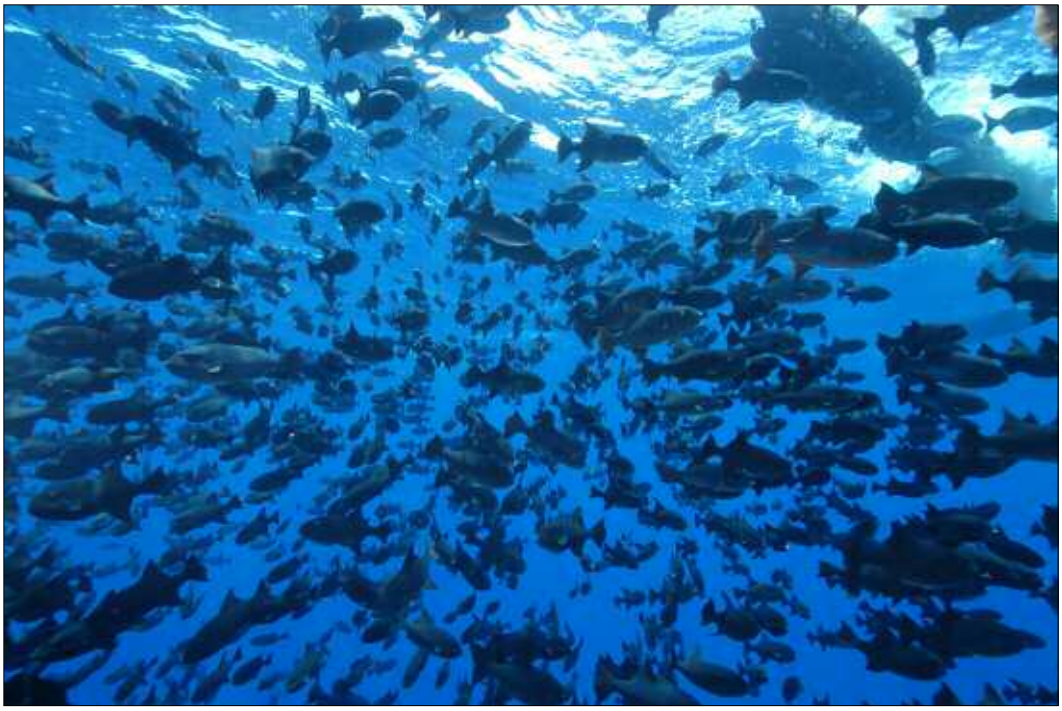
Comparison was then made with data gathered from free-school caught individuals of these same species. A salient finding was that 74% of drifting FAD-associated skipjack had empty stomachs at the moment of capture compared with only 13% for those fished from free schools. Figures of the same order of magnitude were obtained for yellowfin, with

Katsuwonus pelamis

proportions respectively reaching 49% caught on drifting FADs and 7% from free schools. The survey indicated that the tuna caught under the FADs fed less well than those fished from free schools. Moreover, the fact that for the same weight the FAD associated specimens caught showed lower plumpness than the free-school ones could reflect a deficiency in energy-reserve accumulation in those that concentrated around the floating devices. The research team also sought to find out if the large-scale deployment of drifting FADs could affect the migration patterns of these far-travelling fish species.

Tagging surveys allowed comparison of the nature of migrations accomplished by fish moving with the drift of FADs with that of non-FAD-associated individuals. The migration directions and displacement rates in terms of daily distances travelled were indeed affected by the presence of artificial floating objects. Drifting FADs therefore appeared to act as super-stimuli, like strong magnets exerting a binding attraction that leads the tuna towards ecologically inappropriate waters with scarcer food supplies. This survey brought support for a body of reasonable assumptions regarding the tuna behaviour. However, it did not provide certain confirmation of drifting FADs' negative impact on the entire life cycle of these tuna species and therefore of their possible role as a true ecological trap. Nevertheless, the biological effects observed indicated that it would be more reasonable to preclude deployment of drifting FADs near coasts where tuna juveniles aggregate. These young fish represent the future of the whole stock and such a restriction would be a way of avoiding their being led astray, away from the zones which are ecologically most favourable to them.

Source : IRD, Scientific News, Sheet 291, March 2008
www.ird.fr



Fish schools aggregate naturally under floating objects
© IRD - Ifremer/Fadio