

TORRES STRAIT PRAWN MANAGEMENT ADVISORY COMMITTEE	Meeting No. 2 19-20 September 2006
Research Outcomes of the TSSAC meeting	Agenda Item No. 6.1

THE TSPMAC RECOMMENDS

That the PZJA **NOTES** the outcomes of the TSSAC meeting held 7 – 8 August 2006:

That the PZJA **REQUESTS** the TSSAC provides advice to the TSPMAC and the PZJA on research for the prawn fishery, including stock assessment advice.

BACKGROUND

At the TSPMAC 1 meeting of June 2006, the role of the TSSAC in advising the TSPMAC on research for the fishery was discussed. Members considered the costs associated with a fishery specific Resource Assessment Group (RAG) and the benefits associated with having the extra scientific expertise available for specific projects. Members agreed in principle that a RAG was desirable but that the cost implications overrode the benefits of this approach.

The ability to use the TSSAC rather than the RAG was also considered as it would save a considerable amount of money. It was also recommended that this action be reported to the TSSAC with a recommendation that the role of the TSSAC be expanded accordingly.

A meeting of the TSSAC was held in Cairns on 7 – 8 August 2006. The first day of the meeting focused on completing Torres Strait CRC business. On day two a slightly smaller group discussed the future of the TSSAC post CRC and commence the development of a fisheries research program. Draft minutes of the meeting are included as Attachment 1.

DISCUSSION

The main focus of the second day of the TSSAC meeting was to commence development of a fisheries research program for TS for the next few years. The TSSAC discussed the need to expand the fisheries part of the *Torres Strait Strategic Marine Research Plan 2005 – 2010* to be in a position to respond quickly to the projects that are needed.

The meeting also discussed the agenda paper for the TSPF research meeting that was organised by Steve Colquitt (DAFF) to be held the day after the TSSAC meeting. The objective of the research meeting was to progress the development a research proposal that would best utilise the \$1 million in special Commonwealth fund provide for research into the TSPF over the next three years. The main concept to be discussed at that meeting was the proposal to charter industry vessels to conduct biomass surveys at various sites and times through the fishing season. The TSSAC discussed the funding and the proposal and agreed to the following response which was tabled at the research meeting the next day.

TSSAC's comments on the proposed research under special funding for the TSPF

The TSSAC reviewed the research proposals and wishes to make the following comments. A formal evaluation of the proposed projects was not possible. The TSSAC's identified and agreed high priorities for the TSPF listed in the 5 year strategic research plan as follows;

- *Monitoring and Assessment - Tiger/endeavour - LTMP surveys*
- *Estimating changes in fishing power*
- *Ecological impacts of fishing - Bycatch information*
- *Management effectiveness – the performance and reliability of fishery indicators e.g. Emsy, Bmsy*
- *Catch sharing with PNG*

The TSSAC also considered the importance of bio-economic modelling given the current economic climate.

The TSSAC's role is to provide the PZJA with advice on fisheries research funding and expenditure and monitor the progress of those projects and ensure quality control of the science. The proposed prawn research program represents a very large proportion of the total research funding for Torres Strait fisheries. The TSSAC believes that it is the most appropriate body to evaluate research proposals and to provide advice on the research requirements for the Torres Strait

In response to the TSPMAC request for the TSSAC to expand its role post Torres CRC to consider more fishery specific issues, the TSSAC believes that it is the best committee to provide overall “*advice on fisheries research funding and expenditure and monitor the progress of those projects and ensure quality control of the science*”.

The TSPMAC should encourage the TSSAC to play an active role in providing advice on research requirements and activity for the prawn fishery. A good working relationship between the TSPMAC and the TSSAC would negate the need to establish a RAG for the fishery, as the expertise of the TSSAC could be used.

TORRES STRAIT PRAWN MANAGEMENT ADVISORY COMMITTEE	Meeting No. 2 19-20 September 2006
RESEARCH FUNDING AND PRIORITIES Update on the development of research projects associated with Australian Government funding.	Agenda Item No. 6.2 FOR INFORMATION/ DECISION

THE TSPMAC NOTES

1. The information provided in this update on the progress of the research plan development for the additional research funding provided by the Australian Government in the 2006 budget.
2. The recommendations from the 9 August 2006 Torres Strait Prawn Fishery Research Group meeting, including:
 - (a) the overarching research objectives for the research programme,
 - (b) the objectives for the spatial distribution trawl survey project,
 - (c) the objectives for the endeavour prawn stock assessment project, and
 - (d) the objectives for the project extending the stock surveys into PNG waters.
3. A meeting between representative from the TSPEHA, QDPIF and DAFF has been scheduled to take place in Innisfail on 7 September 2006 to work out what level of involvement industry members will have in the collection of data in the research programme. A verbal report on the outcomes of this meeting will be delivered at the TSPMAC meeting.
4. The proposed next steps for the development of the research project.
5. That other information relevant to the involvement of PNG in this research programme is considered in the agenda item entitled '*outcomes of Papua New Guinea Bilateral Discussion*'.

THE TSPMAC RECOMMENDS

6. That a 6 person Steering Committee be established to evaluate procurement processes and to oversee the delivery of the research projects for the duration of the research programme.
7. That the Steering Committee comprise 1 representative from DAFF (Chair), 1 Representative from BRS, 1 representative from AFMA, 1 representative from the QDPIF Fisheries Resource Management Branch and 2 industry representatives.
8. That a Technical Advisory Group be established consisting of representatives (selected as necessary) from Industry, QDPIF, CSIRO, AFMA, BRS and DAFF, that will advise the Steering Committee on technical issues when requested.

BACKGROUND

The Australian Government has provided \$1 million over the next 3 financial years to undertake research in the Torres Strait Prawn Fishery (TSPF). This money is separate to the existing PZJA research funds and was provided to ensure the long term sustainability

of the fishery. This will include research to monitor the movement and distribution of difference species of prawn stocks in the TSPF. The research results are to be incorporated into the legislative management plans.

At the last TSPMAC meeting, the TSPMAC requested that quarterly updates be provided on the progress of this research programme.

A Torres Strait Prawn Fishery Research Advisory Group met on Wednesday 9 August 2006 at the Northern Fisheries Centre, Cairns. Attendees included:

- Stephen Colquitt (DAFF)
- Barry Wilson (TSPEHA)
- Dorothea Huber (AFMA)
- Mick George (AFMA)
- Shane Gaddes (QDPIF)
- Clive Turnbull (QDPIF)
- Barry Ehrke (QDPIF)
- Rob Coles (QDPIF)
- Rick Officer (QDPIF)
- Cathy Dichmont (CSIRO)
- Ib Svane (SARDI)
- Michael O'Neil (QDPIF)

The Advisory Group confirmed the overarching research objectives that would form the basis for utilising the \$1 million research funding announced by the Australian Government on 9 May 2006. The priority research projects identified by the TSPMAC on 25 May 2006 were confirmed by the Advisory Group and individual project objectives were developed. The Advisory Group also discussed specifications for the procurement of research providers (principle investigators) for these projects, noting that some of the research contracts may need to put out to the market through a request for tender process to ensure Australian Government procurement guidelines are met.

The Advisory Group recognised that the TSSAC was responsible for coordinating PZJA funded research but noted that this additional research funding had been provided by the Australian Government and as such it was outside the PZJA research umbrella. The TSSAC therefore has no official role in the planning of this research programme but will continue to be consulted on the research strategies being pursued and where possible the research should work in partnership to ensure delivery of research priorities identified by the TSSAC. The Advisory Group also noted that a number of members from the TSSAC were already involved in the research planning process.

Key areas were identified in each of the research projects requiring further technical development. It was also recommended by the Advisory Group that a Steering Committee would need to be established to evaluate tender bids and guide delivery of the research projects for the period of research funding.

DISCUSSION

Overarching research objectives.

The following overarching research objectives were recommended by the Advisory Group:

1. Develop alternative management strategies that:
 - a) Ensure the long term viability of the fishery with regards to the ongoing sustainable harvest of commercial prawn stocks;
 - b) Ensure long term viability of the fishery by optimising economic performance through a range of measures.
2. Conduct research in a manner that will maximise industry participation;
3. Where possible, address the recommendations from the current DEH strategic assessment;

4. Ensure that the results of any research can be incorporated into the fishery management plan.

Research priorities

The following research priorities were recommended by the Advisory Group:

1. Spatial Distribution Trawl Survey Objectives

The following research project objectives were recommended by the Advisory Group:

- (a) Design a trawl survey that will determine the spatial and temporal abundance of all commercially harvested prawn species (tiger, endeavour and king prawns) within the commercially worked regions in the Australian jurisdiction of the Torres Strait Prawn Fishery. The survey should also ascertain prawn size and spawning condition distributions;
- (b) Train industry members to ensure effective industry participation in trawl surveys;
- (c) Fund industry members to conduct regular periodic trawl surveys between March and November, in organised sampling areas within the Australian jurisdiction of the Torres Strait prawn fishery, and ensure the timely collection of trawl survey data;
- (d) Develop new (and/or refine existing) spatial management models that will evaluate the potential for additional fishing effort in the Torres Strait Prawn Fishery whilst avoiding the unsustainable harvest of prawn stocks of any species;
- (e) Investigate the effects of alternative spatial management models on the economic performance of the fishery;
- (f) Analyse collected spatial abundance survey results to determine the feasibility of proposed spatial management models.

2. Endeavour Prawn Stock Assessment Objectives

The following research project objectives were recommended by the Advisory Group:

- (a) Develop a scientific stock assessment model for endeavour prawns in the Torres Strait;
- (b) Identify potential biological reference points for the long term sustainable management of endeavour prawns in the Torres Strait;
- (c) Ensure that results of this research can be incorporated into the legislative management plan for the fishery.

3. Extension Of Stock Surveys Into PNG Waters Objectives

Please note that this research project has also been discussed in Agenda Item 3 under the results from PNG Bilateral discussions. The following research project objectives were recommended by the Advisory Group:

- (a) Facilitate stock surveys in the PNG jurisdiction of the Torres Strait to develop a more complete survey information database for the straddling prawn stocks in the Torres Strait;
- (b) Review information from stock surveys undertaken in PNG in conjunction with the information obtained from stock surveys conducted in the Australian jurisdiction of the Torres Strait to develop more accurate stock assessments;
- (c) Ensure stock surveys are consistent with the information needs of the current Torres Strait prawn stock assessments;

- (d) Ensure that the results of any research can be incorporated into the legislative management plans in the fishery.

4. Catch sharing arrangements with PNG

This Advisory Group considered elements of the development of PNG catch sharing arrangements, but this issue has already been covered in more detail under Agenda Item 3 in results from PNG Bilateral discussions.

Proposed steps for the development of the research plan following the TSPMAC meeting.

It is proposed that:

1. A Research Steering Committee be formed on the recommendations of the TSPMAC, and that this Steering Committee should operate for the life of the programme;
2. Research project design principles be developed by the Research Steering Committee based on industry's desired level of involvement in the research projects. These design principles will be incorporated into a request for tender process to be run by DAFF. This should occur as a matter of priority and be finalised by 20 October 2006;
3. The request for tender process will be used to select principle investigators for the research projects. The Research Steering Committee will evaluate the tender bids received. The principle investigators should be identified by 30 November 2006;
4. Selected research providers will consult with relevant technical experts in the Technical Advisory Group to design necessary research surveys and detailed project plans. This should be finalised by 12 January 2007;
5. The Steering Committee will approve the final project plans for each research project. This should be finalised by 19 January 2006;
6. Industry training and selection of scientific observers will be conducted in Late January/early February 2007 (if required);
7. At-sea research will aim to start at the beginning of the 2007 fishing season (March 2007).

TORRES STRAIT PRAWN MANAGEMENT ADVISORY COMMITTEE	Meeting No. 2 19-20 September 2006
RESEARCH Ecological Risk Assessment (ERA) for the Torres Strait Prawn Fishery	Agenda Item No. 6.3

RECOMMENDATIONS

That the Torres Strait Prawn MAC:

1. Consider and provide feedback on the key documents relevant to the TSPF ecological risk assessment (ERA);
2. Discuss the draft level one results of the TSPF ERA; and
3. If available discuss the draft level two results of the TSPF ERA.

BACKGROUND

At the last TSPMAC meeting held on 13-14 June 2006, members were provided with an outline of the Ecological Risk Assessment (ERA) methodology and project for the Torres Strait Prawn Fishery. This included an outline and information on the level one, qualitative assessment process. Due the state of the assessment, TSPMAC did not have an in depth discussion of the draft scoping and level one results developed by CSIRO/QDPI&F. To ensure these results are an accurate reflection of what occurs in the fishery, AFMA wants to ensure stakeholders have an opportunity to discuss and identify any concerns with the results.

Under the current hierarchical assessment approach, each fishery is assessed at a level one, qualitative level and any activities assessed as potential causing a moderate or greater impact will then undergo a level two assessment. The level two assessment is a more focused, semi-quantitative assessment of the risk posed by fishing on each individual species, habitat and community. The assessment examines each unit (species etc) individually, determining a risk score based on their productivity (ability to recover from impact) and susceptibility to fishing. Please see the attached document – ERA methodology for more details of the methodology.

At this stage the level one assessment has been completed by QDPI&F and AFMA has provided comments on the assessment. The level two assessment is currently being undertaken with an aim of having the results prepared prior to the September TSPMAC meeting. If prepared, the level two results will be provided to members as a late item before the meeting.

DISCUSSION

Level One Assessment:

The focus of the TSPMAC discussion will be to provide the MAC with a better understanding of the level one assessment details and to discuss the results for the TSP fishery. To assist this discussion, key documents regarding the assessment are attached so that the discussion can be focused and address key questions and issues that may arise.

The documents provided are:

- **Species list:** This list identifies the range species that occur in the TSPF;
- **Habitat list:** This list outlines the range of both benthic and pelagic habitats that occur in the area of the TSPF.
- **Communities list:** This list outlines the demersal and pelagic communities identified for the TSPF assessment.
- **Hazard identification for TSPF:** This list identifies the range of activities that occur in the fishery;
- **Abridged ERA Report for the TSPF.** This report includes an executive summary and the level 1 (SICA) results for TSPF including a summary of consequence scores of the level 1 assessment.

Please note - the consequence scores at level one are scored from 1 (negligible) to 6 (intolerable). Only the consequence scores of 3 or above will require further assessment or management responses.

TSPMAC are asked to consider these documents and provide the comments along the following lines:

Species lists

1. Is the species list sufficient?
2. Does it miss species?
3. Does it contain erroneous species?

List of hazards

1. Do these activities occur?
2. Are there activities that do occur that are listed as not occurring in the fishery?

Level 1 analysis

1. Were any of these activity-component scores a surprise?
2. Did you expect any components to be given a higher risk score? A lower risk score?

Level 2:

If a level two risk assessment for the fishery is completed prior to the TSPMAC meeting, AFMA intends to discuss the results of this assessment with the MAC also. Discussion of these results will also depend on there being sufficient time at the meeting for this discussion. MAC discussion of the level two results will focus on the individual species risk scores and whether these scores are accurate for the Torres Strait Prawn Fishery.

If time does not permit discussion of these results, AFMA will discuss with members the best option for commenting and finalising the level two assessment.

Following stakeholder input, AFMA will update the assessment based on the discussions and AFMA will ensure that it is provided to stakeholders for comment either in session or out of session for final comment and endorsement.

Overview: Ecological Risk Assessment for the Effects of Fishing (ERAEF) Framework

The Hierarchical Approach

The Ecological Risk Assessment for the Effects of Fishing (ERAEF) framework involves a hierarchical approach that moves from a comprehensive but largely qualitative analysis of risk at Level 1, through a more focused and semi-quantitative approach at Level 2, to a highly focused and fully quantitative “model-based” approach at Level 3 (**figure 1**). This approach is efficient because many potential risks are screened out at Level 1, so that the more intensive and quantitative analyses at Level 2 (and ultimately at Level 3) are limited to a subset of the higher risk activities associated with fishing. It also leads to rapid identification of high-risk activities, which in turn can lead to immediate remedial action (risk management response).

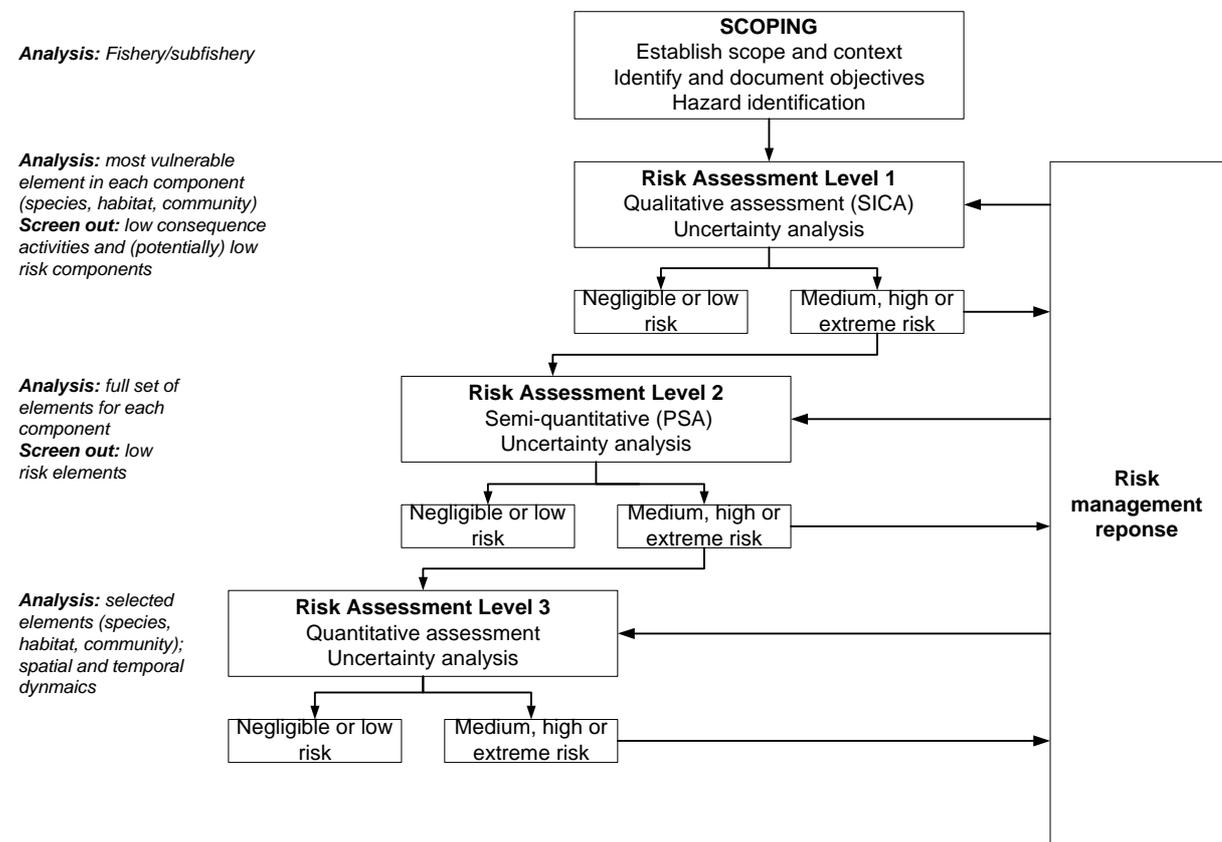


Figure 1. Overview of ERAEF showing focus of analysis for each level at the left in italics.

Conceptual Model

The approach makes use of a general conceptual model of how fishing impacts on ecological systems, which is used as the basis for the risk assessment evaluations at each level of analysis (Levels 1-3). For the ERAEF approach, five general ecological components are evaluated, corresponding to five areas of focus in evaluating impacts of fishing for strategic assessment under EPBC legislation. The five *components* are:

- Target species
- By-product and by-catch species
- Threatened, endangered and protected species (TEP species)
- Habitats
- Ecological communities

This conceptual model (**figure 2**) progresses from *fishery characteristics* of the fishery or sub-fishery, → *fishing activities* associated with fishing and *external activities*, which may impact the five ecological components (target, byproduct and bycatch species, TEP species, habitats, and communities); → *effects of fishing and external activities* these are the direct impacts of fishing and external activities; → *natural processes and resources* that are affected by the impacts of fishing and external activities; → *sub-components* which are affected by impacts to natural processes and resources; → *components*, which are affected by impacts to the sub-components. Impacts to the sub-components and components in turn affect achievement of management objectives.

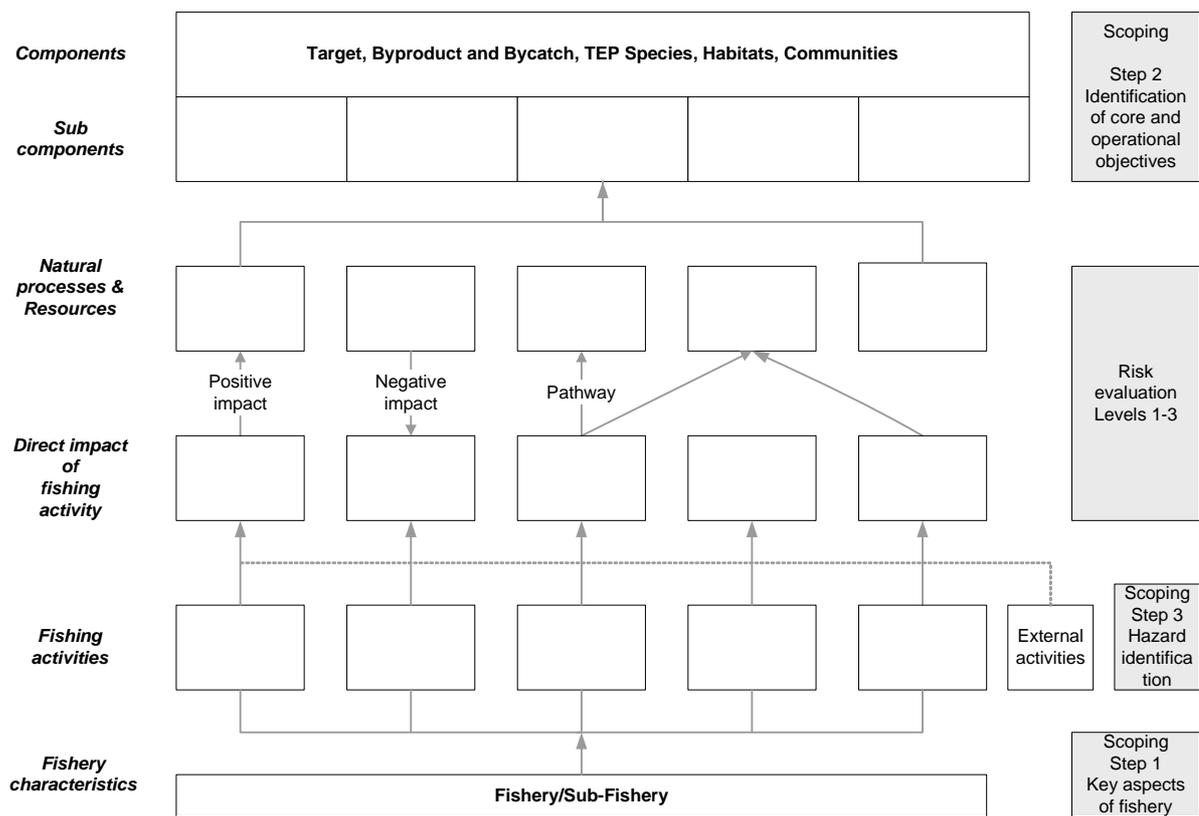


Figure 2. Generic conceptual model used in ERAEF.

The Assessment

The assessment of risk at each level takes into account current management strategies and arrangements. A crucial process in the risk assessment framework is to document the rationale behind assessments and decisions at each step in the analysis. The decision to proceed to subsequent levels depends on

- Estimated risk at the previous level
- Availability of data to proceed to the next level
- Management response (e.g. if the risk is high but immediate changes to management regulations or fishing practices will reduce the risk, then analysis at the next level may be unnecessary).

ERAEF stakeholder engagement process

A recognized part of conventional risk assessment is the involvement of stakeholders relevant to the activities being assessed. Stakeholders can make an important contribution in terms of expert judgement, fishery-specific and ecological knowledge, and process and outcome ownership. The ERAEF method also relies on stakeholder involvement at several stages. This section outlines when stakeholder involvement might take place.

In the course of the ERAEF project the project team was responsible for producing a first draft of each stage of the risk assessment for each fishery prior to full stakeholder involvement, however, in subsequent years and iterations of the risk assessment, alternative approaches are possible. Multiple interactions with stakeholders are likely until general agreement is reached. Stakeholder interactions through each of the case study processes will be noted using **Summary Document SD1** (see end of this section).

Scoping

As this stage is based on assimilation of existing documentation, much of the scoping information can be collected and even completed to a draft stage prior to full stakeholder involvement. This will provide all the stakeholders with information on the relevant background issues. Three key outputs are required from the scoping, each requires stakeholder input.

1. Identification of units (e.g. target, bycatch/byproduct and TEP species, habitat types and community assemblages) potentially impacted by fishery activities is part of the scoping process (section S1.1). Identification of target, bycatch and byproduct species impacted in the fishery is often possible through existing data and reports. Potentially impacted TEP species are often poorly documented, perhaps as not all interactions result in death, and a wide variety of sources and experts should be consulted to generate potential species. Expert judgement and anecdotal evidence is also used to compile this preliminary species list. Stakeholders are then consulted, individually and at fishery management meetings, on the preliminary list and additions and deletions made, with rationale recorded for the particular decisions.
2. Selection of objectives (section S1.2) is a challenging part of the assessment, because these are often poorly defined, particularly with regard to the habitat and communities component. Stakeholder involvement is necessary to agree on the set of objectives that the risks will be evaluated against. A set of preliminary

objectives relevant to the sub-components is selected by the drafting authors, and then presented to the stakeholders for modification. An agreed set of objectives is then used in the Level 1 SICA analysis. The agreement of the fishery management advisory body (e.g. the MAC, which contains representatives from industry, management, science, policy and conservation) is considered to represent agreement by the stakeholders at large.

3. Activities (hazards) (section S1.3) that do occur in the sub-fishery are identified from the checklist of potential activities provided. The checklist was developed following extensive review, and allows repeatability between fisheries. Additional activities raised by the stakeholders can be included in this checklist (and would feedback into the original checklist). The background information and consultation with the stakeholders is used to finalize the set of activities. Many activities will be self-evident (e.g. fishing, which obviously occurs), for others, expert or anecdotal evidence may be required.

Level 1. SICA

The SICA analysis evaluates the risk on ecological components resulting from the stakeholder-agreed set of activities. Evaluation of the temporal and spatial scale, intensity, sub-component, unit of analysis, and credible scenario (consequence for a sub-component) can be done in a workshop situation, or prepared ahead by the draft case study author and debated in the stakeholder environment. Because of the number of activities (up to 24) in each of five components (120 SICA elements), preparation ahead of involving the full set of stakeholders may allow time and attention to be focused on the uncertain or controversial or high risk elements. The rationale for each SICA element must be documented and this will represent a challenge in the workshop situation. Documenting the rationale ahead of time for the straw-man scenarios is crucial to allow the workshop debate to focus on the right portions of the logical progression that resulted in the consequence score.

Level 2. PSA

The semi-quantitative nature of this analysis tier should reduce but not eliminate the need for stakeholders. In particular, transparency about the assessment will lead to greater confidence in the results. The components that were identified to be at moderate or greater risk in Level 1 are examined at Level 2. The units of analysis are the agreed set of species, habitat types or communities in each component identified during the scoping stage. A comprehensive set of attributes that are proxies for productivity and susceptibility have been identified during the ERAEF project. Stakeholders can provide input and suggestions on appropriate attributes, including novel ones, for evaluating risk in the specific fishery. The attribute values for many of the units (e.g. age at maturity, area, mean trophic level) can be obtained from published literature and other resources (e.g. scientific experts) without full stakeholder involvement. This is a consultation of the published scientific literature. Further stakeholder input is required when the preliminary gathering of attribute values is completed. In particular, where information is missing, expert opinion can be used to derive the most reasonable conservative estimate. For example, if the species attribute values for annual fecundity have been categorized as low medium and high on the set [<5 , 5-500, >500], estimates for species with no data can still be made. Estimated fecundity of a species such as a broadcast-spawning fish with unknown fecundity, is still likely greater than the cutoff for the high fecundity categorization (>500). Susceptibility attribute estimates, such as “fraction alive when

landed”, can also be made based on input from experts, particularly those with experience in the fishing activities. The final PSA is completed by scientists because access to computing resources, databases, and programming skills is required. Feedback to stakeholders regarding comments received during the preliminary PSA consultations is considered crucial. The final results are then presented to the stakeholder group before decisions regarding Level 3 are made. The stakeholder group may also decide on priorities for analysis at Level 3.

Level 3

This stage of the risk assessment is fully-quantitative and relies on in-depth scientific studies on the units identified as at moderate or greater risk in the Level 2 PSA. It will be both time and data-intensive. Individual stakeholders are engaged as required in a more intensive and directed fashion. Results are presented to the stakeholder group and feedback incorporated, but live modification is not considered likely.

Conclusion and final risk assessment report

The conclusion of the stakeholder consultation process will result in a final risk assessment report for the individual fishery according to the ERAEF methods. It is envisaged that the completed assessment will be adopted by the fishery management group and used by AFMA to address the requirements of the EPBC Act as evaluated by Environment Australia.

Subsequent risk assessment iterations for a fishery

The frequency at which each fishery must revise and update the risk assessment has not been determined. As new information or management changes occur, the risks can be reevaluated, and documented as before. The fishery management group or AFMA may take ownership of this process, or scientific consultants may be engaged. In any case the ERAEF should again be based on the input of the full set of stakeholders and reviewed by independent observers familiar with the process.

TORRES STRAIT PRAWN MANAGEMENT ADVISORY COMMITTEE	Meeting No. 2 19-20 September 2006
RESEARCH Trends in catch and effort data	Agenda Item No. 6.4

THE TSPMAC RECOMMENDS

That the PZJA **NOTES** the preliminary analysis of the trends in catch and effort for the 2006 season that indicate an above average stock biomass for tiger and to a lesser extent endeavour prawn during the 2006 season.

BACKGROUND

A preliminary analysis of trends in the catch and effort data for the 2006 season will be presented in a PowerPoint presentation. A download of all the catch and effort data for the 2005 and 2006 seasons was obtained from AFMA logbook section on the 31st August 2006. The data was used to update the catch and effort statistics for 2005 and provide a preliminary analysis of the trends for 2006. The estimated coverage is almost 100% for March and April, 72% for May and 26% for June. There are some records for July and August.

DISCUSSION

The preliminary trends in the catch and effort data indicate that 2006 will be the best season on record for tiger prawn catch rates indicating a high tiger prawn stock biomass. The endeavour prawn catch rates are also higher than for recent years.

The total catches recorded for the period up to August 2006 are 463 t of tiger prawn, 535 t of endeavour prawn and 31 t of king prawn from 3,168 days of recorded fishing effort (Figure 1). Based on the trends so far the tiger prawn catches for the whole season could be close to the five year average (2001-05) of 662 t.

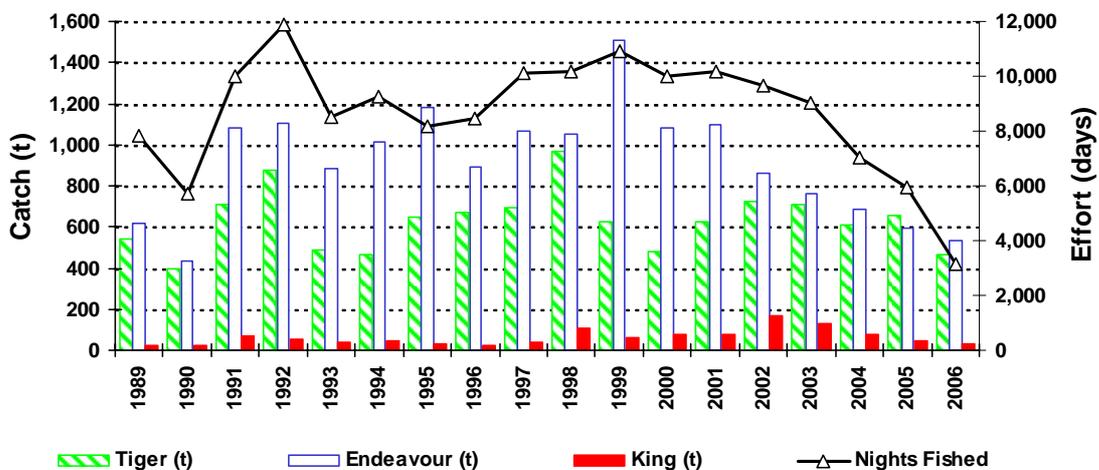


Figure 1 Total annual catch and effort

The monthly trend in fishing effort compared with earlier years is shown in Figure 2. The effort in most months of 2005 was well below average, especially in the middle of the season. The trend for 2006 indicates that fishing effort in 2006 will also track well below average and possibly lower than for 2005. Note that the only March and April indicate the full fishing effort for 2006.

The error markers on the average lines in figures 2 to 4 indicate the range of values (minimum and maximum) that have occurred each month during the years 1989-04.

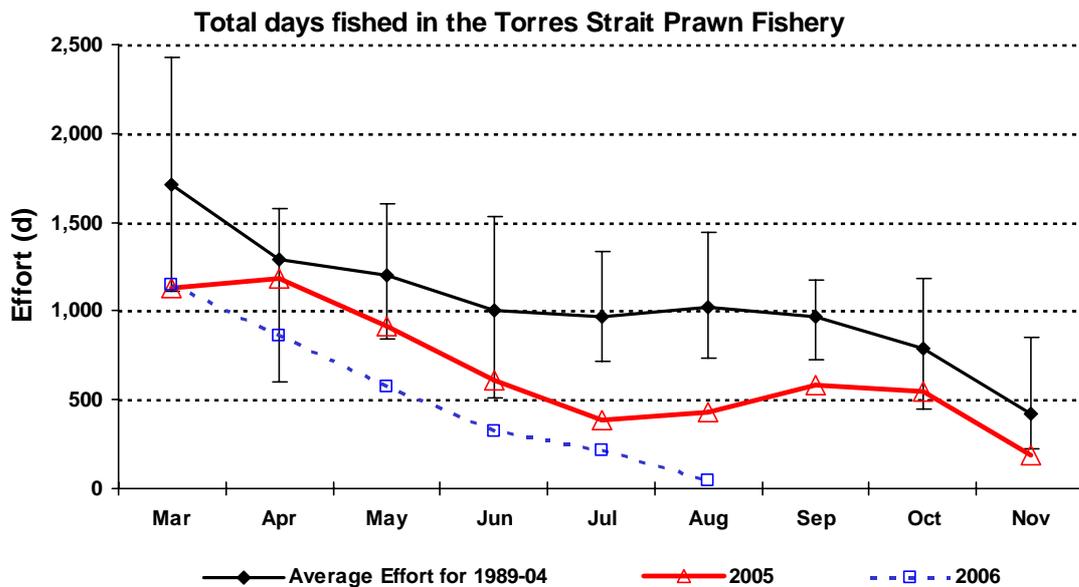


Figure 2 Fishing effort by month

The monthly trend in tiger prawn catch rates for 2005 (Figure 3) was well about average for the entire season. The 2006 catch rates are following a similar trend. Note that the much higher than average values for June to August 2006 may be an artefact of the low number of records for those months. As more records are added it would be expected that the catch rate for these months would drop but still be well above average.

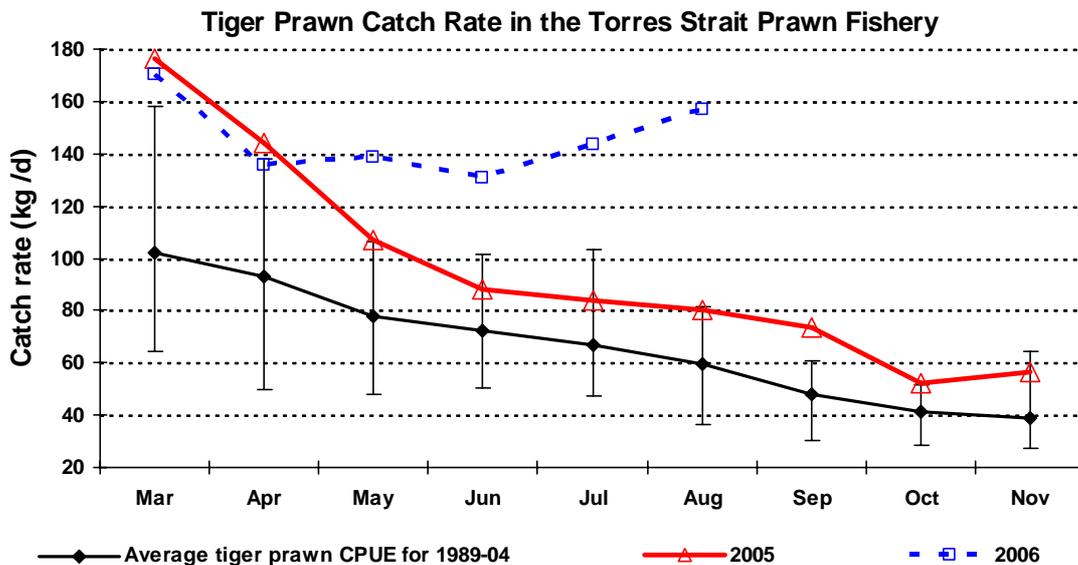


Figure 3 Tiger prawn catch rates by month

The monthly trend in endeavour prawn catch rates indicates that catch rates in 2006, in contrast to 2005, are well above average (Figure 4).

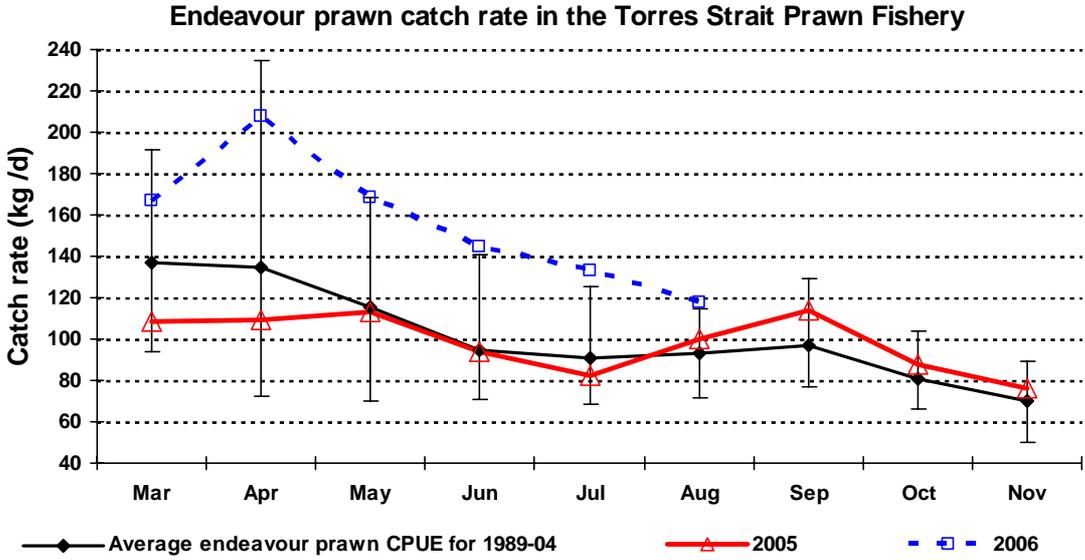


Figure 4 Endeavour prawn catch rates by month