

F I S H E R I E S

EASTERN TORRES

STRAIT FISHING



By Bruce Mapstone

ELF research

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Fishing in the Torres Strait has been a vital aspect of islander life for generations. Commercial line fishing for reef fish has played a relatively small part in islander fisheries but has grown in importance with both islander and non-islander fishers over recent years. Commercial interest in line fishing in the Torres Strait has brought to light a number of concerns regarding sustainability of fish stocks, and conflict between stakeholder groups in the fishery has been reported recently.

These concerns prompted the Australian Fisheries Management Authority (AFMA) to focus attention on this poorly researched area. AFMA contracted the Effects of Line Fishing (ELF) team to review information about the reef line fishery in the Eastern Torres Strait (ETS) as the first step to better understanding the line fishery. This information will be important to managers and stakeholders in managing the fishery in the future.

The review was primarily a scoping study to document what is currently known about the fishery, what more can be learned from data available now and what further information may be required by stakeholders. The major outcomes from this research project are presented here, but a full report will be available in the near future.

Current Information

The ELF team identified three main sources of information on the reef line fishery in the Torres Strait that may be available for further analysis:

- A) Catch and effort information from the commercial fishery;
- B) Previous information;
- C) Personal records from people who have lived and worked in the Torres Strait over many years.

A) Catch and Effort Information

Since 1988 the catch and number of days fished by non-islander commercial reef line fishers in the Torres Strait has been reported to the Queensland Fisheries Service (QFS) or AFMA. In some cases, private records of individual skippers who have been active in the ETS may also have data on catch and/or effort in the commercial reef line fishery in the

area. Despite some limitations, this information probably represents one of the best sources of data for assessment of the fishery.

Islander commercial fishing information may also be available from records kept by commercial freezer facilities at a number of islands throughout the ETS. Records of purchases of fish from fishers and sales of fish to wholesalers have been kept by operators or island councils for at least some of the time these freezers have operated, since around the mid 1990's. These records are valuable in providing information on commercial harvest of reef fish by islander people.

Recreational fishing in the area is probably only at very low levels due to its remote location. However, an ANSA recreational fishing club has operated around Thursday Island for around three years and records of competitions could be a valuable inclusion in the knowledge of the ETS reef line fishery.

B) Previous Research

Information on subsistence fishing in the ETS will mainly be available from islanders, although some records have been recorded by CSI RO during the early 1990's. There was also some biological research in the 1980's on some reef fish species in the ETS including coral trout, red emperor and spangled emperor.

C) Personal Information

Discussion with islanders undoubtedly will provide important historical information about the fishery, but will require specialist expertise to gather and analyse the data. Already we have learnt from islanders that many of the species fished commercially were not important traditionally as food for islanders.

Recommended Future Research

Species such as barramundi cod and passionfruit(or leopard) coral trout that are reasonably abundant in the ETS, but are not often caught on the East Coast, could prove to be extremely important in the Torres Strait. The relative rarity of passionfruit coral trout south of Torres Strait means the Torres Strait population take on heightened



LIVE FISH RESEARCH

Keeping fish alive for the live fish export trade substantially increases profits for Queensland line fishers, providing considerable incentive to enter the lucrative industry. In light of documented fish stock collapses linked to live fishing in overseas countries, the ELF team, with support from the Fisheries Research and Development Corporation, was prompted to investigate this new industry. A synopsis of the main findings from this research are presented here.

Catch from the GBR commercial reef line fishery was traditionally sold as frozen, chilled or filleted fish on the domestic market. Then, in 1993 the first live fish for food was exported from Australia and the live fish industry was born. As early as 1995 the rise of the live fish industry saw a number of concerns voiced by recreational fishers and conservationists, as well as some commercial fishers related to the potential for increases in commercial fishing effort and over-fishing with detrimental effects on the fishery and GBR ecosystem. Concern was also raised that live fishing effort would be concentrated on reefs close to large ports with international airports required to freight live product, resulting in potential localised depletion of fish stocks. At the time, there was no information upon which to refute or support the claims of these concerned groups, or manage the industry appropriately if required. The controversy prompted researchers from the ELF team to investigate this new industry in Australia, as well as the extent to which commercial line fishers targeted spawning aggregations of common coral trout. The aim of the research was to provide managers and stakeholders with information on how the change in fishing practice (from selling frozen to live fish) impacted on catch rates, effort and fishing behaviour in the reef line fishery in Queensland. The research was done over two years (1996-1998) in the early development of the industry.

Research results clearly indicated that fishing effort in the Queensland commercial reef line fishery had increased in recent years from around 16,800 primary vessel days in 1989 to over 27,000 days in 1998. Within this total effort, effort specifically targeting live fish had also increased from less than 100 days in 1993 to nearly 7,400 days in 1999. The extent to which the live fish industry contributed to the overall effort increase is unclear, partly due to inconsistent reporting of live fishing in the early days of the industry and because a number of other management adjustments in related fisheries may have led to increased participation in the reef line fishery. Nevertheless, it is expected that the high prices paid for live fish (live fish sell for between 40-300% more than the same fish as filleted or whole dead product) has provided at least part of the incentive for real increases in total commercial effort in the fishery since 1994, whether through increased effort by already active fishers or the activation of inactive licences.

Research results also indicated that operations predominantly targeting live fish product tended to run shorter trips and fished on reefs closer to major ports than did boats that were killing their catch. This was most likely due to the fact that poorly refined handling and holding techniques meant fishing vessels were unable to hold live fish on board for more than 5 to 6 days, especially in the early days of the live fish industry. In addition, live boats have considerably lower holding capacities than similar operations keeping frozen product. Fishing inshore reefs has the potential for conflict between commercial and recreational fishers who also prefer these inshore reefs. This problem has been

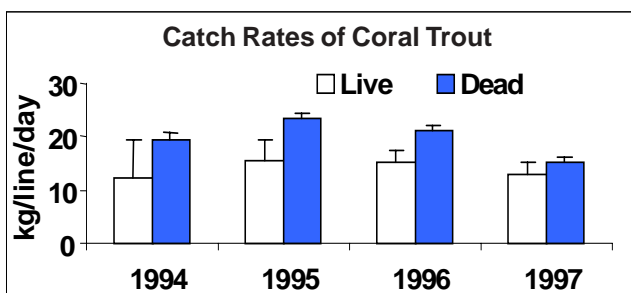
somewhat alleviated in recent years because more refined handling techniques have resulted in live fishing being distributed more widely over much of the GBR.

Catch rates of most species of reef fish tended to be less when fish were kept alive for market than when they were killed. This was most conspicuous for by-product species, such as red throat emperor but was also true for coral trout (the main target species for the live fish industry) at times of maximum catch rates. Fishers selling live fish tended to be more selective about where they fished in order to maximise their catches of the high price fish, especially coral trout, and tended to avoid less valuable species that could not be sold live. The size of coral trout taken also varied between live and dead fishing practices. However, the results did not support the notion that live operations harvested significantly more small coral trout than did dead operations, despite small legal sized coral trout (38 - 45 cm total length) being preferred for the live market and fetching higher prices than larger fish. Relatively higher rates of capture and subsequent release of coral trout under the minimum size limit by live fishers may be a concern if post-release mortality is significant.

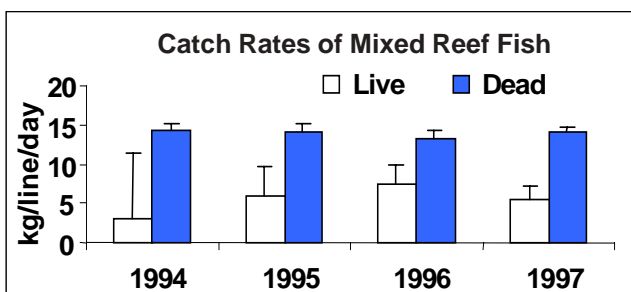
The research also found little evidence for the consistent targeting of spawning aggregations of common coral trout by commercial fishers. This research indicated that either deliberate targeting of common coral trout spawning aggregations was a relatively minor factor in the success of GBR fishers or that spawning aggregations could not be found consistently. Hence, it appears unlikely that common coral trout is at great risk from targeting of spawning aggregations by Queensland commercial fishers, although other species that are believed to form larger, more predictable aggregations may be more vulnerable to harvest when spawning.

The potential exists on the GBR for the trade in live reef fish to be a success story, largely because of a strong regulatory environment, the absence of destructive fishing practices, and a range of management strategies that protect spawning stocks. The trade in live fish on the GBR has not resulted in increased per-capita catch rates or fishing practices that are intrinsically worse than those which have been in place in the fishery for decades. Indeed, given the significantly reduced catches of by-product species, no increase in catch rates

of live target species, and added value to the industry, the transition from frozen to live markets for GBR reef fish might be seen as positive development in both economic and ecological terms. On the other hand, the increased prices paid for live fish are likely to have provided at least part of the incentive for real increases in effort in the fishery since 1994. Any potential benefits of the live fish industry may be offset by overall increases in effort. Prudent management action is advisable, therefore, to control effort adequately and avoid real or perceived stock depletions and economic hardship in the fishery.



Average catch rates of coral trout (above) and mixed reef fish (below). There are no significant differences in the catch rates of coral trout between live and dead fishers, but, dead fishers took more types of other fish, especially in later years of the study.



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PROJECT UPDATE

a word from the project leader



Bruce Mapstone

After a short break since our last newsletter this issue is jam packed with information. The break has been due to our liaison officer and newsletter editor, Annabel Jones, being away on maternity leave, but with her return we are back on track with the F&F Newsletter. This issue is a big one, with snippets of information from final reports of three different research projects.

Firstly we present some of the information that has come out of the scoping study we did on the Eastern Torres Strait reef line fishery. This very beautiful area is in need of research information to ensure that the fishery in that area remains sustainable for the long term.

We also present a synopsis of the large amount of information we collected on the live reef fish industry that has taken off in Queensland in recent years. We also present some more information from John Kung's PhD project on the aquarium fish fishery. John has moved on to a job as policy officer with the Queensland Fisheries Service.

The first half of 2002 has once again seen some new faces to the F&F Team: Modeller Ian Montgomery, Research Assistant Annelise Wiebkin and Administration officer, Iesha Stewart. We will introduce these people to you in more detail in the next newsletter.

research update

By Andrew Tobin & Amos Mapleston



The Spanish Mackerel Research Project, funded by the Fisheries Research and Development Corporation and CRC Reef has progressed rapidly since beginning last year. To date, project staff have been kept busy processing in excess of 600 spanish mackerel samples collected and supplied by commercial, recreational and charter fishers. Most of these samples have been collected from the Townsville and South-East Queensland regions. Many thanks go to all fishers who have provided these valuable samples to us.

The largest mackerel collected to date measured 1.6m (fork length) and weighed an impressive 38 kgs (whole weight). At the other end of the scale, staff have collected some young-of-the-year mackerel measuring around 40-50 cm (fork length) from as far south as Noosa. Young-of-the-year mackerel are those that have not yet reached 1 year of age, spawned during the spring spawning season of 2001.

Some preliminary ageing conducted so far shows the oldest fish estimated at 16 years of age. Due to some complexities involved with ageing fast growing species like mackerel, a suitable ageing protocol is being designed in consultation with expert mackerel biologists from the Northern Territory and Western Australia. With a little more work, we will be able to accurately determine the ages of mackerel with consistency and confidence. Look forward to more on ages (amongst other things) of spanish mackerel in future newsletters!

In the coming months, project staff will be focusing greater attention on collecting samples from fishers within the Rockhampton and Mackay regions. The mackerel seasons in both these areas are fast approaching and we hope for all fishers it will be a good one. Fishers who would like more information on the project, particularly if they would like to help out by collecting mackerel frames, can contact Andrew Tobin on (07) 4781 5114 (andrew.tobin@jcu.edu.au).



SPANISH MACKEREL



Otoliths are removed from the heads of collected spanish mackerel frames allowing scientists to determine the fishes age.

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significance for improving knowledge of this species on the GBR. Other biological research that the ELF team recommends for the ETS includes investigation of the biology of other important commercial fish species such as common coral trout, bar-cheek (island) coral trout and small cods to verify if information based on East Coast samples of these fish can be applied to the ETS. Key information will include how long the fish live and how fast they grow, age and size at which they reach sexual maturity, if they change sex over their lifetime and if they display any spawning aggregation behaviour. This information will be essential for future management decisions on the ETS fishery for these species.

Future Management Arrangements

The ELF team was also asked to review current management arrangements for the line fishery in the ETS. Current management is based on former arrangements that applied when the Torres Strait was managed as part of the Queensland East Coast fishery, though since 1999 the line fishery has been managed as a separate Torres Strait fishery. Any future changes should build on those already existing arrangements, give consideration to the needs of the Torres Strait Island people and maintain consistency with existing arrangements in the East Coast/GBR line fishery where possible. While commercial fishing effort in the ETS was generally found to be low, discussions with ETS line fishery stakeholders highlighted an urgent need to carefully consider the amount of latent effort that exists in the fishery, in both the non-islander and islander commercial fisheries.

Conclusion

The reef line fishery in the Torres Strait has much potential for a profitable and sustainable future, both for islanders and non-islanders. A key issue to be tackled, however, will be to control commercial effort (both islander and non-islander) to ensure continued viability of the fishery. Future research as suggested by the ELF review will aid in the choice of appropriate management strategies for the Torres Strait reef line fishery.



AQUARIUM FISH COLLECTING

F&F scientist studies economics to help out with management

A few issues back, F&F Researcher John Kung presented socio-economic profiles of people involved in the aquarium fish collecting fishery in Queensland. In this issue, John explains how he has now used these profiles to examine the impact of different management policies on the viability of fishing operations in the industry. This information will give managers and stakeholders a much better guide to what management strategies will be most efficient for the fishery.



John Kung

New management regulations can affect the profitability of fishing businesses and subsequently the fishing behaviour of operators in the industry. If these impacts can be predicted, policies can be selected that best maximise support for the changes and fit with current practices while still satisfying the objectives they were set to meet. Support will ensure maximum efficiency of new management regimes as compliance rates will be high, significantly reducing the costs of enforcement.

John used a common economic modelling technique called comparative statistics to predict impacts of a variety of management strategies including effort restrictions, catch quotas on heavily targeted species, and area closures. This allowed him to relate various levels of fishing effort to a corresponding value of revenue and costs (see figure below). From this analysis the level of effort providing maximum profits for a fishing operation can be calculated. By then analysing changes to revenue or costs due to changes in management regulations, the changes in optimum effort and profit levels can be tracked, providing a guide to how well the regulation will be accepted by fishers in the industry.



Several important implications for management have arisen from this research. First, from the accompanying figure, it is evident that for fishers to achieve maximum economic benefits, fishers need to operate at around 400 diver days/year. John's research has shown that the majority of fishers operate at a much lower level of effort of around 191 days/year, hence the widely held perception of this fishery as a cottage industry. Any moves to reduce effort further for these small operators may well see their business run at a loss, and not be well supported by a majority of the operators. Also, the management objectives for the fishery need to be stated clearly to reduce the risk of

regulations trying to meet conflicting objectives. For example, if the objective of a management regime was to optimise economic benefit from the fishery, effort could be allowed to increase from current levels. However, this could conflict with the objective to protect the sustainability of the fishery. Similarly, imposing a catch quota on a heavily targeted species may achieve conservation for this species, but also likely redirection of fishing effort to other species could place additional pressure on other targeted species and therefore conflict with the objective of maintaining biodiversity. Clear objectives that are acceptable to all stakeholders will help ensure any new regulations instigated to meet these objectives will be readily accepted by the industry.

John's research has identified that a management strategy based on area closures would be the most efficient strategy for the aquarium fish collecting industry given the current state of our knowledge of the fishery. In addition to the biological benefits for targeted species, his research has shown that area closures would have the least economic impact on harvesting operations and already have the support of fishers. Hence compliance would be high, reducing the need for high levels of enforcement in the industry.

These research results have now formed the basis for John's PhD thesis and should provide managers and stakeholder groups in the aquarium fish collecting industry with better information for sustainable management of their fishery. For more information or if you have any questions on this important research, please contact John on (07) 322 51851 or john.kung@dpi.qld.gov.au.



Economic analysis of aquarium fish collecting operations indicate that maximum economic revenue was reported from larger operations that recorded about 400 diver days/year. However, many operations in the industry fish much less than this. Future management decisions could be made simpler if economic information such as this is taken into consideration.

