TORRES STRAIT PRAWN MANAGEMENT ADVISORY COMMITTEE	Meeting No. 6 10-11 July, 2008
REPORTS **Torres Strait Prawn Research Program - Progress report**	Agenda Item No. 3.1 **FOR NOTING**

RECOMMENDATION

3.1.1   The TSPMAC **NOTES** the progress report presented for the Torres Strait Prawn Fishery Research Program.

BACKGROUND

In the 2006-07 federal budget, the Australian Government announced $1 million of special research funding to conduct research into the TSPF that would assess and further develop the spatial management arrangements proposed at the July 2005 Alternative Management Workshop. Queensland DPI&F successfully tendered to conduct the research program.

DISCUSSION

A major component of the program is the fishery independent research trawl surveys that are being conducted during May, July, September and November of 2007 and 2008. The surveys include the PNG area of the fishery and are providing species, gender, size and spawning information on the distribution of the commercial prawn stocks in the TSPF. This information is being used in the development of fishery simulation models that can be used to assess and refine to spatial management arrangements for the fishery.

Trawl surveys were conducted during May, July, September and November of 2007 using the QDPI&F research trawler, the "*Gwendoline May*". There are 115 sampling sites randomly spread through the main trawl grounds, in the West of Warrior Reef closure area and within Papua New Guinea waters of the Torres Strait Protected Zone. A 0.5 nautical mile trawl is conducted at each site using four x four-fathom commercial mesh tiger prawn nets. The species, gender, carapace length and spawning condition of all commercial prawn from each net are recorded.

The data from the 2007 surveys has been plotted using Geographic Information Software (ArcView). Examination of these plots indicates that:
- The overall catch rates and species composition of prawns in the PNG area of the TSPZ are similar to that for the Australian area.
- The species composition and prawn sizes varied markedly between sites within both the Australian and PNG jurisdictions. Small numbers of Kuruma prawn (*Penaeus japonicus*) were obtained at the sites near Bramble Cay and along the northern eastern edge of the TSPZ.
- The catch rates (CPUE) for both tiger prawns and endeavour prawns was highest in May and lowest in November indicating higher stock abundances towards the earlier part of the fishing season.
- The percentage of ripe female tiger prawns was highest in September/November and lowest in May. The majority of sites with higher percentages of ripe female

tiger prawns were located in deeper waters to the east of Yorke Island and between Stephens Island and Bramble Cay.

- There are high catch rates of endeavour prawns along the East of Warrior closure line during September.

The survey data has been extrapolated to generate models of prawn distribution by abundance, size and spawning condition. During 2008, QDPI&F will develop a spatial simulation model that uses data from the 2007 surveys and logbook records to simulate spatial closures aimed at protecting spawning tiger prawns. This model will be used to assess and refine the spatial management arrangements proposed at the July 2005 Alternative Management Workshop.

The results of surveys have been presented to:
- The October 2007 Australia / PNG Bilateral Fisheries Talks in Port Moresby, Papua New Guinea.
- The December 2007 TSFMAC meeting.
- The February 2008 Harvest Strategy Port meetings.
- The April 2008 Project Steering Committee meeting.

In September 2007, Mai Tanimoto was appointed to the Fisheries Modeller position on the project and commenced work on an endeavour prawn stock assessment. The available biological data for endeavour prawns was reviewed and used to provide the biological parameter estimates required for the assessment model. An endeavour prawn assessment model was then developed that is based on the current version of the tiger assessment model. The total monthly endeavour prawn catch and standardised catch rate data for the years 1980 to 2006 were used in this model to conduct a preliminary endeavour prawn assessment. This data was obtained from unload records for the years 1978-1988, voluntary logbook records for the years 1980-1988 and the compulsory logbook records for the years 1989-2006.

The preliminary endeavour prawn assessment results indicate that the catch rate data being used is not a good index of the endeavour prawn biomass on the sea bed. This is probably a result of endeavour prawns being a secondary target species. The estimates of the spawner-recruitment relationship parameters have large error ranges which reduce the reliability of the estimate of Maximum Sustainable Yield (MSY). Although the estimate of MSY is similar to the average endeavour prawn catch during the 1990's the current problems with the assessment make it unreliable.

During the February 2008 Harvest Strategy port meetings we sought advice from industry as to what percentage of endeavour prawn catch for a nights fishing would be representative of targeted endeavour prawn fishing and vice versa. Industry indicated that they targeted the mix of species that would provide the highest return rather than targeting a specific species. Historical product price data was obtained from ABARE and used to split the daily fishing effort for tiger and endeavour species. The results of this analysis however failed to reduce the uncertainty surrounding the estimate of MSY so other strategies are being investigated.

FINANCIAL IMPLICATIONS
No new financial implications.

RECOMMENDATIONS

3.2.1   The TSPMAC **NOTES** the completion of the CSIRO seabed mapping project "*Mapping and characterisation of key biotic and physical attributes of the Torres Strait ecosystem*".

3.2.2   The TSPMAC **DISCUSSES** the suggested uses of the outputs resulting from the project.

BACKGROUND

From 2003 to 2006, the Torres Strait Mapping and Characterisation Project mapped seabed habitats and their associated biodiversity across the length and breadth of the Torres Strait Protected Zone (TSPZ). The aim was to provide information that would help managers with regional planning and to ensure that fisheries are ecologically sustainable, in line with environmental protection legislation (*Environment Protection and Biodiversity Conservation Act 1999*) and the *Torres Strait Fisheries Act (1984).*

Comprehensive information on the biodiversity of the seabed was acquired by visiting almost 200 sites, representing a wide range of known environments. Data was collected during two 1-month-long voyages on the QDPI&F vessel *Gwendoline May* and JCU vessel *James Kirby,* during November/December 2003 and March/April 2005 respectively. Several types of devices were deployed such as: towed video and digital cameras, an epibenthic sled and a research trawl to collect samples for more detailed data about plants, invertebrates and fishes on the seabed.

This project was completed in mid-2007 and the final report, which includes maps of seabed habitats and assemblages and comprehensive quantitative risk assessment for bycatch can be obtained from:
        ftp://ftp.csiro.au/cmar_cv/RolandPitcher/

A summary of the report is provided at attachment 3.2A and a PowerPoint presentation will be made at the meeting.

DISCUSSION

The information obtained from this project can be utilised by the PZJA management agencies in a number of contexts, including:

- estimates of the level of impact of past trawling on the TSPZ environment,
- utilizing the ecological risk/sustainability indicators and biological reference points developed during the course of the project in the Environmental Risk Assessment for the Torres Strait Prawn fishery.

PZJA agencies should also consider the management response required to facilitate meeting environmental sustainability objectives of the *Torres Strait Fisheries Act*

(1984). Further, agencies should also note the capability to evaluate future alternative management strategies, in a Management Strategy Evaluation context, needed to ensure management is in line with environmental sustainability legislation. Other potential uses of the data are detailed in the full report which can be obtained from the aforementioned link.

FINANCIAL IMPLICATIONS
Nil.

NON-TECHNICAL SUMMARY

PROJECT:

Mapping and Characterisation of Key Biotic & Physical Attributes of the Torres Strait Ecosystem, CRC-TS Task Number T2.1

PRINCIPAL INVESTIGATORS:

Dr C. Roland Pitcher and Mick Haywood, CSIRO

Dr John Hooper, QM

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OBJECTIVES:

To deliver comprehensive baseline maps and other information needed for managing for sustainability of the TSPZ and planning for conservation of biodiversity by AFMA and other Regional, State and Commonwealth Government Agencies — for the majority of the TSPZ region, incorporating the trawl fishery enabling its ecological assessment. Specific objectives included:

- Develop comprehensive inventories and maps of the distribution and abundance of physical and biological seabed habitats, seagrasses and benthos assemblages as a benchmark of their current status, and provide these to Regional Managers for future planning.

- Analyse bio-physical relationships for the sampled area and assess the utility of environmental correlates for spatial prediction of (as surrogates for) assemblages of biodiversity.

- Develop attributes (eg. biomass, species richness, rarity, uniqueness, condition, potential vulnerability to impact etc.) for seabed habitats and assemblages for the sampled area.

- Develop maps of the distribution of fauna vulnerable to trawling and provide these to industry, Islanders and managers to facilitate development of fishery management strategies that reduce impacts

- Develop ecological risk indicators for species caught in trawl bycatch, by estimating the proportion of these populations exposed to and caught by trawling in relation to their life-history characteristics, thus contributing to and facilitating ecosystem-based management of the fishery

- Contribute to quantifying the large-scale impacts of trawling on benthos and bycatch species, in terms of their abundance across the range of trawl intensities.

- Provide input to a biological model of seabed benthos dynamics, to develop status and trend indicators for benthos and evaluate the environmental performance of different options for managing the fishery, potentially including effort, time/space closures.

- Recommendations for monitoring trends in the status of key seabed habitats and assemblages

NON-TECHNICAL SUMMARY:

The Torres Strait Protected Zone (TSPZ) is a unique area of ecological and cultural significance, shared under an international treaty with Papua New Guinea. As a joint management area, activities such as commercial fishing and traditional hunting occur with primary natural resource conservation goals. Managers need information on habitats and biodiversity distribution and risks to ensure these activities are conducted sustainably. However, while broad seabed habitat information was available for much of the TSPZ from past projects, there were significant gaps and very limited species level data. From 2003 to 2006, the Torres Strait Mapping and Characterisation Project has mapped habitats and their associated biodiversity across the length and breadth of the Protected Zone to provide information that will help managers with regional planning and to ensure that fisheries are ecologically sustainable, as required by environmental protection legislation.

Comprehensive information on the biodiversity of the seabed was acquired by visiting almost 200 sites, representing a wide range of known environments, during two 1-month-long voyages on two vessels and deploying several types of devices such as: towed video and digital cameras, an epibenthic sled and a research trawl to collect samples for more detailed data about plants, invertebrates and fishes on the seabed. Data were collected and processed from ~100 km of towed video and >10,000 photos, and from sorting and identification of ~2,000 benthic samples, ~1,200 seabed fish samples, and ~200 sediment samples. The project has analysed this information and produced all of the outputs as originally proposed; these included:

- Images and videos of seabed habitat types and fishes, including more than 120 substratum and biological habitat component types.
- An inventory of more than 3,600 species of benthos, bycatch and fishes, with catalogued museum voucher specimens, many of which were new species, and a database of almost 25,000 records of species distribution and abundance on the seabed.
- Identification of the key environmental variables likely to be important in structuring seabed distributions, and predictive models of bio-physical relationships between seabed species, their assemblages and the physical environment.
- Maps of the distribution and abundance of ~250 seabed species throughout the TSPZ region.
- Estimates of the likely extent of past effects of trawling on benthos and bycatch over the entire TSPZ region, which indicated that trawl effort had a significant effect on the biomass of 8.2% of ~250 species mapped; with negative change of -3% to -18% for 3.5% of species and positive change of +3% to +63% for 4.7% of species.
- Estimates of exposure to trawl effort showed that about 80% of the ~250 species mapped had low or very low exposure, and at the other extreme about 21 species had moderate-high to very-high exposure — of these species, after taking relative catch rates into account, six had moderate-high to very high estimates of proportion caught annually and 13 had moderate-low. The remainder (237) had low or very low estimates of proportion caught annually.
- Indicators based on qualitative recovery ranks showed that about 9 species stood out as being at higher relative risk. Another, additional, quantitative absolute sustainability indicator showed that one species exceeded a limit reference point while three others exceeded one or two conservative reference points. Another 10 species were also listed due to uncertainty in parameters though they were below the sustainability reference points. Further research is recommended to address key uncertainties in estimates of these indicators.

A key output from the project is the identification, by means of the trawl exposure and sustainability indicators, of species at risk or potentially at risk from trawling. Different species were highlighted by different indicators, though there was some overlap. One indicator was both quantitative and directly related to sustainability, with biologically based reference points — while one species appeared to be at risk and another three species exceeded conservative reference points, there is uncertainty that requires a more precautionary response. Hence, the top ranked species for all indicators were listed and recommended to be considered for stakeholder consultation regarding future action; options may include clarification of the identified uncertainties, monitoring of species at risk, and management interventions that reduce risk or combinations of these actions.

It is also recommended that long-term monitoring of trends in ecological condition of identified key seabed habitats and constituent species be implemented to assess responses to regional pressures, including climate change. Candidate habitats should include those that have been

demonstrated to be particularly biodiverse such as vegetated areas and epibenthic gardens. The seabed may well be vulnerable to climate change as there is an expectation that the thermocline may deepen and upwellings may become weaker and less frequent, with potential consequences for productive habitat dependent on nutrients from such sources.

Further work is needed to address the uncertainties in the risk assessments that arise from uncertainties in estimates of catchability and natural mortality rates. Currently, the uncertainty is such that several additional species could exceed the reference points and many species with unknown mortality might be of concern. It is also possible that clarification of these uncertainties may show that species currently thought to be at risk or potentially at risk may be demonstrated to be of no sustainability concern. Thus, it is recommended that further studies of catchabilities and natural mortality rates be conducted to address this key uncertainty for affected species. Such results are likely to have wide application in risk assessments being conducted in multiple jurisdictions.

Many fisheries in Australia are conducting qualitative approaches to Ecological Risk Assessments. However, the results of the more quantitative sustainability indicators applied here raise concerns about the reliability of the qualitative approaches, which have not been benchmarked because of the lack of a suitable test bed. Such a test bed is now available with this Torres Strait seabed mapping and characterisation dataset and an assessment of the performance of the qualitative methods is warranted. This seabed mapping dataset also provides an opportunity to develop condition and trend and vulnerability indicators for seabed communities and ecosystems that are needed to meet the increasing requirement for ecosystem-based management approaches.

A follow on project supported by the Marine and Tropical Science Research Facility is quantifying visible species from the available towed camera video to fill significant gaps in areas that were too rough for sampling and are currently lacking species information.

Another project supported by the Commonwealth Environment Research Fund National Marine Biodiversity Hub will use the Torres Strait seabed mapping dataset in comparisons with other datasets to test the inter-regional utility of physical variables and cross-taxonomic patterns as surrogates for application in marine planning at a national scale.

Other further opportunities include: sorting and identification of remaining samples that could not be completed within the scope of the project, and taxonomic work to properly identify the more difficult specimens. These activities would provide full utilization of the samples and deliver additional value, with expected benefits for greater understanding of the seabed ecosystem, fishery sustainability, and ongoing regional marine planning.

Outcomes Achieved

Preliminary outputs were presented during the course of the project and team members contributed to management/industry activities such as alternative management strategy workshops. The final results for each objective have become available only near the end of the project and, with delivery of the final outputs and planned uptake activities; the anticipated outcomes may now be achieved. Progress against expected industry, management and stakeholder outcomes has included:

- Reports and presentations to various audiences and multimedia information available via a website have contributed to raising the level of stakeholder knowledge of the status of the region's ecosystems, facilitating understanding and implementation of regional management plans for sustainable use. Further activities are planned to disseminate and adopt the outputs of the project among managers, stakeholders and scientists. Further development of the website would be valuable.

- Ecological risk/sustainability indicators and biological reference points developed during the course of the project can be expected to contribute to the Environmental Assessment for the Torres Strait Trawl fishery and, with management response, can be expected to facilitate meeting of environmental sustainability objectives under Commonwealth legislation.

- Estimates of the level of impact of past trawling and capability to evaluate future alternative management strategies needed to meet environmental sustainability legislation, by estimating outcomes for the environment and for the fishery in a Management Strategy Evaluation context.

RECOMMENDATION
3.3.1   The TSPMAC **NOTES** the verbal update on the outcomes of the TSSAC No. 45 meeting held on Thursday Island from June 17-18, 2008.

BACKGROUND
The TSSAC reports directly to the PZJA but keeps the TSPMAC informed of its positions on research issues in the Torres Strait. The TSSAC had its forty-fifth meeting on Thursday Island from June 17-18, 2008 following a two year hiatus.

DISCUSSION
At the forty-fifth meeting of the TSSAC a number of key issues were discussed of relevance to the TSPMAC, including: (the complete agenda from TSSAC No. 45 is provided at Attachment 3.3A)

- **TS Fishery Overviews**
  o Prawn Fishery
- **Funding**
  o Process for funding of TS research projects using AFMA funds
  o External funding options
- **TSSAC Research Plan 2005-2010**
  o Review of previous research plan and determination of relevance to reformed TSSAC
- **Research Priorities**
  o Suggested research priorities **-** TS Committees/Groups
- **Call for research proposals for 2008/2009 financial year**

Formal minutes from the TSSAC No. 45 will not be available for TSPMAC No. 6, however a verbal update will be provided on the outcomes of the meeting.

FINANCIAL IMPLICATIONS
Nil.

Australian Government
Australian Fisheries Management Authority

Australian Government

Queensland Government

TORRES STRAIT
PZJA
PROTECTED ZONE
JOINT AUTHORITY

TORRES STRAIT SCIENTIFIC ADVISORY COMMITTEE MEETING No. 45
June 17th/18th, 2008: Commencing at 10:30 am on the 17th; 8:30 am on the 18th
Venue: AFMA Pearls Building,
Address: 38 Victoria Parade, Thursday Island, QLD

Preliminaries – Chairs opening remarks/Apologies/Adoption of Agenda/Disclosure of Interests

DRAFT AGENDA

1   **Meeting Administration**
1.1   Introductions from each TSSAC member - All members to provide a brief introduction of themselves, their expertise and relevant experience
1.2   PZJA FMP No.1 (May 2008)
1.3   TSSAC Terms of Reference

2   **TS Fishery Overviews**
2.1   Fisheries Management in the Torres Strait
2.2   Tropical Rock Lobster Fishery
2.3   Prawn Fishery
2.4   Finfish Fisheries (Reef Line and Spanish Mackerel)
2.5   Hand Collectable Fisheries
2.6   Traditional - Turtle and Dugong fisheries

3   **Funding**
3.1   Process for funding of TS research projects using AFMA funds
3.2   External funding options

4   **TSSAC Research Plan 2005-2010**
4.1   Review of previous research plan and determination of relevance to reformed TSSAC

5   **Research Priorities**
5.1   Suggested research priorities **-** TS Committees/Groups

6   **Research proposals for TSSAC consideration/support**

7   **Call for research proposals for 2008/2009 financial year**

8   **Work Plan for TSSAC**

9   **Other business**
9.1   Dates for next meeting

Individuals wishing to attend the meeting as an observer are required to contact the Chair (Mr Ian Cartwright: c/o TSSAC Executive Officer – Annabel Jones at Annabel.jones@afma.gov.au) notifying him of your desire to attend.