Final Task Report

Task Number: T1.4
Title: Sustainability Assessment of the Torres Strait Sea Cucumber Fishery
Start Date: 01-Jul-03
End Date: 30-Jun-06

Task Contacts

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Objectives

1. Conduct surveys of the holothurian population and their habitats in Torres Strait.

2. Provide information on stock status of all commercial species, population dynamics and recovery of depleted species, fisheries ecology and possible environmental effects of fishing.


Need (from proposal)

The (modern) sea cucumber fishery in Torres Strait provides a substantial source of income and employment for Islander communities and downstream industries, with catches peaking at over 1400 t (wet weight) in 1995. Sandfish (Holothuria scabra) on Warrior Reef provided the bulk of the early catches and most of this population was fished out over a three-year period from 1994 to 1996. A survey in January 1998 found that the sandfish population was severely depleted and it was closed. Subsequent surveys in January 2000 and October 2002 found that the sandfish population had recovered somewhat, but it was still considered heavily depleted. The surveys also indicated a strong stock recruitment relationship with a two-year cycle. The last survey also indicated the presence of a strong breeding yearclass for the first time since surveys began in 1995. It is important for characterizing the life history of this species that the recruitment from this yearclass be surveyed in early 2004. The strength of this recruitment will determine the likely management and research strategy, with a strong recruitment resulting in a likely resumption of fishing in late 2007, after a survey in early 2007.

After the sandfish closure in 1998, the fishery targeted several species in east Torres Strait, in particular black and white teatfish (H whitmeai and H. nobilis) and surf redfish (Actinopyga mauritiana). However, a survey in March 2002 found that black teatfish and surf redfish were overexploited, and they were also closed to fishing in January 2003. Other targeted species, such as white teatfish and prickly redfish (Thelenota ananus) were not considered overexploited, but it was recommended that their catches be restricted and the populations closely monitored. Several other species, mostly of low value but often having a large standing stock, were considered as near virgin biomass levels. TACs for each species were formulated from simple stock assessment models and conservative decision rules. However, research is required to track the performance of the new management strategies. It is planned to resurvey this population in early 2005 (rather than 2004 and 2006 as per the original proposal). The 2005 survey would be three years after the last survey, and two years after the closure of the black teat and surf redfish. This resampling time period is the best compromise between observing some recruitment/recovery of depleted species and monitoring the status of currently exploited species. The results of the survey will be used to formulate management strategies and research objectives for the following three years.

The population dynamics and fishery ecology of holothurians is poorly understood. The recovery of depleted populations has proven to be slow and sporadic, and the dynamics of exploited populations is poorly understood and poorly modelled. Fundamental to this is research on recruitment processes and the stock-recruitment relationship. Fishery dependant data (logbooks) for the fishery have proven
extremely difficult to obtain and are unreliable, with stock surveys the only viable method for determining the size and status of fished populations, and for providing data on fundamental fishery parameters.

These surveys will provide data on the population dynamics of exploited populations and the recovery of depleted species. The surveys, by continuing a time series of surveys, will also provide information on the recruitment dynamics and stock/recruitment relationship. Data to refine estimates of size at maturity will also be gathered. This information will be used to formulate sustainable management strategies for fished species during the project. By the end of the project, we will be able to formulate a suitable suite of future research priorities and monitoring regimes, including a timetable for periodic surveys and fishery dependant data collection.

While there has been some published work on the ecological role of these important benthic organisms, the environmental effects of holothurian fishing are also unknown. We will also gather information on gross environmental parameters of the fishery habitat, not only for assessing the effects of fishing, but for mapping and monitoring the environment in general. For example, Warrior Reef is the largest single reef ecosystem in Torres Strait. It has a high cover of several seagrass species, and is a known nursery area for prawns and an important dugong and turtle feeding area. It is a major rock lobster and sea cucumber fishing area. It is significantly influenced by the Fly River plume and is adjacent to a busy shipping channel and the Torres Strait prawning grounds. Previous surveys have found some changes in the fishery habitat on Warrior Reef that may be related to the depletion of sandfish.

Significance (from proposal)

This research is essential for the sustainable fishing of holothurians in Torres Strait, not only to maximise economic returns to Torres Strait Islanders and downstream industries, but also for mitigating ecological impacts of the removal of this important animal group. Management agencies (AFMA, QFS) and Islander bodies in Torres Strait have recognised an urgent need for research on this fishery to formulate sustainable management strategies to ensure the long-term viability of the fishery. There will be a strong desire by Torres Strait Islanders and their representative bodies, such as the TSRA, for research to assess the fishery status of closed and open species on a continuing basis.

While it is generally recognised that the sandfish fishery in Torres Strait is a shared stock with PNG, the relationship between the two fisheries is yet to be fully determined. This research has direct relevance to PNG and the sustainable use of their resource, and of the stock as a whole. PNG and Australian researchers have carried out joint surveys of sea cucumber in Torres Strait in the past and there is a possibility to formulate reciprocal management strategies between the two countries for the sandfish fishery.

The outputs from this project will have relevance to the management of holothurian fisheries in other areas of Australia (the same species are currently considered overexploited on the GBR and Coral Sea) and in the South Pacific. The environmental data collected during the surveys will be used to assess the effects of fishing, which has been identified as an important area for research by Environment Australia. It will also have relevance to the general environmental management of Torres Strait. The collection of this data has resulted in linkages with two other CRC projects, the Distribution and Abundance of Seagrass, and Habitats Near Shipping Lanes projects, both run by QDPI.

Research Summary

The proposed surveys of sandfish on Warrior Reef (January 2004) and other commercial species in the east Torres Strait fishery (January 2005) were completed, as planned. The sandfish survey was primarily focused on the recovery of this species after it was heavily depleted during the mid 1990s, and the east Torres Strait survey was designed to assess the status of all other commercial species, but with particular interest in the two currently closed species, black teatfish and surf redfish. The surveys successfully tracked changes in the relative abundance of important commercial species with sufficient precision to allow for an assessment of current stock status. The results of both surveys indicate a slow recovery for depleted species, and we recommend that they remain closed to fishing. Other fished species are showing some signs of depletion, and we recommend that the recently formulated individual TACs be enforced and monitored.

The results of the surveys, and recommendations for sustainable management strategies, were
reported to AFMA for inclusion in the TS MAC meetings in 2004 and 2006. A comprehensive report from the project will be completed by August 2006.

During the surveys, we also collected more information on the fishery ecology of holothurians, and collected habitat data for comparison with previous years. The habitat data showed that important ecosystem components such as seagrass on Warrior Reef and live coral cover in east Torres Strait reefs were stable in comparison with historical data.

CSIRO staff also participated in a series of highly successful sea cucumber fishery workshops in January 2005 (CRC project number T1.13.). These workshops were organized to disseminate information about the surveys, to explain the results of previous surveys and the scientific advice relevant to the fishery, and to get feedback from the islanders about the survey technique and the state of the resources.

Task Associate Comment

No comment available.

Outcomes/Achievements against each Specific Objective

1: Conduct surveys of the holothurian population and their habitats in Torres Strait.

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The surveys successfully tracked changes in the relative abundance of important commercial species with sufficient precision to allow for an assessment of current stock status. The results of both surveys indicate a slow recovery for depleted species, sandfish, black teatfish and surf redfish.

During the surveys, we also collected more information on the fishery ecology of holothurians, and collected habitat data for comparison with previous years. The habitat data showed that important ecosystem components such as seagrass on Warrior Reef and live coral cover in east Torres Strait reefs were stable in comparison with historical data.

3: Recommend management strategies for sustainable harvest of sea cucumber in Torres Strait, and optimal sampling strategies for future monitoring.

The results of the project were used to formulate management advice that was conveyed to AFMA for discussion at the TS MAC meetings in 2004 and 2006. This resulted in changes to the Sea cucumber management, including the addition of individual species TACs.

The outputs of the research have also been used as the basis for explaining current management arrangements and future management challenges during the recent sea cucumber fishery workshops in January 2005 (CRC project number T1.13.).

Utilisation and Application of the Research, Commercialisation

The results of the sandfish survey in early 2004 were used by AFMA and the TS MAC to decide on the future management arrangements for the TS sandfish fishery. The provision of accessible and "plain English" summaries has assisted in this regard.

Staff from CSIRO also participated in workshops throughout East Torres Strait in January 2005 to explain the research behind the management actions w.r.t. the beche-de-mer fishery in Torres Strait. We presented extensive visual slide shows of our research and the strategies for sustainable exploitation, and also contributed to material handed out at the workshops.

Publications
Other Outputs

A final report from the project will be forwarded to AFMA by August 2006. The report will include an assessment of the stock recovery of depleted species, management recommendations for fishery and suggestions for future research.

1st July 2004 - 30th June 2005

Workshops, Industry Information Sessions for Communications of Research findings:
Participated in Torres Strait beche-de-mer (sea cucumber) sustainability workshop 2005 - a collaborative approach. (CRC project number T1.13.). These workshops were held on three islands in east Torres Strait before the east Torres Strait survey in January 2005.

Postgraduate Students

Svea Mara Wolkenhauer, PhD, C.R. Pitcher and T. Skewes, Impact of removal. A case study on the ecological role of the commercially important sea cucumber Holothuria scabra (Holothuroidea: Echinodermata) in Moreton Bay, southern Queensland, Australia. 2002 to June 2007; CSIRO Marine Research has hosted Mara for the duration of her PhD and provided logistical, and financial support for her PhD.

Grants & Awards

None reported.