PZJA TORRES STRAIT FINFISH RESOURCE ASSESSMENT GROUP
MEETING No. 1
9 – 10 November 2017
Park Regis Hotel, 293 North Quay, Brisbane CBD

MEETING TIME: **8:30 – 5:00pm Thursday 9th November 2017**

8:30 – 3:00pm Friday 10th November 2017

AGENDA

1. **Preliminaries**

   1.1 Welcome and meeting preliminaries

   1.2 Declaration of Interests

2. **RAG updates**

   2.1 Industry member updates

   2.2 Management update – 2016/17 season summary

3. **Data needs and research priorities**

   3.1 Short to medium-term data improvements

   3.2 Research priorities

4. **Research project updates**

   4.1 Traditional Take Project Update (P.I.: Nicole Murphy, CSIRO)

   4.2 Scoping study for barramundi, black jewfish and crab in top-western Torres Strait communities (P.I.: Andrew Tobin, Tobinfish)

5. **Advice for management**

   5.1 Recommended Biological Catches for 2018/19, 2019/20 and 2020/21 seasons

   5.2 Estimating catches taken outside of the commercial fishery

   5.3 Estimating Traditional Inhabitant Boat sector catches

   5.4 Update on work supporting expansion of take of other reef-line species

6. **Harvest Strategy**

   6.1 Objectives

   6.2 Framework

6.3 Indicative work plan

6.4 Outline of data collation

6.5 Development of critical indicators of fishery performance

7. Other Business

8. Work plan and date and venue for next meeting

Individuals seeking to attend the meeting as an observer must contact the Executive Officer – Andrew Trappett (andrew.trappett@afma.gov.au) beforehand.

PZJA TORRES STRAIT FINFISH RESOURCE ASSESSMENT GROUP	Meeting 1 9-10 November 2017
PRELIMINARIES Welcome and meeting preliminaries	Agenda Item No. 1.1 For NOTING

RECOMMENDATIONS

1. That the RAG **NOTE:**
    a. an opening prayer;
    b. an acknowledgement of traditional owners;
    c. the chairperson's welcome address; and
    d. apologies received from members unable to attend.

2. That the RAG **ADOPT** the draft agenda (**Appendix A**)

3. That the RAG **NOTE** the terms of reference for the group.

BACKGROUND

1. **Apologies** have been received from Rick Buckworth (Scientific Member)

2. **A draft agenda** was circulated to members and other participants on 16 October 2017. No comments were received.

Role of the RAG and relationship to Finfish Working Group

3. In comparison to a working group (such as the Finfish Working Group) the main role of Resource Assessment Groups (RAG) is to provide advice on the status of fish stocks, sub-stocks, species (target and non-target species) and on the impact of fishing on the marine environment.

4. Advice provided by the Finfish RAG should address biological, economic and wider ecological factors impacting on the fishery. RAGs should also evaluate alternative harvest options proposed by the relevant fishery WG and/or MAC. This includes advising on the impact over time of different harvest strategies (for example, the time required for a particular fish stock to reach a reference point), stock depletion or recovery rates, the confidence levels of the fishery assessments, and risks to the attainment of approved fishery objectives.

5. The Finfish RAG will report to the PZJA. It also informs relevant SACs, MACs or WGs of work on stock assessments in progress or potential issues, but is not restricted by them. This ensures that the potential conflict of interest generated by the assessment roles of RAGs and the management advisory roles of other consultative bodies does not impact on the quality of advice provided to the PZJA.

6. As the Finfish Working Group and associated Finfish RAG are likely to have some common membership, it is essential that members' roles be recorded and differentiated by the respective Chairpersons.

Terms of reference

7. The terms of reference for a Resource Assessment Group are outlined in the *PZJA Fisheries Management Paper No. 1 (FMP 1)* which guides the operation and administration of PZJA consultative groups. These are proposed for the FFRAG without change.

8. General Terms of Reference for PZJA RAGs are:

    a. Analyse, assess, and report on the fishery status against agreed reference points, including target and non-target stocks, impacts on the marine environment from fishing, and the economic efficiency with which stocks are fished;
    b. Identify improvements and refinements to assessment methodology;
    c. Evaluate alternative harvest strategies or TAC settings. This includes providing advice on confidence limits or risk levels associated with particular management/harvest strategies;
    d. Assist the relevant MAC and/or the WG to develop, test, and refine sustainability reference points and performance indicators for the fishery. Advise on stock status and trends relative to these reference points and indicators;
    e. Identify and document fishery assessment and monitoring gaps, needs and priorities. These should be communicated to the SAC so that they can be incorporated in the Torres Strait strategic research plan;
    f. Provide advice and recommendations to the SAC on issues consistent with RAG functions;
    g. Facilitate peer review of assessment outputs;
    h. Facilitate/drive a collaborative stock assessment with adjacent jurisdictions;
    i. Maintain awareness of current issues by promoting close links with the MACs, SACs and any other Torres Strait RAGs; and
    j. Liaise with other researchers, experts and key industry members.

Finfish RAG priorities

9. A more detailed discussion on the RAG work plan and priorities is scheduled for Agenda Item 8.

10. As a matter of priority, AFMA proposes to seek advice from the RAG on:
    a. harvest strategy options,
    b. data needs,
    c. Spanish mackerel stock assessment refinements,
    d. research needs, and
    e. catch estimates for all sectors.

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PZJA TORRES STRAIT FINFISH RESOURCE ASSESSMENT GROUP	Meeting 1 9-10 November 2017
PRELIMINARIES Declarations of interests	Agenda Item No. 1.2 For ACTION

RECOMMENDATIONS

1. That Finfish RAG members:
   a. **DECLARE** all real or potential conflicts of interest in Torres Strait hand collectable fisheries at the commencement of the meeting;
   b. **DETERMINE** whether the member may or may not be present during discussion of or decisions made on the matter which is the subject of the conflict;
   c. **ABIDE** by decisions of the RAG regarding the management of conflicts of interest; and
   d. **NOTE** that the record of the meeting must record the fact of any disclosure, and the determination of the RAG as to whether the member may or may not be present during discussion of or decisions made on the matter which is the subject of the conflict.

BACKGROUND

2. Consistent with the *Protected Zone Joint Authority (PZJA) Fisheries Management Paper No. 1 (FMP1)*, which guides the operation and administration of PZJA consultative forums, members are asked to declare any real or potential conflicts of interest (**APPENDIX A**).
3. RAG members are asked to provide the executive officer with a list of declared interests.
4. FMP1 recognises that members are appointed to provide input based on their knowledge and expertise and as a consequence, may face potential or direct conflicts of interest. Where a member has a material personal interest in a matter being considered, including a direct or indirect financial or economic interest; the interest could conflict with the proper performance of the member's duties. Of greater concern is the specific conflict created where a member is in a position to derive direct benefit from a recommendation if it is implemented.
5. When a member recognises that a real or potential conflict of interest exists, the conflict must be disclosed as soon as possible. Where this relates to an issue on the agenda of a meeting this can normally wait until that meeting, but where the conflict relates to decisions already made, members must be informed immediately. Conflicts of interest should be dealt with at the start of each meeting. If members become aware of a potential conflict of interest during the meeting, they must immediately disclose the conflict of interest.
6. Where it is determined that a direct conflict of interest exists, the forum may allow the member to continue to participate in the discussions relating to the matter but not in any decision making process. They may also determine that, having made their contribution to the discussions, the member should retire from the meeting for the remainder of discussions on that issue. Declarations of interest, and subsequent decisions by the forum, must be recorded accurately in the meeting minutes.

LIST OF ATTACHMENTS

Appendix A - *Protected Zone Joint Authority (PZJA) Fisheries Management Paper No. 1 (FMP1)*

PROTECTED ZONE JOINT AUTHORITY

FISHERIES MANAGEMENT PAPER No. 1

(PZJA FMP No.1)

MANAGEMENT ADVISORY COMMITTEES, SCIENTIFIC ADVISORY COMMITTEES, WORKING GROUPS AND RESOURCE ASSESSMENT GROUPS

MAY 2008

Prepared by the Australian Fisheries Management Authority
on behalf of the Protected Zone Joint Authority

CONTENTS

LIST OF ATTACHMENTS

1. ACRONYMNS/DEFINITIONS

For the purposes of this document:

AFMA	Australian Fisheries Management Authority
DAFF	Department of Agriculture, Fisheries and Forestry
EO	Executive Officer
FMP	Fisheries Management Paper
MAC	Management Advisory Committee
PNG	Papua New Guinea
PZJA	Protected Zone Joint Authority
QDPI&F	Queensland Department of Primary Industries and Fisheries
RAG	Resource Assessment Group (including Stock Assessment Group, species Assessment Group or any scientific group).
SAC	Scientific Advisory Committee
TSFMAC	Torres Strait Fisheries Management Advisory Committee
TSPMAC	Torres Strait Prawn Management Advisory Committee
TSPZ	Torres Strait Protected Zone
TSRA	Torres Strait Regional Authority
WG	Working Group

2. PURPOSE

This Fisheries Management Paper sets out the Torres Strait Projected Zone Joint Authority's (PZJA) policy for the operation and administration of Management Advisory Committees (MACs), Scientific Advisory Committees (SACs), Working Groups (WGs) and Resource Assessment Groups (RAGs) or other associated consultative groups.

This paper also outlines key decision making processes associated with the delivery of advice in the pursuit of the Protected Zone Joint Authority's (PZJA) legislative objectives. This includes the interactive processes, respective roles and responsibilities between the PZJA, MACs, SACs, WGs and RAGs.

3. INTRODUCTION

Sections 40(7-8) of the *Torres Strait Fisheries Act 1984* (the Act) provide for the establishment of advisory committees "….to provide information and advice to the Protected Zone Joint Authority on scientific, economic and technical matters related to any fishery."

In the Australian area of jurisdiction, traditional fishing and the commercial fisheries are managed by the Torres Strait Protected Zone Joint Authority (PZJA). The PZJA, established under the *Torres Strait Fisheries Act 1984* (the Act), comprises the Federal and State (Queensland) Ministers responsible for fisheries, and the Chair of the Torres Strait Regional Authority (TSRA). The PZJA is responsible for managing fisheries in the Torres Strait Protected Zone (TSPZ). The PZJA has delegated day-to-day management of the fisheries to the Australian Fisheries Management Authority (AFMA) and compliance and licensing in the fisheries to the Queensland Department of Primary Industries and Fisheries (QDPI&F) under a cost sharing arrangement. Five of the fisheries currently being managed are known as Article 22 fisheries and are jointly

managed by PNG and Australia. The two countries share the catches of Article 22 commercial fisheries according to formulae set out in the Torres Strait Treaty.

The PZJA agencies include AFMA, the Queensland Department of Primary Industries and Fisheries (QDPI&F), the Torres Strait Regional Authority (TSRA) and the Department of Agriculture, Fisheries and Forestry (DAFF). Recreational fishing is still managed under Queensland law.

The PZJA is responsible for monitoring the condition of the designated fisheries and for the formulation of policies and plans for their management. The PZJA has regard to the rights and obligations conferred on Australia by the Torres Strait Treaty, in particular the protection of the traditional way of life and livelihood of the traditional inhabitants, including their traditional fishing.

4. CONSULTATIVE STRUCTURE

The consultative structure for Torres Strait fisheries incorporates Australian Traditional Inhabitant commercial and traditional fishers, non-Traditional Inhabitant commercial fishers, Australian and Queensland Government officials, and technical experts.

The PZJA may be advised by Management Advisory Committees (MAC), Scientific Advisory Committees (SAC), and Resource Assessment Groups (RAG) on issues associated with TSPZ fisheries (Figure 1).

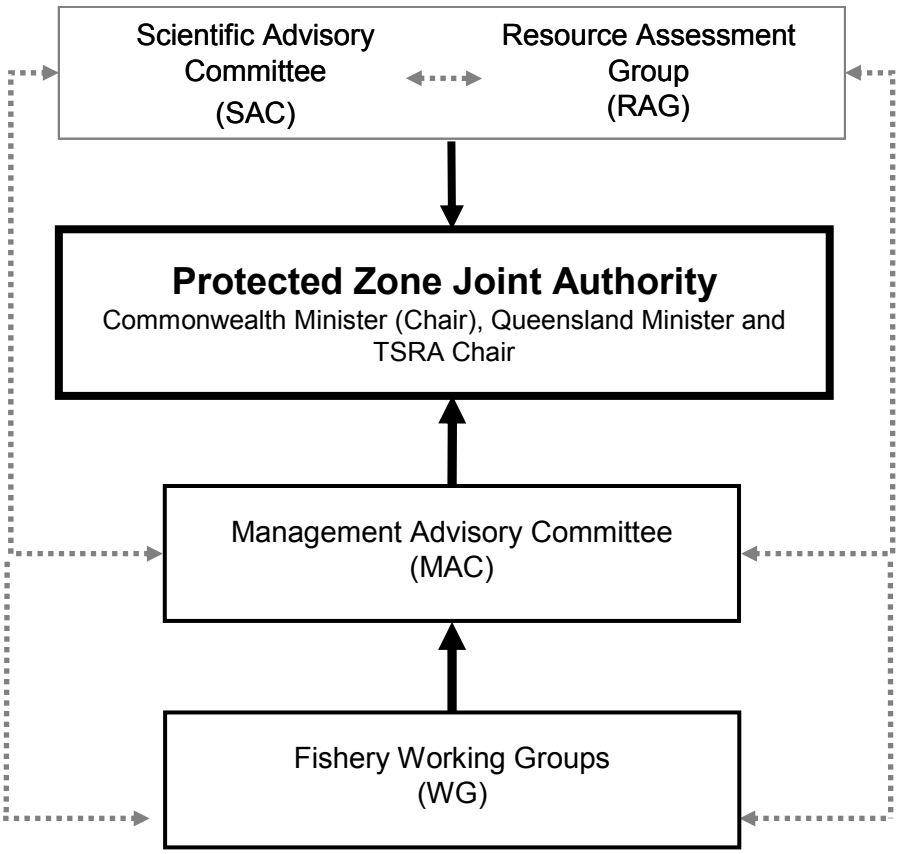


Figure 1. The consultative structure of the Torres Strait Protected Zone Joint Authority (PZJA). Solid lines and dashed lines indicate primary and secondary lines of communication respectively.

Consultation and communication can be difficult across all islands of the Torres Strait, but are important elements in the effective management of the region's fisheries. The consultative committees are, therefore, complemented by meetings between fisheries officers and fishermen in communities around the Torres Strait. These meetings are occasionally supplemented by fisheries programs broadcast on Radio Torres Strait and articles/advertisements in the Torres News.

While the Committee's and Groups outlined in Figure 1 are the main means of the PZJA obtaining advice and information, it is not the only means. The PZJA may seek advice and views from others with relevant expertise or interest. This includes PZJA Agencies, other government agencies, independent consultants, operators in fisheries more broadly and representatives of the broader community.

Key principles that should be observed in relation to the respective committees/groups within the PZJAs decision-making framework are:

i. All committees/groups are advisory rather than decision-making;
ii. Committees/groups should provide expert advice that best pursues PZJAs legislative and policy objectives;
iii. The PZJA seeks, through its consultative processes, to obtain best quality information and advice;
iv. The PZJA will make decisions based on the best advice (and information) available at the time;
v. Committees/groups should have defined roles and there should be minimum overlap in responsibilities; and
vi. Advice and reporting should be a transparent and open process.

4.1 Role and functions of a Management Advisory Committee (MAC)

Management Advisory Committees (MAC) are the principal source of advice for the PZJA on fishery-specific management issues in all Torres Strait fisheries. A MAC and its working group/s have specific functions that support the decision making process.

A MAC advises the PZJA on fishery objectives, strategies, reference points, risk profiles and management arrangements for achieving fishery-specific goals. For the PZJA to be able to make decisions based upon MAC advice, the PZJA has to be confident that a MAC has put in place rigorous processes to determine the best package of measures in pursuit of the PZJA's objectives. Good governance and business efficiency demand that the PZJA is normally able to approve MAC advice without delving into MAC business details, or needing to seek clarification from a MAC.

The role of a MAC is to advise the PZJA on management issues for the fisheries managed under the Act. It provides the forum where issues relating to the fisheries are discussed, problems identified and possible solutions developed. The outcome of these deliberations determines the recommendations a MAC will make to the PZJA concerning the management of relevant fisheries.

All MAC members must be aware of the PZJAs legislative objectives and functions (as contained in Attachment A) and of the continuing need to take these into account in their deliberations.

4.2 Role and functions of a Scientific Advisory Committee (SAC)

A Scientific Advisory Committee's (SAC) main role is to advise the PZJA on the strategic directions, priorities and funding for research relevant to meeting information needs and objectives of the PZJA and its relevant consultative bodies.

The committee normally provides a review process for research conducted by research providers to ensure that milestones are met and that the research outcomes represent good value for money. The committee may also be called upon to make its own assessments of fisheries data and comment on stock assessment advice. The committee may also solicit external review when the questions asked fall outside the committee's area of expertise.

A SAC may also provide advice to the MACs, WGs, and RAGs on scientific and research issues in the Torres Strait Protected Zone (TSPZ).

4.3 Role and functions of Working Groups (WG)

To assist in the operations of a MAC, Working Groups (WG) have been established to provide advice on particular matters relevant to individual fisheries. The task of a WG is to discuss, negotiate and debate issues relevant to individual fisheries. In order to be manageable and cost effective, WGs will be no larger than is necessary to ensure the appropriate blend of knowledge and expertise is available to provide the required advice to a MAC.

Ordinarily the WGs deal with the fishery specific issues, including the specification of management objectives, research priorities for the particular fishery, management issues and strategies, and compliance issues. In addition to these tasks the WGs deal with a range of ad hoc issues. These are reported to a MAC and/or SAC as appropriate.

4.4 Role and functions of a Resource Assessment Group (RAG)

The main role of Resource Assessment Groups (RAG) is to provide advice on the status of fish stocks, sub-stocks, species (target and non-target species) and on the impact of fishing on the marine environment. Advice provided by a RAG should address biological, economic and wider ecological factors impacting on the fishery.

RAGs should also evaluate alternative harvest options proposed by the relevant fishery WG and/or MAC. This includes advising on the impact over time of different harvest strategies (for example, the time required for a particular fish stock to reach a reference point), stock depletion or recovery rates, the confidence levels of the fishery assessments, and risks to the attainment of approved fishery objectives.

A RAG reports to the PZJA. It also informs relevant SACs, MACs or WGs of work on stock assessments in progress or potential issues, but is not restricted by them. This ensures that the potential conflict of interest generated by the assessment roles of RAGs and the management advisory roles of other consultative bodies does not impact on the quality of advice provided to the PZJA. A MAC (including its WGs) and associated RAG are likely to have some common membership, therefore it is essential that members' roles be recognised and differentiated by the respective chairs.

5. TERMS OF REFERENCE

5.1 Management Advisory Committees and Working Groups

The following terms of reference are to be utilised by Management Advisory Committees (MAC) and Working Groups (WG) as operating guidelines.

1. To provide a forum for the discussion of matters relevant to the management of Torres Strait fisheries and to act as a medium for the flow of information between all stakeholders;
2. To provide advice and make recommendations to the PZJA (in the case of a MAC) or MAC (in the case of a WG) with respect to:
    i. the management of the fishery;
    ii. the development of fishery management plans;
    iii. ongoing measures required to manage the fishery in accordance with the provisions of management plans; and
    iv. amendments to management plans as required;
3. To provide advice and make recommendations to the PZJA (in the case of a MAC) or MAC (in the case of a WG) on research priorities and projects for the fishery. MACs and WGs are to ensure that processes are in place for industry and other interested stakeholders to receive advice from researchers in a form that will be easily understood by the audience;
4. To establish sub-committees as required ensuring that the range of management issues is given proper attention;
5. To liaise with PZJA Agency staff and provide assistance as necessary to ensure approved management measures are implemented; and
6. To undertake additional functions on behalf of the PZJA as determined by the Authority.

5.2 Scientific Advisory Committee (SAC)

The following terms of reference are to be utilised by a Scientific Advisory Committee (SAC) as operating guidelines.

1. Identify and document research gaps, needs and priorities for fisheries in the Torres Strait;
2. Provide a forum for expert consideration of scientific issues referred to the SAC by a MAC;
3. Provide a forum for detailed consideration of scientific issues raised by WGs and relevant stakeholder representative bodies and advise WGs and relevant stakeholders on the feasibility and merits of suggested research;
4. Develop and update a strategic plan for Torres Strait Fisheries research;
5. Solicit and review research proposals in line with the strategic plan and recommend proposals for implementation to the AFMA Research Committee (ARC) and/or other relevant funding organisations;
6. Provide other advice to the MACs on matters consistent with SAC functions;
7. Review research / consultancies, stock assessments, and other reports and outputs relevant to Torres Strait fisheries and advise the appropriate MAC and WG, on their technical merit;
8. Advise the MACs and WGs on the management implications identified by the research projects or the SACs own assessment of fisheries data;
9. Convene Fisheries Assessment workshops as appropriate to review and address assessment needs for Torres Strait fisheries and recommend research priorities for future assessments;

10. Provide advice to research providers and the MACs on appropriate mechanisms and protocols for engaging research providers in the Torres Strait fisheries;
11. Provide advice on effective delivery of research results to stakeholders; and
12. Provide advice on a range of issues including stock assessment advice.

5.3 Resource Assessment Groups (RAG)

A Resource Assessment Groups' (RAG) Terms-of-Reference (TOR) should be tailored according to their specific fishery requirements. However, general TOR for RAGs are:

1. Analyse, assess, and report on the fishery status against agreed reference points, including target and non-target stocks, impacts on the marine environment from fishing, and the economic efficiency with which stocks are fished;
2. Identify improvements and refinements to assessment methodology;
3. Evaluate alternative harvest strategies or TAC settings. This includes providing advice on confidence limits or risk levels associated with particular management/harvest strategies;
4. Assist the relevant MAC and/or the WG to develop, test, and refine sustainability reference points and performance indicators for the fishery. Advise on stock status and trends relative to these reference points and indicators;
5. Identify and document fishery assessment and monitoring gaps, needs and priorities. These should be communicated to the SAC so that they can be incorporated in the Torres Strait strategic research plan;
6. Provide advice and recommendations to the SAC on issues consistent with RAG functions;
7. Facilitate peer review of assessment outputs;
8. Facilitate/drive a collaborative stock assessment with adjacent jurisdictions;
9. Maintain awareness of current issues by promoting close links with the MACs, SACs and any other Torres Strait RAGs; and
10. Liaise with other researchers, experts and key industry members.

6. Cost Recovery

Under the existing Australian Government cost-recovery policy, MACs and their subcommittees (WGs) are funded largely by industry levies as their functions are attributable to industry as the principal beneficiary.

In Torres Strait, only the costs of the prawn fishery are attributed to Industry and recovered at the present time. It should be noted however that the PZJA agreed in principle that cost recovery should extend to other Torres Strait fisheries in line with AFMAs Cost Recovery Impact Statement (CRIS). A policy on the cost recovery is being developed for the PZJAs consideration.

7. OPERATIONAL GUIDELINES

7.1 Membership Composition

The PZJA or delegate has final responsibility for determining the actual membership of MACs, SACs, WGs and RAGs and will consider membership in relation to the needs of the Torres Strait Fisheries.

7.1.1 Management Advisory Committee (MAC)

The minimum requirements for MAC membership are as follows:
- 1 x Chair;
- 1 x Executive Officer;
- 2 x Staff members from AFMA;
- 2 x Staff members from QDPI&F;
- 1 x Scientific member;
- 6 x Traditional Inhabitant members*;
- 5 x Non-Traditional Inhabitant Industry members[#];
- 1 x TSRA support member.

* The exact number of Traditional Inhabitant members may vary for each MAC as determined by the PZJA or delegate depending upon the needs of the fisheries (e.g. TSFMAC = 6 rotational from 24 communities; TSPMAC = 3).

[#] The composition of Non-Traditional Inhabitant Industry Members may vary for each MAC as determined by the PZJA or delegate depending upon the needs of the fisheries covered by the MAC (e.g. TSFMAC = 4 x Fishing licence holders, 1 x Industry processor; TSPMAC = 4 x Fishing licence holders, 1 x Industry processor).

7.1.2 Scientific Advisory Committee (SAC)

In view of the special circumstances of the Torres Strait, especially in relation to the multiple jurisdictional arrangements for management and the provisions for economic development favouring Torres Strait Islanders in the Torres Strait Treaty (1985) and the Torres Strait Fisheries Act (1984), the Torres Strait Scientific Advisory Committee (SAC) should reflect a balance between stakeholder representation and research expertise. The SAC might be expected to have a greater representative function than other AFMA Scientific Committees. Accordingly, minimum requirements for a SAC membership are as follows:
- 1 x Chair;
- 1 x Executive Officer;
- 1 x Staff member from AFMA;
- 1 x Staff member from QDPI&F;
- 4x Scientists*;
- 1 x Independent industry member;
- 1 x Community Fisher Representative nominated by the TSRA;
- 1 x Papua New Guinea Representative.

*The exact number of Scientific members may vary for each SAC as determined by the PZJA or delegate depending upon the needs of the committee.

Other experts included on a register of experts maintained by AFMA may be called to attend specific SAC meetings based on their specific areas of expertise as required.

7.1.3 Working Group (WG)

The minimum requirements for WG membership are as follows:
- 1 x Chair;
- 1 x Executive Officer;
- 1 x Staff member from AFMA;
- 1 x Staff member from QDPI&F;

- 1 x Scientific member;
- 6 x Traditional fishing members*;
- 3 x Non-Traditional Inhabitant Industry members#;
- 1 x TSRA support member.

* The exact number of Traditional Inhabitant members may vary for each WG as determined by the PZJA or delegate depending upon the needs of the fishery.

The composition of Non-Traditional Inhabitant Industry Members may vary for each WG as determined by the PZJA or delegate depending upon the needs of the fishery.

7.1.4 Resource Assessment Group (RAG)

A stock assessment that engenders a strong management response may bring the RAG into conflict with sectors of industry or attract political attention. Therefore, members of the RAG must be credible, expert and impartial in undertaking their assessments.

The minimum requirements for RAG membership are as follows:
- 1 x Chair;
- 1 x Executive Officer;
- 1 x Staff member from AFMA;
- 1 x Staff member from QDPI&F;
- 1 x Traditional fishing member;
- 1 x Non-Traditional Inhabitant Industry member;
- 1 x Scientific member;
- 1 x Independent Scientific member;
- 1 x Conservation member;
- 1 x PNG NFA member;
- 1 x TSRA support member.

7.2 Term of appointment

The PZJA or delegate makes all appointments to MACs, SAC, WGs and RAGs, with Members generally appointed for terms of up to three years. In order to ensure continuity, Members will not normally be appointed for a period of less than two years. Subsequent re-appointment may be permitted.

8. Responsibilities and obligations of Members

8.1 Responsibilities of Members

Being appointed to a PZJA consultative committee or group brings with it a number of important responsibilities. Specifically, members must be prepared to meet the following requirements:
- they must be able to put views clearly and concisely and be prepared to negotiate to achieve acceptable outcomes and compromises where necessary;
- they must act in the best interests of the fisheries as a whole, rather than as an advocate for any particular organisation, interest group or regional concern;
- they must be prepared to observe confidentiality and exercise tact and discretion when dealing with sensitive issues;

- they must contribute to discussion in an objective and impartial manner and avoid pursuing personal agendas or self-interest;
- they must be prepared to make the necessary commitment of time to ensure that they are fully across matters which are the subject of consideration by the committee;
- Industry Members must not have commercial interests in the same company as other members on the same MAC, SAC, WG or RAG;
- Industry members must have the wider industry's confidence and authority to undertake their functions as a MAC, SAC, WG or RAG member. They must also be prepared to consult with members of industry through port-level associations, regional associations and peak industry bodies as necessary; and
- Traditional inhabitant members must have the community's confidence and authority to undertake their functions as a MAC, SAC, WG or RAG member. They must also be prepared to consult with members of community through local associations and meetings as necessary.

8.2 Reaching consensus

A co-operative approach to MAC, SAC, WG and RAG discussions is essential. While this does not mean that there won't be disagreements from time to time, it does mean that agreement is ultimately to be reached through reasoned discussion, consultation and negotiation having regard to what is best for the fishery.

A MAC, SAC, WG or RAG should reach agreement through consensus and not use voting as a mechanism for achieving outcomes. Where agreement cannot be reached, members are encouraged to reconsider the issue and seek further information if necessary before making their recommendation. If a deadlock cannot be avoided, the views of members and general discussion should be well documented in the minutes of the meeting and highlighted in recommendations that are put before the PZJA (in the case of a MAC, RAG or the SAC) or MAC (in the case of a WG). MACs and WGs are the best means to achieve agreement on management issues. Ownership of the formal process by its members is vital to successful fisheries management.

8.3 Disclosure of interests

8.3.1 Types of interests

MAC, SAC, WG and RAG members are appointed to provide input based on their knowledge and expertise and as a consequence, it is inevitable that members may face potential or direct conflicts of interest. There may be a conflict of interest where a member:

- has a material personal interest, including a direct or indirect financial or economic interest, in a matter being considered, or about to be considered, by the MAC, SAC, WG or RAG; and
- the interest could conflict with the proper performance of the member's duties in relation to the consideration of the matter.

There may often be a level of general conflict simply because members come from areas of the industry that may be affected as a result of a recommendation. For example, industry members may be participants in the fishery, TSRA members may represent the geographical region under discussion or scientific members may face a conflict related to a research proposal. To assist in identifying areas of potential conflict, a MAC, SAC, WG or RAG may consider it appropriate to maintain registers of members' interests that could possibly lead to conflicts.

Of greater concern is the specific conflict created where a member is in a position to derive direct benefit from a MAC, SAC, WG or RAG recommendation if it is subsequently implemented. In either case, members should recognise the potential for conflict to occur and its possible impact on the operations of the Committee/Group.

8.3.2 Declaring an interest

When a MAC, SAC, WG or RAG member recognises that a real or potential conflict of interest exists, the conflict must be disclosed as soon as possible to other members. Where this relates to an issue on the agenda of a meeting this disclosure can normally wait until that meeting, but where the conflict relates to decisions already made, members must be informed immediately. If there is any doubt, a specific conflict of interest and its nature should be declared and recognised in the discussions of the meeting and recorded in the minutes of the meeting.

8.3.3 Dealing with an interest

To facilitate the smooth operation of meetings, it is suggested that conflicts of interest are dealt with at the start of each meeting. Members receive agenda and associated papers prior to the meeting and should be able to make disclosures of potential conflicts of interest and their nature (including, for example, the type and quantity of fishing concessions held by industry members) at the commencement of meetings.

Where it is determined that a direct conflict of interest exists, the MAC, SAC, WG or RAG may allow the member to continue to participate in the discussions relating to the matter but not in any decision making process. The member or the Committee/Group may also determine that, having made his/her contribution to the discussions, the member should retire from the meeting for the remainder of discussions on that issue.
As a guide, members with a direct conflict of interest should only be excluded from decision making if the matter being considered only affects the individual member rather than all persons involved in the fishery.

Finally, the Chair must ensure that the minutes of the meeting show the disclosure of interest, reflect the meeting's subsequent decision(s) and demonstrate that these are put into effect at the appropriate point in the meeting. If members become aware of a potential conflict of interest during the course of the meeting, they must immediately disclose the conflict of interest and the members present must consider how best to deal with the disclosure at that point.

8.4 Other Obligations of Members

Members must:
- act in good faith in the best interests of the PZJA;
- act honestly and exercise a reasonable degree of care and diligence in the discharge of their duties; and
- not make improper use of inside information to gain an advantage for themselves or someone else or cause harm to the Authority or to another person.

Members must not use their position, or information obtained as a member of a MAC, SAC, WG or RAG, dishonestly or with the intention of directly or indirectly gaining an advantage for themselves or someone else, or with the intention of causing harm to the PZJA or to another person.

8.5 Personal and professional behaviour

MAC, SAC, WG or RAG members should perform all duties associated with their positions diligently, impartially, conscientiously, in a civil manner and to the best of their ability.

In the performance of their duties they should:
- act in such a way, at meetings, in the field and at official functions that will be held in a high regard by the community and by industry;
- treat other members and stakeholders with courtesy and sensitivity; and
- not take, or seek to take, improper advantage of official information gained in the course of their membership.

8.5.1 Fairness and equity

MAC, SAC, WG and RAG members are not permitted to discriminate against or harass any colleague, client or member of the public, particularly on the basis of:
- Race;
- Religion;
- Gender;
- Political or union affiliation;
- Sexual preference;
- Political opinion;
- Marital status;
- Pregnancy;
- Social origin;
- Criminal record;
- Age; or
- Physical, intellectual or mental disability or impairment.

Behaviour, which is shown to be discriminatory, or which constitutes harassment will not be tolerated and may result in the members' appointment to MACs, SACs, WGs and/or RAGs being terminated by the PZJA or delegate.

8.5.2 Public comment

Public comment includes public speaking engagements, comments on radio and television and expressing views in letters to newspapers or in books, journals or notices or where it might be expected that the publication or circulation of the comment would spread to the community at large.

Whilst MAC, SAC, WG and RAG members, as members of the community, have the right to make public comment and to enter into public debate on political and social issues, there are some circumstances in which public comment is inappropriate. These circumstances would be where there is an implication that the public comment, although made in a private capacity, is in some way an official comment of a MAC, SAC, WG or RAG. Members should avoid making private statements about matters relating to a MAC, SAC, WG or RAG unless it is made clear that they are speaking as a private citizen.

9. Confidentiality and Non-Disclosure

9.1 General

Material made available to Members is generally public information. In some instances, members will have access to information that is confidential; however members will be advised accordingly. Members must not publish or communicate to any unauthorised person any fact or document which comes to their knowledge, or possession by virtue of being a MAC, SAC, WG or RAG member.

9.2 Resource Assessment Groups (RAG)

Members of RAGs may sometimes require access to confidential fishery catch and effort data and will have access to draft reports, materials or working papers that are unready or not intended for wider circulation.

The Chair should warn members when matters of a confidential nature are tabled, and ensure that discussion documents are not used for any purpose not related to the business of the RAG. Exceptions should only occur with the written consent of the RAG Chair. However, all members are obliged to maintain standards of confidentiality and non-disclosure relating to data. Note that industry members, non-government organisation personnel (NGO), and other fishery stakeholders may not be given access to confidential data.

Scientific members who are custodians of data for the purposes of analyses must apply best practice to ensure security, confidentiality, and non-disclosure of the data. This includes prevention of loss, theft, corruption and unapproved duplication. Data received from AFMA for the purposes analyses will be subject to the conditions set forth in the contract between the research provider and AFMA. Similar arrangements may exist between other data providers and research providers using data provided by the other party.

It is the responsibility of the Chair to ensure that data contained in all public documents, assessment reports or other publications is aggregated sufficiently to preserve commercial confidentiality and privacy.

10. Role and appointment procedures for Members

On behalf of the PZJA, AFMA administers the overall appointment process. The PZJA or delegate, however, makes the appointments. Nominations for Members are sought from both individuals and associations.

10.1 The Chair

10.1.1 Role

The Chair of a MAC, SAC, WG or RAG plays a key role in ensuring effective and thorough discussion of factors affecting the performance of a particular fishery (e.g. implementation of ecological sustainable development factors, and impacts of management strategies on, the particular fishery) and is the primary communication link between the MAC/SAC/WG/RAG and the PZJA. Accordingly, the Chair must:

- Be independent of commercial or other interests with the particular fishery/fisheries, including industry association(s);

- Have a demonstrated capacity to chair meetings, including a sound understanding of the meeting procedures and practices necessary for the efficient conduct of meetings (including the rules of debate);
- Have an ability to identify strategic goals and objectives and facilitate their achievement through the MAC, SAC, WG or RAG process;
- Have a demonstrated capacity to communicate clearly and concisely to a wide cross-section of people, particularly with respect to acting as the MAC, SAC, WG or RAG spokesperson and representing MAC, SAC, WG or RAG views to the PZJA, industry, Government, the media and the general community in a balanced and rational manner;
- have an understanding of industry and public policy;
- preferably, have some fisheries (or resource management) experience; and
- not be a staff member of the PZJA Agencies, although this is allowed for SACs, WGs and RAGs.

An explanation of the procedural matters relating to the conduct of MAC, SAC, WG and RAG meetings, including the requirement to give notice of a meeting and to circulate papers, is provided at Attachment C.

The roles and responsibilities of a Chair include:
- Ensuring members are aware of their responsibilities under this PZJA FMP No. 1;
- Ensuring members remain aware of and consider the PZJAs legislative objectives in the deliberations of the MAC, SAC, WG or RAG;
- Ensure the timely availability of agenda papers before meetings and the preparation and circulation of minutes and Chair's Summaries after meetings;
- Formally communicating meeting outcomes, recommendations and matters for information to the PZJA (in the case of a MAC, RAG or SAC Chair) or to a MAC (in the case of the WG Chairs) for consideration and to the industry for information. In undertaking this function, the Chair will be assisted by the Executive Officer;
- Summarising outcomes for each agenda item at the end of the discussion for each item and at the end of the meeting. This will assist in the reporting of the outcomes after each meeting;
- Ensuring that meeting minutes, letters and other correspondence to the PZJA Chair (in the case of a MAC, RAG or SAC) or a MAC Chair (in the case of a WG) clearly and accurately describe MAC, SAC, WG or RAG recommendations and alternative options when an agreed position has not been reached; and
- Ensuring that minutes and other material arising from meeting deliberations clearly and accurately describe MAC, SAC, WG or RAG recommendations, including dissenting views where they are expressed.

Chairs are not to allow members who are absent from meetings to have separate notes or views attached to minutes. Absentee members may convey views in writing to the MAC, SAC, WG or RAG prior to the meeting.

10.1.2 Selection/Appointment Procedure

Whenever there is a vacancy in the office of MAC, SAC, WG or RAG Chair, whether created by the resignation of an existing Chair or the expiration of the term of appointment of an existing Chair, a shortlist of nominees considered to have the necessary attributes to fill the vacant position may be drawn from applications for the position or from a *Register of Interest maintained by AFMA*. A selection panel including representatives from the PZJA Agencies will review the nominee's relevant skills and experience and may interview nominees before candidates are submitted to the PZJA or delegate for consideration and approval.

On behalf of the PZJA, AFMA maintains a *Register of Interest* of suitably qualified persons interested in being appointed to the position of Chair of a MAC, SAC, WG or RAG. From time to time AFMA may advertise nationally for nominations to this Register.

10.1.3 Acting Chair

The PZJA or delegate may appoint a person to act as the Chair of a MAC, SAC, WG or RAG during:

- a vacancy in the office of Chair (whether or not an appointment has previously been made to the office); or
- any period, when the Chair is absent from duty or from Australia or is, for any other reason, unable to perform the duties of the office.

A person appointed to act during a vacancy must not continue to do so for more than 12 months.

10.2 Protected Zone Joint Authority (PZJA) Agency Members

10.2.1 Roles

The role of an AFMA and QDPI&F member of a MAC, SAC, WG or RAG is to:

- participate in general discussion;
- contribute fisheries management expertise to deliberations;
- provide advice on relevant Government policy and the process required for policy development and change;
- ensure that the MAC, SAC, WG or RAG is aware of, and fully understands, PZJA policy and obligations under its governing legislation; and
- seek and provide additional information on Government policy as necessary.

The views expressed and the policies advocated by AFMA and QDPI&F members are to be considered those of their relevant organisations.

The role of the TSRA member of a MAC, SAC, WG or RAG is to:

- assist and support the traditional inhabitant members and provide fisheries expertise.

10.2.2 Selection/Appointment Procedure

AFMA, QDPI&F and TSRA will nominate officers to a MAC, SAC, RAG and WG at the organisations' discretion.

10.3 Industry Members

10.3.1 Role

The role of an industry member of a MAC, SAC, WG or RAG is to:

- contribute knowledge and experience relevant to the particular fishery and the fishing industry generally;
- contribute fisheries expertise to achieve the best management of the fishery; and
- regularly report to and liaise with other operators in the fishery on the MAC, SAC, WG or RAG activities, including the issues being dealt with and the possible solutions being considered.

10.3.2 Selection/Appointment Procedure

The PZJA considers the selection of the industry members to a MAC, SAC, WG or RAG to be critical to the success of the Committee/Group. These individuals must have

the capacity to put views clearly and concisely and be prepared to negotiate to achieve acceptable compromises when necessary. Industry members should not have commercial interests in the same company as another member/s of the same committee or group. Above all, they must have credibility within the industry and the ability to address issues with the best interests of the fisheries in mind.

Industry members will normally be appointed through the following process:

- all operators in the fishery will be invited to nominate for consideration for appointment as a MAC, SAC, WG or RAG industry member. Relevant industry organisations will also be informed to allow them to canvass within their membership for nominations;
- interested operators will be required to complete a nomination form which is included with the invitation to nominate. This form sets out the nominee's personal details and provides space for nominees to outline the particular skills and expertise they can bring to the MAC, SAC, WG or RAG. Industry organisations can provide statements of support to individuals who nominate themselves; and
- an Assessment and Ranking Panel (the Panel) will be formed to consider nominations and make recommendations to the PZJA or delegate. The Panel will usually comprise the MAC, SAC, WG or RAG Chair, PZJA agency representatives and an industry member of standing in the fishery. The Executive Officer of the MAC, SAC, WG or RAG will act as secretariat to the Panel.

To facilitate the short listing process, the Panel may interview potential appointees, either in person or by telephone. Where candidates are well known to agencies and in the interests of cost-effectiveness, the requirement to conduct interviews may be waived.

The PZJA or delegate will determine industry member appointments on the advice of the Panel.

In considering each nomination, the Panel assesses whether the applicant is a fit and proper person for the purposes of MAC, SAC, WG or RAG membership. If the Panel identifies any issue that is likely to adversely effect:

- the applicant's ability to perform his/her role as an industry member;
- the PZJAs credibility; or
- the applicant's credibility with industry or other stakeholders.

The Panel may advise the PZJA or delegate that the applicant is unsuitable for appointment to the MAC, SAC, WG or RAG. The Panel may also consider that an applicant is not a fit and proper person if the applicant has been convicted of a fisheries offence and if the Panel believes that the conviction may compromise either the PZJA, or the applicant's credibility, or the applicant's ability to perform his/her duties as a member of a MAC, SAC, WG or RAG.

While the PZJA or delegate may consult with industry organisations in the selection of industry members, once appointed, industry members are required to act in accordance with the duties and obligations of MAC, SAC, WG and RAG members as set out in this paper. This means their contribution must be in the best interests of the fishery, rather than as an advocate of the industry sector that nominated them. Industry members are not representatives of particular sectors or interest groups.

10.4 Scientific Member

10.4.1 Role

A Scientific member of a MAC, SAC, WG or RAG should be independent of commercial interests in the fishery. The role of the scientific member is to:

- contribute impartial scientific and/or economic expertise to MAC, SAC, WG or RAG deliberations; and
- provide advice to the MAC, SAC, WG or RAG on the latest scientific or economic developments of relevance to the fishery.

10.4.2 Selection/Appointment Procedure

The scientific member will be appointed on the basis of his/her scientific or economic qualifications, experience and expertise, knowledge of the fishery and the species being managed and therefore must:

- be a person of seniority and standing in the scientific community;
- have experience in liaising with the major Commonwealth and State fisheries research organisations at the highest level; and
- not have, or be employed by an entity with or representing entities with, commercial interests in the fishery.

Scientific members will normally be appointed through the following process:

- relevant research agencies will be invited to submit nominations for membership on a MAC, SAC, WG or RAG. Nominations may also be sought from appropriate individuals; or
- Calls for applications for the position as scientific members on the TSSAC will be advertise nationally by AFMA.

A selection panel that may include the MAC or Working Group Chair will review and may interview applicants from a shortlist of candidates prior to submission of a preferred candidate to the PZJA Board for consideration and approval.
The PZJA or delegate will determine scientific member appointments after considering nominations and any other information sought or obtained in relation to the nomination.

10.5 Traditional Inhabitant Members

10.5.1 Role

The role of the Traditional Inhabitant Members and traditional fishing representatives is to:

- contribute knowledge of fisheries and communities to a MAC, SAC, WG or RAG;
- contribute fisheries expertise to achieve the best management of the fishery;
- regularly report to and liaise with other traditional inhabitants in the community on MAC, SAC, WG or RAG activities, including the issues being dealt with and the possible solutions being considered; and
- consult with members of community through local associations and meetings as necessary.

10.5.2 Selection/Appointment Procedure

The TSRA runs an open process to seek members for their community fishers group. Accordingly nomination traditional inhabitant members and the TSRA support member will be sought from the TSRA. AFMA as the agency administering the MACs, SACs, WGs and RAGs appointment process will liaise with the TSRA when member appointments are required.

10.6 Conservation Member - Optional

The PZJA or delegate may appoint a conservation member to a MAC, SAC, WG or RAG if appropriate.

10.6.1 Role

The role of the conservation member is to:

- Contribute ecological knowledge and expertise to MAC, SAC, WG or RAG deliberations;
- Advise the MAC, SAC, WG or RAG on environmental or conservation developments of relevance to the particular fishery; and
- Advise on any implications that MAC, SAC, WG or RAG deliberations and recommendations may have in relation to ecological considerations.

10.6.2 Selection/Appointment procedure

Appointment of conservation members will be done by the PZJA or delegate. Conservation members will be selected on the basis of their ability to fulfill the role outlined above.

Conservation members are not appointed as representatives of a particular sector/s or interest group/s and, once appointed, must act in the best interest of the fishery.

10.7 Other Members

According to the changing needs of the Torres Strait Fisheries, the PZJA or delegate may appoint other persons to a MAC, SAC, WG or RAG as a member, including persons from the general community. On appointment, these members will have the same rights, and be subject to the same obligations and responsibilities, as other members as set out in this FMP.

11. Termination or resignation – Chair and Members

11.1 Termination of appointment

The PZJA or delegate may terminate the appointment of the Chair or any other MAC, SAC, WG or RAG member for:

- misbehaviour or physical or mental incapacity;
- misconduct or non-performance; or
- inefficiency or incompetence.

Misconduct includes, non-observance of confidentiality (e.g. disclosure of data, results or other materials prior to an agreement to circulate, conflict of interest, misleading or misinforming, and making fraudulent travel or expense claims).

Non-performance includes excessive unexplained absences from meetings, repeated non-performance of assigned tasks or failure to participate in discussions in an objective, impartial and constructive manner.

The PZJA has determined that any action by a Chair or member that demonstrates unwillingness or inability to comply with their obligations and responsibilities may constitute misbehaviour and/or inefficiency. As such, non-compliance with the obligations and responsibilities as outlined in this FMP are grounds for termination of appointment.

In addition, any action by a member which results in his/her conviction for a fisheries or related offence during the term of his/her appointment may be considered as misbehaviour and could constitute grounds for termination of appointment.

Appointment may also be terminated if:

- the Chair or member becomes bankrupt, applies to take the benefit of any law for the relief of bankrupt or insolvent debtors, compounds with his/her creditors of makes an assignment of his or her remuneration for their benefit; or
- the Chair or member has a direct or indirect pecuniary interest in a matter being considered, or about to be considered, and the interest could conflict with the proper performance of the member's duties in relation to consideration of the matter, and he/she fails to disclose the nature of the interest at a meeting of a MAC SAC, WG or RAG; or
- the Chair is absent, except with the leave of the PZJA, from two consecutive meetings of a MAC, SAC, WG or RAG; or
- a Member is absent, except with the leave of the Chair, from two consecutive meetings of a MAC, SAC, WG or RAG.

Termination of appointment under this section will take effect when:

- the member has been warned by the MAC, SAC, WG or RAG Chair, or the PZJA Chair in a case of MAC, SAC, WG or RAG Chair non-compliance, that:
  - they have not complied with one or more of their obligations or responsibilities, and
  - the non-compliance is unacceptable, and
- the PZJA Chair or delegate is satisfied the member has a case to answer of non-compliance with their obligations or responsibilities warranting termination of appointment; and
- the PZJA Chair or delegate has asked the member in writing to show cause why their appointment should not be terminated; and
- after at least 14 days have elapsed, the PZJA or delegate has considered the matter, including any response by the member, and made a decision on the member's continuation in their position.

Cancellation of membership may be appealed. The PZJA or delegate will consider any appeals. These appeals must be addressed to the PZJA Chair and lodged, in writing, within 21 days after receiving notice to stand down.

11.2 Resignation

11.2.1 Chair

A Chair may resign from a MAC, SAC, WG or RAG before the term of his/her appointment has expired by forwarding a signed notice of resignation to the PZJA Chair or delegate with a copy to the relevant Executive Officer (EO).

11.2.2 Members

A member may resign from the MAC, SAC, WG or RAG before the term of his/her appointment has expired by forwarding a signed notice of resignation to the MAC, SAC, WG or RAG Chair with a copy to the relevant EO.

12. Other participants

12.1 Permanent Observers

The PZJA or delegate may also appoint other persons who can be expected to make a meaningful contribution to a MAC, SAC, WG or RAG as a permanent observer. Permanent observers are required to participate in discussions in accordance with the obligations and responsibilities set out under this FMP.

Appointment of permanent observers is generally viewed as a transitionary phase which might be prompted by a requirement for additional expertise and balance which cannot be accommodated within the existing MAC, SAC, WG or RAG due to limitations on the number of members. Accordingly, the PZJAs preferred approach is that there be a general move towards appointing permanent observers as full members where appropriate.

As with members, the contribution of permanent observers to the MAC, SAC, WG or RAG discussions and deliberations will be recorded in the minutes of the meeting. While permanent observer contributions will be recorded in the minutes, in the unlikely event that consensus in the MAC, SAC, WG or RAG cannot be reached, only members' views will be included in recommendations put before the PZJA.

The appointment processes for permanent observers will generally mirror those undertaken for MAC, SAC, WG or RAG members – nominations will be sought in the same way as for members and proposed permanent observers will be required to complete a declaration form before being appointed to the MAC, SAC, WG or RAG. There is nothing to prevent the appointment of a permanent observer covering an area of interest for which a member has been appointed.

As for MAC, SAC, WG and RAG members, a permanent observer may resign from the MAC, SAC, WG or RAG before the term of his/her appointment has expired. A resigning permanent observer must give signed notice of resignation to the PZJA Chair or delegate with a copy to the MAC, SAC, WG or RAG Chair. The appointment of a permanent observer may be terminated on the same grounds as any other member.

12.2 Casual Observers

Casual observers are generally welcome to attend MAC, SAC, WG and RAG meetings. Individuals should seek the agreement of the MAC, SAC, WG or RAG Chair to attend a meeting as a casual observer for a particular agenda item or items – either to provide additional advice and expertise which may be required for that meeting or to observe the proceedings of the MAC, SAC, WG or RAG. This is done via contacting the MAC, SAC, WG or RAG Executive Officer.

Attendance by casual observers is to be on the basis that the presence of the casual observer does not inhibit or disrupt formal members from freely contributing to discussions and decisions. Casual observers must follow any directions made by the MAC, SAC, WG or RAG Chair.

Casual Observers are not formally appointed to a MAC, SAC, WG or RAG and do not participate in the decision-making processes.

Papua New Guinea representatives may be granted observer status on any Torres Strait MAC, SAC, WG or RAG. This is an important opportunity to engage PNG in the management of these stocks.

13. Executive Officers (EO)

13.1 Role of Executive Officers

The role of the Executive Officer (EO) is to provide all the necessary secretariat services to ensure smooth operation of a MAC, SAC, WG or RAG. In performing this role, the EO liaises with, and reports to the MAC, SAC, WG or RAG Chair.

13.2 Duties of Executive Officers

While there may be some variation in the duties undertaken by external and internal Executive Officers (EO), in consultation with the Chair they are generally responsible for:

- making arrangements (including booking venues and catering) for meetings of the MAC, SAC, WG or RAG;
- preparing and circulating meeting notices, agendas and agenda papers to members, ensuring a final agenda and papers are provided to the Chair and members at least **10 working days** prior to all meetings of the MAC, SAC, WG or RAG;
- ensuring a Chair's Summary of the MAC, SAC, WG or RAG meeting is prepared and cleared within **five working days** following the meeting;
- ensuring the Chair's Summary is made available to all operators and others with an interest in Torres Strait fisheries (or in the case of a WG or RAG the relevant individual Torres Strait fishery) as soon as practicable following the MAC, SAC, WG or RAG meeting but no later than **10 working days** after the meeting;
- preparing the draft minutes and action sheets from each meeting and submitting them to the Chair for comment and approval within **14 working days** and distributing them to members within **21 working days** after the meeting;
- maintaining files, correspondence lists and follow-up action arising lists relating to the MAC, SAC, WG or RAG business; and
- ensuring that there is positive two way communication between the MAC, SAC, WG or RAG and the participants in the fishery/fisheries and that decisions or recommendations made by the MAC, SAC, WG or RAG and the reasons for them, are well publicised.

In addition, the EO is available to the MAC, SAC, WG or RAG as a resource to conduct research and investigations into matters affecting Torres Strait fisheries. These may, or may not, be directly related to the management of the fisheries. The EO may also be required to undertake surveys of operators in the fishery so that the MAC, SAC, WG or RAG has a better understanding of industry views on major issues under consideration.

The duties of the EO will be determined in consultation with the MAC, SAC, WG or RAG Chair and in the case of an external EO, will be specified in the relevant employment contract or letter or appointment.

13.3 Selection/Appointment Procedure

The Executive Officer (EO) is appointed by AFMA on behalf of the PZJA, not by the MAC, SAC, WG or RAG. An EO may be either internal or external to the PZJA Agencies.

An EO will generally be a person who is involved in the management of the particular fishery and who will undertake the EO role as part of his/her normal duties as a PZJA Agency employee.

14. Meetings

The procedures to be followed for MAC, SAC, WG and RAG meetings are set out in Attachment C.

15. Communication

15.1 General Communication and Liaison Issues

The Chair and members of a MAC, SAC, WG or RAG are expected to develop effective two way communication with the PZJA and any individuals or organisations that have an interest or are engaged in Torres Strait Fisheries, including PZJA Agencies.

The MAC, SAC, WG and RAG Chair and EO carry the major responsibility for communicating with industry and ensuring the flow of information between industry and the PZJA. However the PZJA and Agencies also have a role to play in the communication process.

15.2 Publication and distribution of MAC, SAC, WG and RAG papers

All MAC, SAC, WG and RAG papers are considered to be public documents unless they contain items of specific commercial confidentiality. As such, the PZJA has agreed that MAC, SAC, WG and RAG agendas, agenda papers (other than commercial-in-confidence) and Chair's Summaries should be made available to all stakeholders to facilitate the flow of information between the PZJA, MACs, SACs, WGs and RAGs and those with an interest in Torres Strait Fisheries.

The preferred means for making such information available is via the PZJA website, rather than providing printed copies of papers to individual fishing concession holders or other stakeholders. In accordance with the Government's Online Strategy, it is the PZJAs intention to publish MAC, SAC, WG and RAG papers on the website at the same time they are printed and made available in hard copy. This will mean that papers will be available on the website before they are considered at the MAC, SAC, WG or RAG meeting.

15.3 Reporting

All MAC, SAC, WG and RAG members are responsible for regularly reporting to their stakeholders on MAC, SAC, WG and RAG activities, the issues and possible solutions

under consideration. The MAC, SAC, WG and RAG Chair's Summary report of meetings is available to assist in this process.

The PZJA expects the MACs, SACs and RAGs to keep it informed about what is happening in Torres Strait fisheries, to develop views on issues affecting the fishery and to recommend changes to make management of the fishery more effective. In making recommendations directly to the PZJA, multiple recommendations from MACs, RAGs and SACs are acceptable for particular issues if considered necessary.

In turn, MACs, RAGs and SACs can expect the PZJA to communicate its decisions and the reasons for them to a MAC, RAG or SAC through the PZJA and MAC, RAG and SAC Chairs.

It is expected that each consultative committee or group report discussions through meeting reports, technical working papers and/or fishery assessment reports. The reporting process should not become onerous and should attempt to balance the reporting costs with the benefits achieved through the process.

i. Meeting reports are minutes or the record of a meeting;
ii. Technical working papers are reports tabled and considered during meetings. These are important resources that underpin an overall assessment of the fishery. Technical working papers may not become public documents, but do need to be retained and archived. These documents should be series numbered identifying the Committee or Assessment Group involved, the year produced and the meeting when they were considered. Copies must be provided to the relevant Committee Secretariat for lodgement in the AFMA research library; and
iii. Assessment reports are PZJA publications that are produced annually or periodically, and provide an assessment of the fishery. These assessment reports should generally adopt a standard reporting format for fishery assessment reports. The reports should carry an AFMA and PZJA logo, be series numbered and be made available for public circulation to stakeholders. Copies must be provided to the relevant Committee Secretariat for lodgement in the AFMA research library.

15.3.1 Chair's summary

The PZJA expects the Chair's of a MAC, RAG and SAC to provide it with a formal report (MAC, RAG or SAC Chair's Summary) after each MAC, RAG and SAC meeting. The Chairs of WGs are required to submit a similar report to the relevant MAC Chair.

It is important that the Chair summarises outcomes for each agenda item after the discussion on that item has concluded and at the end of the meeting to aid in reporting outcomes after meetings. The Chair is to be diligent in ensuring that meeting minutes, letters and other correspondence to the PZJA, MAC, RAG or SAC Chair, clearly and accurately describe MAC, SAC, WG or RAG recommendations and alternative options when an agreed position has not been reached.

15.3.2 Self Assessment

All MACs, SACs, WGs and RAGs are to conduct a self-assessment of their performance at least once a year against the following performance indicators set by the PZJA, reporting the outcome to the PZJA:

1. The performance of the MAC, SAC, WG or RAG as a forum for the discussion of matters relevant to the management of the fishery;

2. Ability of the MAC, SAC, WG or RAG to provide advice and make recommendations to the PZJA (or MAC) as appropriate with respect to the management of the fishery;
3. Ability of the MAC, SAC, WG or RAG to provide advice and make recommendations to the PZJA (or MAC) as appropriate on research priorities and projects for Torres Strait fisheries;
4. Standard of liaison by MACs, RAGs or SACs with the PZJA, or by WGs with MACs to ensure that the range of management issues is given the proper attention;
5. Quality of meeting papers;
6. Quality of Chair's performance;
7. Quality of Executive Officer's support services;
8. Quality of PZJA Agency Members' performance;
9. Level of confidence that the MACs, RAGs or SACs views and recommendations are conveyed effectively to the PZJA, or that WGs views are conveyed to MACs; and
10. Rating the dynamics of the MAC, SAC, WG or RAG when in session over the last year.

16. Financial Management

16.1 Fishery Budgets

All MACs and WGs will be asked to provide comment on the draft annual budget for the fishery for consideration by the PZJA.

The draft budget will show the cost of managing Torres Strait fisheries, including surveillance, logbook collection and processing and general administration costs. It will also include the cost of MAC meetings and other specific activities or projects that have been commissioned by MACs.

Comments received from MACs and WGs will be considered by the PZJA Agencies. Once approved by the Agencies, the budget will be used by the PZJA as the basis for determining levies payable by those in the fisheries.

16.2 Annual work planning and budget preparation for RAGs

RAG members may be required to assist in developing an annual, costed work plan for the RAG. The relevant WG and MAC should be consulted and provide comment on whether the budgeted work plan best meets the assessment needs for the fishery. The PZJA may be required to approve the annual work plans and accompanying budgets. The Chair of a RAG may obtain advice on this from the relevant line agency members and if required obtain an application proforma from AFMAs research administrator.

It is the responsibility of a RAG chair to ensure that annual work plans are developed and that applications for funding, where required, are submitted in an accurate and timely fashion.

16.3 Travel Expenses of Members

The policy concerning the travel allowances to MAC and SAC meetings for members and other participants, and to WG and RAG meetings for members is contained in Attachment D.

16.4 Remuneration for inter-sessional work

It is expected that a significant amount of MAC, SAC, WG or RAG work will be conducted between formal meetings. The PZJA will consider claims for reimbursement of such inter-sessional work where it can be demonstrated that a member's contribution to MAC, SAC, WG or RAG inter-sessional work is outside the normal business of the member's agency providing the services. This is a matter for consideration by the PZJA when determining budgets. Remuneration provision for inter-sessional work will be specified in member contracts at the time of appointment where appropriate.

Claims for inter-sessional work benefiting a MAC, SAC, WG or RAG should be budgeted, and reasonable. Remuneration can be claimed by lodgment of a tax invoice with AFMA and should be supported by a documentary record of the actual staff time inputs to MAC, SAC, WG or RAG work. AFMA, on behalf of the PZJA, reserves the right to inspect such records, before approving payment of claims for inter-sessional work.

16.5 Remuneration for Chairs and SAC/RAG Scientific Members

The PZJA accepts that the duties of Chairs and SAC/RAG scientific members require high-level skills and carry obligation and responsibility. In order to attract and retain suitable people, remuneration for these duties may be considered. The level of remuneration is not fixed, but may be negotiated between AFMA and the chairperson/scientific members. Approved Chair/scientific member remuneration will be specified in the relevant contract at the time of appointment.

16.6 Consultancies

In order to accomplish work plans MACs, SACs, WGs or RAGs may, from time to time, require the specialist skills or services of people not already members of the MAC, SAC, WG or RAG. In these instances and for specific defined tasks, the chairperson may engage consultants. Work plans must anticipate these needs and budgets need to provide for any consultancy fees to be paid.

Consultants should be engaged under an AFMA contract. Preparation of such a contract is the responsibility of the AFMA Research Manager in consultation with the MAC, SAC, WG or RAG chairperson. (For further information on contracts refer to the AFMA Research Manager).

17. Consultative Committees

The PZJA may establish committees, other than a MAC, SAC, WG or RAG to assist it in the performance of its functions.

ATTACHMENT A

Legislative Objectives and Functions

Governing and guiding the PZJAs fisheries related activities are the legislative objectives contained under the provisions of sections 8 and 34 of the *Torres Strait Fisheries Act 1984*.

8 Objectives to be pursued

In the administration of this Act, regard shall be had to the rights and obligations conferred on Australia by the Torres Strait Treaty and in particular to the following management priorities:

(a) to acknowledge and protect the traditional way of life and livelihood of traditional inhabitants, including their rights in relation to traditional fishing;
(b) to protect and preserve the marine environment and indigenous fauna and flora in and in the vicinity of the Protected Zone;
(c) to adopt conservation measures necessary for the conservation of a species in such a way as to minimise any restrictive effects of the measures on traditional fishing;
(d) to administer the provisions of Part 5 of the Torres Strait Treaty (relating to commercial fisheries) so as not to prejudice the achievement of the purposes of Part 4 of the Torres Strait Treaty in regard to traditional fishing;
(e) to manage commercial fisheries for optimum utilisation;
(f) to share the allowable catch of relevant Protected Zone commercial fisheries with Papua New Guinea in accordance with the Torres Strait Treaty;
(g) to have regard, in developing and implementing licensing policy, to the desirability of promoting economic development in the Torres Strait area and employment opportunities for traditional inhabitants.

34 Functions of Joint Authority under this Act

Where there is in force an arrangement under this Part under which the Protected Zone Joint Authority has the management of a fishery and the fishery is to be managed in accordance with the law of the Commonwealth, the Protected Zone Joint Authority has the functions of:

(a) keeping constantly under consideration the condition of the fishery;
(b) formulating policies and plans for the good management of the fishery; and
(c) for the purposes of the management of the fishery:
    (i) exercising the powers conferred on it by this Part; and
    (ii) co-operating and consulting with other authorities (including Joint Authorities established under the *Fisheries Act 1952* or the *Fisheries Management Act 1991*) in matters of common concern.

ATTACHMENT B

EXAMPLE ONLY – NOT FOR USE

Chair
Protected Zone Joint Authority
C/- Communications and Planning Section
Australian Fisheries Management Authority
PO Box 7051
Canberra Business Centre ACT 2610

Dear Chair

I refer to my proposed appointment as the …….. ……. Member/Permanent Observer on the ……MAC/SAC/WG/RAG.

In compliance with the PZJAs requirements prior to appointment to this position, I advise that:

(i) I have read, and understand, PZJAs Fisheries Management Paper covering MACs, SAC, WGs and RAGs; and
(ii) I understand that, if my appointment is confirmed, I must disclose any relevant conflict of interest during the course of all MAC/SAC/WG/RAG meetings at which I am present.

I also give my assurance that I will endeavour to participate in discussion in an objective and impartial manner and that I will serve the best interests of the above mentioned MAC/SAC/WG/RAG and of the fisheries, and hold up the PZJAs legislative objective.

Yours sincerely

Signature ……

Name (please print) ……

Mailing Address ……...

Daytime Telephone No.……

Mobile Telephone No. ……

Daytime Fax No. ……

Email Address ……

Date ……

ATTACHMENT C

Procedural Matters

The Torres Strait MACs, SACs, WGs and RAGs will operate in accordance with the following procedures:

1. Notice of a meeting

Except in exceptional circumstances, notice of a meeting shall be forwarded by the Executive Officer to all members no less than **20 working days** prior to a meeting being held. The notice shall call for agenda items and stipulate:

- the date of the meeting
- the time the meeting will commence
- the venue for the meeting
- the proposed business to be dealt.

The notice shall be sent to every member of the MAC, SAC, WG or RAG whether they are able to attend the meeting or not. The issue of a notice of the meeting to all members before the meeting is held is necessary for the meeting to be correctly constituted.

Full use of the PZJA web page should be made to assist in the communication of papers and other relevant information concerning the MAC, SAC, WG or RAG.

2. Quorum

A quorum is the minimum number of persons who need to be present to constitute a valid meeting. If a meeting is not properly constituted, it cannot conduct business in a valid manner. For resolutions of a meeting to be valid the number of Members necessary to form the quorum must be present throughout the meeting.

A sensible size for a quorum is a sufficient number of members to conduct business with an adequate spread of responsibility, experience and representation. In the case of MACs, SACs, WGs and RAGs, the number shall be two-thirds of the members.

3. Agenda

An agenda is more than a list of items or a guide to matters to be dealt with at a meeting. It provides a program to aid consideration of each item and allow the business of the MAC, SAC, WG or RAG to proceed in a logical, orderly and timely manner. It also provides a basis on which to write the minutes of the meeting.

Members are encouraged to provide input to the development of the draft agenda. Where significant business is proposed by a member, the agenda item supporting papers must be submitted to the EO by the member no less than **15 working days** before the meeting and be accompanied by a brief explanatory note setting out the main points to be considered. Otherwise, special items can only be submitted with the concurrence of the Chair.

All MAC, SAC, WG and RAG papers are to be considered public documents unless they contain items of specific commercial confidentiality.

Irrespective of the time frames specified in this section, it is the responsibility of the MAC, SAC, WG or RAG Chair to ensure the timely availability of agenda and other papers to all members prior to meetings.

The EO shall prepare the agenda in consultation with the Chair which is to be sent out to MAC, SAC, WG or RAG members, with papers and other information **10 working days** prior to the meeting. Papers are also to be sent to the AFMA Web Administrator (webadmin@afma.gov.au) at least 10 working days prior to the meeting to allow posting on the PZJA website.

The agenda should have items listed in the following order:

- **Chair's Opening Remarks**

  Provides the Chair with an opportunity to make any opening remarks to set the tone of the meeting, welcome any visitors etc.

- **Review and adoption of the agenda**

  Provides an opportunity for members to review the agenda and either confirm its adoption or make any necessary adjustments.

- **Declaration of Interests**

  This gives members an opportunity to declare any interest/s they may have in relation to the matters being considered by the MAC, SAC, WG or RAG. Interests may be declared in relation to a specific agenda item or items or be of a standing nature.

- **Apologies**

- **Minutes of the Previous Meeting on (date)**

  This gives those present the opportunity to be satisfied about the correctness of those minutes as a record of the proceedings of that meeting. It also serves as a reminder of decisions made by, and progress reported at, the last meeting and thus of matters which remain pending, decisions still to be made and developments about which reports should be forthcoming.

- **Outcomes of the meeting of the PZJA on (date)**

  The outcomes of the most recent meeting of the PZJA will be reported.

- **Business Arising from the Minutes**

  While the immediate consideration of any business that arises from the minutes of the previous meeting is normal, it may be appropriate for some issues to be

dealt with as individual items later in the agenda.

- **Routine Items**

  Regular business which comes before the MAC, SAC, WG or RAG (such as correspondence etc.) should be dealt with at an early stage in the meeting to enable such items to be dealt with expeditiously, but without undue haste. Reports of the SACs, WGs and RAGs and of each individual fishery will be discussed at this point during a MAC meeting.

- **Business Items to be Dealt With**

  The order in which business is dealt with at a meeting needs to take account of business items arising from the previous meeting and the possible effects on later agenda items. Business items should be structured logically and the sequence of items should not be changed unless to achieve some worthwhile benefit and then only after adequate consideration.

- **Other Business**

  This item provides for the consideration, if only in a preliminary way, of any unexpected or fresh and important business; it also enables up-to-date information on matters of passing interest to be reported and noted at the time rather than wait for the next meeting. As a general rule, items under this agenda heading should not go beyond the scope of the notice for the meeting. At this point the date of the next meeting is discussed.

4. Attendance of Casual Observers

Casual observers are welcome to attend MAC, SAC, WG and RAG meetings. Casual observers may participate at the discretion of the Chair where he or she deems it consistent with the efficient and effective operations of the MAC, SAC, WG or RAG. Casual observers must respect the need for orderly management of the business before the MAC/SAC/WG/RAG and the rights of others in the meeting. Casual observers must follow any directions made by the Chair.

5. Rules of Debate

Rules of debate have no legal authority and it is not necessary to apply such rules at a meeting. However, adherence to conventional rules of debate provides a Chair and others with confidence that a meeting will be conducted in an orderly fashion, with good manners and common decency.

In the case of MAC, SAC, WG and RAG meetings, it is unlikely that the rules of debate will need to be enforced. Rather, issues should be discussed in a co-operative, informal and consultative manner with resolutions being normally arrived at through consensus. At the same time, it is important for members to appreciate that the business of a meeting will be expedited by their personal observance of the general rules of debate and their support for the maintenance of order.

6. The Minutes

Once a MAC, SAC, WG or RAG meeting is completed, the Chair is responsible for formally communicating the outcomes of the meeting, including recommendations and matters for information, to the PZJA Chair (in the case of a MAC or SAC) or to the MAC Chair (in the case of WGs or RAGs) for consideration and to the industry for information. It is a function of the EO to assist the Chair in preparing the minutes of the meeting as well as the Chair's Summary.

Minutes may be defined as the official, permanent, written record of the business transacted at a meeting. They should be accurate, concise and articulate, being free from ambiguity or uncertainty. Where there is, by necessity, substantial and significant detail covered in the MAC, SAC, WG or RAG meeting, the minutes need to reflect this level of detail.

As a general rule, minutes should be expressed in words, phrases and sentences which are free from errors of grammar and syntax. They should preferably be without clichés, jargon, fashionable words or unnecessary detail.

The minutes need to include:

- day and date of meeting
- place of meeting
- names of those present
- apologies
- reference to the minutes of the previous meeting and the signing of them as a correct record of the proceedings of that meeting by the Chair
- record of agenda items discussed, including agreements reached, action required, and the MACs, SACs, WGs or RAGs decision/s in regard to any declared conflict/s of interest
- date and time for the next meeting
- time the meeting closed

Draft minutes are to be written up and submitted to the Chair for comment and approval within **14 working days**, and distributed to members within **21 working days** after the meeting. Minutes are also to be sent electronically to the AFMA Web Administrator (webadmin@afma.gov.au) for posting on the PZJA website.

MAC, SAC, WG or RAG Chairs must not allow members who are absent from meetings to have separate notes or views attached to minutes, however absentee members may convey views in writing to the MAC, SAC, WG or RAG prior to the meeting.

ATTACHMENT D

TRAVEL EXPENSES

Members of travelling on MAC, SAC, WG or RAG business will be paid travel expenses reasonably incurred in connection with RAG business. Normally, this is reimbursement of airfares at the economy class rate, reimbursement of receipted expenditure for accommodation costs, meals and incidental expenses in accordance with AFMAs (as a PZJA Agency) staff travel policy.

To claim reimbursement for expenses incurred while on MAC, SAC, WG or RAG business, members must provide AFMA with a tax invoice with any relevant supporting documentation such as airline tickets, receipts for accommodation, meals, taxis and parking vouchers etc.

No allowance is payable if there is not an overnight stay. However, members may claim reimbursement of any meal expenses incurred by them during the day of a MAC, SAC, WG or RAG meeting not involving an overnight stay. Claims for reimbursement must be accompanied by a valid receipt or tax invoice and approval is at the discretion of PZJA Agency staff.

If a Member would like payment of travel costs to be made to their employer or business, then they must either submit a tax invoice from their employer or business or enter into a signed Recipient Created Tax Invoice (RCTI) agreement with AFMA. An RCTI agreement form can be obtained from AFMAs Finance Manager.

All flights to MAC, SAC, WG and RAG meetings should be booked through AFMAs travel provider. The cost of the flight will be charged directly to AFMA.

Members of a MAC, SAC, WG or RAG who are employed by a Commonwealth or State organisation that has their own discounted travel arrangements, may book flights through their own system. AFMA will reimburse their employer on submission of a valid tax invoice.

The claim form for travel expenses is attached.

Australian Government
Australian Fisheries Management Authority

CLAIM FOR EXPENSES AND ALLOWANCES FOR OFFICIAL ATTENDANCE AT A COMMITTEE (MAC, SAC) OR GROUP (WG or RAG) MEETING

DETAILS OF MEMBER

Name…… ABN*…… Phone No……..…

Address……. Fax No…….

DETAILS OF MEETING

Name of Committee/Group……	Meeting place……..…
Meeting date……..……..…….	Meeting time……..…….

DETAILS OF TRAVEL

Start: Place…… Time……... Date…..……

End: Place…… Time……... Date…..……

Was this travel by the most direct route? Yes ☐ No ☐

If no, please provide comments ..……

……

Method of travel: ☐ Plane (go to section A)
☐ Vehicle (go to section B)

Section A - DETAILS OF FLIGHT (attach tax invoice*)

Outward: Date…….. Depart……..…… Arrive……..……
Return: Date…….. Depart……..…… Arrive……..……

Are you claiming reimbursement for total cost of the airline ticket?

Yes ☐ No ☐ Comments …..…… .

……

Section B - DETAILS OF VEHICLE

Distance travelled by direct route ……..……km Engine size……..cc

Section C - DETAILS OF EXPENSES (attach tax invoices*)

Taxi $……..……..Parking $……..……..Other $..……

SIGNED ……..……..……INVOICE DATE…….……

ATTENDANCE VERIFIED ……

(AFMA use only)

	No.	$
Complete days		
Less meals provided		
Travel allowance payable (6410)		
Cost of ticket *		$
Deductions		
Net cost (6420)		
Rate…….c/km (6430)		$
Expenses *		$
TOTAL PAYABLE $		

THE TOTAL PAYABLE INCLUDES GST

COST CENTRE ……..……TOTAL PAYABLE APPROVED BY……

*Official MAC/WG/RAG/SAC members do not need to provide an ABN. Costs should be entered including GST, where applicable. AFMA can recover GST on reimbursements where an original tax invoice is attached. If the member's business is paid then the member must provide the business' ABN. AFMA can recover the GST from payments to those members only if they have signed an RCTI agreement or provide their own tax invoice

PZJA TORRES STRAIT FINFISH RESOURCE ASSESSMENT GROUP	Meeting 1 9-10 November 2017
RAG UPDATES Industry member and strategic issues updates	Agenda Item No. 2.1 For noting

RECOMMENDATIONS

That the RAG:

1. **NOTE** any updates on catch, research, marketing, trends or issues from the Torres Strait Finfish Fishery and adjacent jurisdictions relevant to the Torres Strait Finfish Fishery.

2. **DISCUSS** and provide **ADVICE** on key strategic issues affecting the fishery.

KEY ISSUES

1. The RAG is tasked with developing an understanding of any matter relevant to the resource within the Torres Strait Finfish Fishery and also within adjacent jurisdictions such as Papua New Guinea, Queensland and the Northern Territory. Developing this understanding will make sure that the proceedings of the RAG are well informed and that all information is considered when addressing resource issues.
2. RAG members are asked to provide any relevant updates on catch, research, marketing, trends or issues from the Torres Strait Finfish Fishery and adjacent jurisdictions.

BACKGROUND

3. The Finfish RAG has yet to consider this agenda item.
4. At its March 2017 meeting the Finfish Working Group noted the following updates from members on a similar agenda item:

   The FWG noted the following update by industry members and observers on recent fishery performance, trends, activities and issues occurring in the Torres Strait finfish and relevant fisheries issues:

   - industry is eager for more Traditional Owners to enter the Finfish Fishery.
   - Meriam fishers have been successfully increasing their effort with recent finfish catches around 500kg per day being taken by five to six dories. This catch is being frozen for the local market and also being sent to Cairns via barge.
   - more representation from active fishers is needed on the working groups to ensure on-water fishing practices and business development issues were understood. It was also noted that this would broaden the on-water knowledge base of how data is used for fishery management purposes and could facilitate uptake of logbooks. An active fisher from Mer (e.g. Alan Passi), should be invited to the next FWG meeting as an observer for this purpose.
   - a new finfish business is being established at Poruma.

- local restaurants are seeking locally caught Spanish mackerel but are finding supply difficult.

- the Ugar industry association is working to develop a five year business plan following on from its success with its bech de mer. The plan will assist the association to become commercially independent. The association is advocating for a similar joint business plan to be developed among the eastern communities. This association is seeking to have this done prior to making investments in things such as freezers to ensure smart/viable investments are made.

The FWG noted the following update from the QDAF member:

- QDAF reported that coral trout caught southwards of Bowen attract a price premium of $5 to $10 per kilogram due toa market preference for fish with a strong red colouration.

- QDAF member advised that some east coast operators were currently tied up due to not being able to acquire coral trout quota.

The FWG noted an update on the FRDC funded project on scoping the development of Barramundi, jewfish and crab fisheries in the top-western waters of the Torres Strait by Andrew Tobin, the Principle Investigator for the project.

Dr Tobin advised that the project has four elements:

1. A desktop scoping study. Collate past research findings etc.

2. Field surveys to understand local stock abundance and whether it could support a local fishery. Aim to commence field work after Easter.

3. A stop-go review to determine if there is enough industry interest and stock available to justify proceeding with the study.

4. An evaluation of infrastructure, skills and business needs to support an active fishery.

The FWG noted the PZJA will likely require advice from the FWG to evaluate any proposal to develop and/or expand new fisheries to ensure they are sustainable. The FWG encourage early engagement with the FWG to ensure any future proposals may be considered in a timely manner.

Dr Tobin also noted that a PZJA scientific permit will be required to undertake the field activities.

Speaking on behalf of Malu Lamar, the representative requested that the PBCs in the relevant communities be engaged as soon as possible and that the terms and conditions of the work for this project be clearly agreed.

PZJA TORRES STRAIT FINFISH RESOURCE ASSESSMENT GROUP	Meeting 1 9-10 November 2017
FINFISH RAG UPDATES Management update – 2016-17 season summary	Agenda Item No. 2.2 For NOTING

RECOMMENDATIONS

That the RAG **NOTE** the reported fishing activity for the Torres Strait Finfish Fishery and general updates from management.

RECENT FISHERY CATCHES

1. Reported fishing activity in both the Spanish mackerel and reef line sectors of the fishery has been relatively stable since the 2008 buyout and commencement of the leasing arrangement (**Attachment A**). Both coral trout and Spanish mackerel stocks are classified as not overfished or subject to overfishing.
2. Since 2008-09 catches of Spanish mackerel have generally been around 80-100 tonnes. Recent catches of Spanish mackerel have been:
    - **83.9** tonnes in 2014-15
    - **86.9** tonnes in 2015-16
    - **93.2** tonnes in 2016-17 (last season)
3. Annual catches of coral trout have been below 50 t for the last 10 years. Recent catches have been:
    - **21** tonnes in 2014-15
    - **38.4** tonnes in 2015-16.
    - **25.7** tonnes in 2016-17 (last season)
4. Annual catches of other reef-line species (e.g. barramundi cod, red emperor) have been below five tonnes in recent years, Recent catches (all species combined) have been:
    - **2.1** tonnes in 2014-15
    - **3.9** tonnes in 2015-16
    - **4.4** tonnes in 2016-17
5. Finfish catches reported by Traditional Inhabitant licenced (TIB) fishers through a voluntary reporting system (referred to as the docket-book system) remains low, generally less than 1 tonne per season in recent years. However, this is likely to be an underestimate due to catch reporting being voluntary for the TIB sector. Mandatory Catch Disposal Records for both sunset and TIB fishers will be implemented on 1 December 2017 and likely begin yielding improved landing data after this time. Daily logbook reporting by TIB licenced fishers will remain voluntary however this is encouraged.
6. AFMA is aware of growing interest and preparation among some TIB operators to increase their effort in the Finfish Fishery.
7. The 2016-17 season saw the first landing of live Torres Strait coral trout and barramundi cod since the 2011 removal of the live-take prohibition. The seasons live reef fish were reportedly sold live for export into the Asian market for a premium prices – as per the existing east coast trade. Prior to last season the removal of the ban on live exports in

Torres Strait had done little to increase activity in the fishery, primarily because of difficulties and costs associated with transporting live fish from remote areas.

8. Targeting the Bramble Cay spawning aggregation remains the focus of the Spanish mackerel sector with 88 per cent of the mackerel being captured at this location in the 2016-17 season.

FISHING EFFORT

9. In recent seasons around 400 fishing days have been reported per season by primary boats from the sunset sector targeting mackerel with around 750 tender days per season.
10. In recent seasons around 300 to 350 fishing days have occurred per season in the sunset reef-line sector targeting coral trout with about the same number of tender days.
11. Effort from the TIB sector remains unknown.

GROSS VALUE OF PRODUCTION

12. The gross value of production of the Torres Strait Finfish Fishery as calculated by ABARES in recent years has generally been around $1 million to $1.2 million dollars (Figure 1) based on harvests of 100 to 130 tonnes. Beach price has averaged around $10/kg in recent seasons.
13. Average GVP between 2003-04 and 2007-08 was $3.54 million. The Government funded adjustment occurred in 2008.
14. Reported beach prices for Spanish mackerel in the 2016/17 season averaged $9.20/kg with coral trout at $12.10/kg.

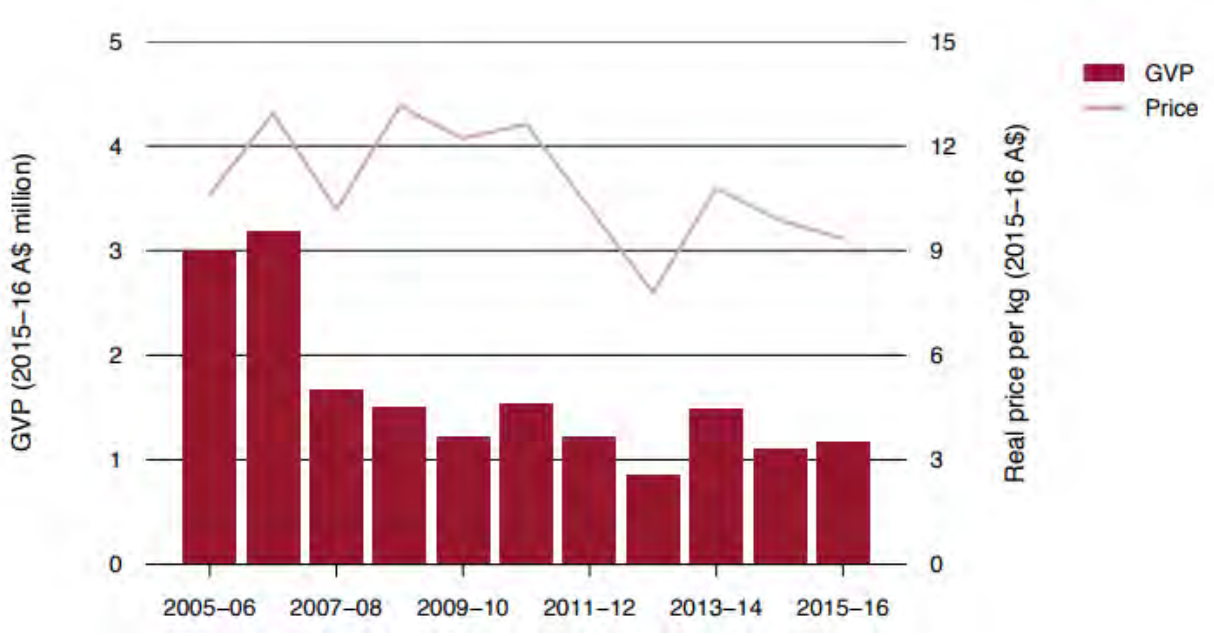


Figure 1. Real GVP and average price per kilogram for the fishery 2005/06 to 2015/16 seasons. (Source: ABARES Fishery Status Reports 2017).

STATUS OF STOCKS – As reported in the *ABARES Fishery Status Reports 2017*

Spanish mackerel stock status

15. Although there is no formal target or limit reference point for the fishery, 0.2 B0 is the proxy limit reference point specified in the *Commonwealth Harvest Strategy Policy* and is used for status determination in the absence of an agreed limit reference point.
16. The 2014 estimates of Spanish mackerel biomass (between 0.4 B0 and 0.6 B0) were above 0.2B0. As a result, the stock is classified as **not overfished**.
17. Reported catches since 2007–08 have been below the range of MSY estimates in the 2016 assessment, and fishing mortality in 2014 was estimated to be below FMSY. On this basis, the stock is classified as **not subject to overfishing**.

Coral trout stock status

18. In the absence of a formal stock assessment, the status of the coral trout stock is evaluated against the results of the MSE, combined with a comparison of the 2015–16 catch with the historical catch record (Figure 16.2).
19. The biomass in 2004 was estimated to be more than 60 per cent of unfished levels (Williams et al. 2011, 2007).
20. Commercial catch in recent years has been below the historical catch levels and well below the lowest catch level simulated in the MSE (80 t per year).
21. The results of the 80 t catch simulation indicated that the stock would increase to more than 80 per cent of the unfished biomass within 20 years at that catch level (Williams et al. 2007, 2011).
22. As a result, the stock is classified as **not overfished** and **not subject to overfishing**.

ENVIRONMENTAL APPROVALS and TEP interactions

23. The Finfish Fishery is included on the List of Exempt Native Specimens under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and has export approval until 22 December 2017.
24. No ecological risk assessments have been conducted for the fishery.
25. The most recent strategic assessment report (AFMA 2012) assumes that the impacts of fishing on the ecosystem are restricted to anchoring, mooring and other anthropogenic activities; vessel accidents, leading to pollution such as oil spills; and potential translocation of species via hull and anchor fouling. The report concludes that direct impacts on the environment are likely to be minimal because of the low-impact nature of the hook-and-line fishing methods used in the fishery.
26. No interactions with species protected under the EPBC Act were reported in the fishery in the 2016/17 season.

Table 1. Summary of status of the Torres Strait Finfish Fishery. *Source: ABARES Fisheries Status Reports 2017.*

Status	2015		2016		Comments
Biological status	**Fishing mortality**	**Biomass**	**Fishing mortality**	**Biomass**	
Coral trout (*Plectropomus* spp., *Variola* spp.)					Management strategy evaluation testing suggests that current catches are well below the level likely to lead to biomass declines. Most recent biomass estimate indicated a biomass above $0.6B_0$.
Spanish mackerel (*Scomberomorus commerson*)					Current fishing mortality rate is below that required to produce MSY. Most recent estimates of biomass are above B_{20}.
Economic status	Estimates of NER are not available. Economic performance in 2015–16 remains uncertain despite an increase in GVP, because of the lack of clarity around fishing effort levels by the TIB sector. The first export of live coral trout from the fishery in 2016–17 is a positive sign for NER.				

Notes: B_0 Unfished biomass. B_{20} 20 per cent of unfished biomass. **GVP** Gross value of production. **MSY** Maximum sustainable yield. **NER** Net economic returns. **TIB** Traditional Inhabitant Boat.

Fishing mortality	Not subject to overfishing	Subject to overfishing	Uncertain
Biomass	Not overfished	Overfished	Uncertain

FISH RECEIVER SYSTEM

27. On behalf of the PZJA AFMA is currently working to replace the existing Torres Strait Seafood Buyers and Processors Docket Book system with a mandatory Fish Receiver System for all the Torres Strait Fisheries (excluding Torres Strait Prawn Fishery) by 1 December 2017 noting that the system will require:
    a. all licence holders (including Traditional Inhabitants) to only dispose of commercially caught fish in those fisheries, other than prawn, to a holder of a Fish Receiver (this does not apply to fish caught for personal consumption); and
    b. it will be mandatory for holders of Fish Receiver licences report (to AFMA) specific details of all fish received (landed) for each fisher.

WESTERN LINE CLOSURE

28. The removal of the western closure of the reef-line sector (**Attachment 1, Figure 2**) has been a long standing item which has been supported in-principle by the Finfish Working Group.

29. At the March 2017 meeting the Finfish Working Group again noted that the closure reflects a historical jurisdiction boundary rather than a specific measure for management purposes. An industry member advised that if the area was to be reopened consideration should first

be given to how much fishing the area could support given the different habitat against the potential for alternative livelihoods or business opportunities for traditional owners such as ecotourism. Noting there are no existing agreements in place to guide resource sharing between these sectors (fishing, tourism etc.) the FWG agreed to the following action:

a. AFMA, TSRA and Malu Lamar to meet out-of-session to consider an appropriate process to canvass community aspirations and considerations for removing the western line closure.

30. An out of session meeting of AFMA, TSRA and Malu Lamar on 5 April 2017 resolved that:

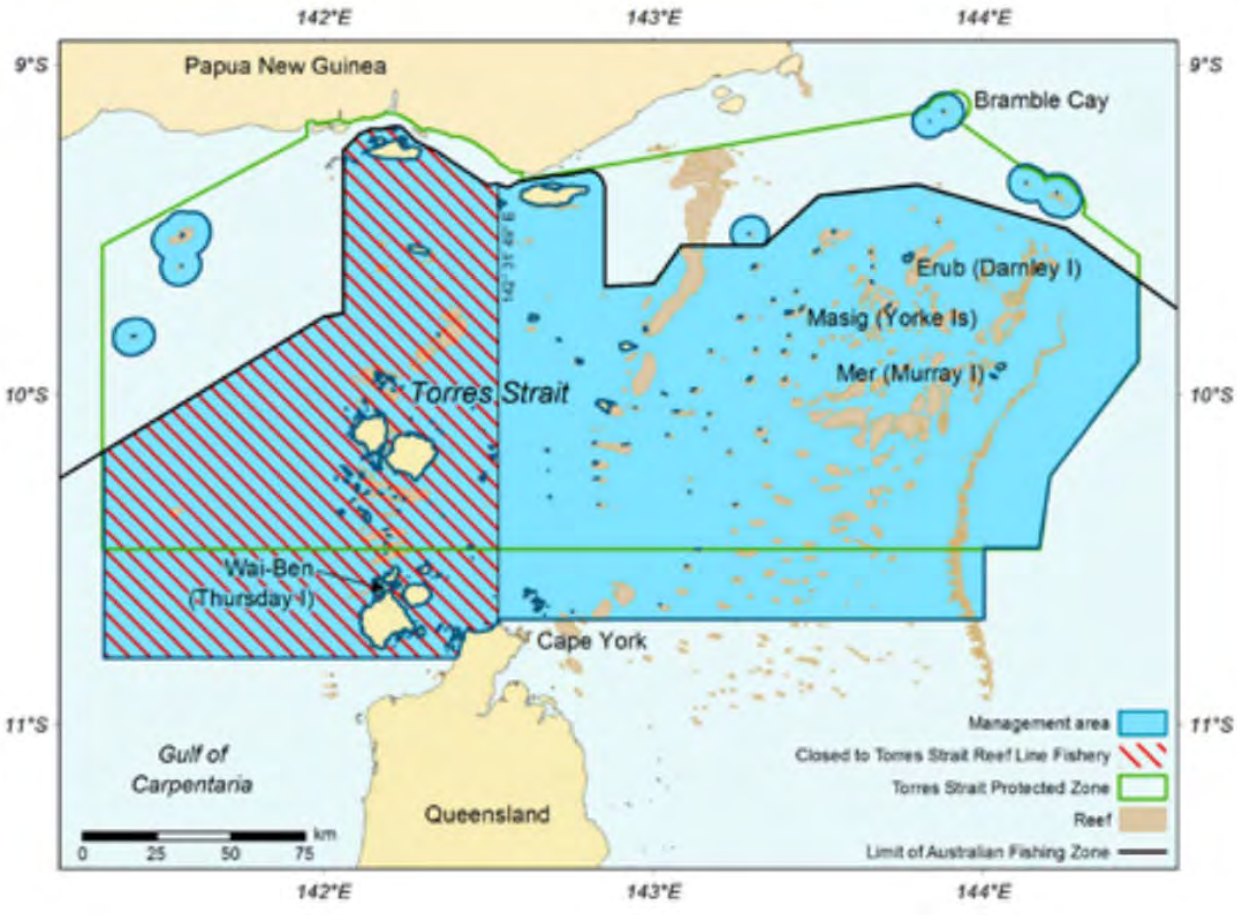
a. Removal of the western line closure is to be contingent on further community consultation with the western communities and consideration of any sustainability risks. The aim of the consultation will be to determine how communities may/or may not like the resources to managed to benefit both commercial and tourism industries.

b. TSRA will lead this consultation process (undertaking meetings / report findings etc). TSRA will undertake consultation opportunistically combining with other meetings (e.g. AFMA fish receiver meetings, top western projects).

c. AFMA will seek scientific advice (through future RAG) on the possible impacts of removing the closure on stocks, noting advice that the fishing grounds/habitat may be different in the west compared to the eastern area. There is concerned that the reefs are shallower and possibly more susceptible to localised depletion.

31. AFMA is seeking RAG views on what inter-sessional work will likely be required to progress this issue (e.g. stock impacts, stock structure, risk assessments).

Figure 2 Map of the Torres Strait Finfish Fishery showing the western line reef-line sector closure.



LIST OF ATTACHMENTS

APPENDIX A – Summary of finfish fishery catch data

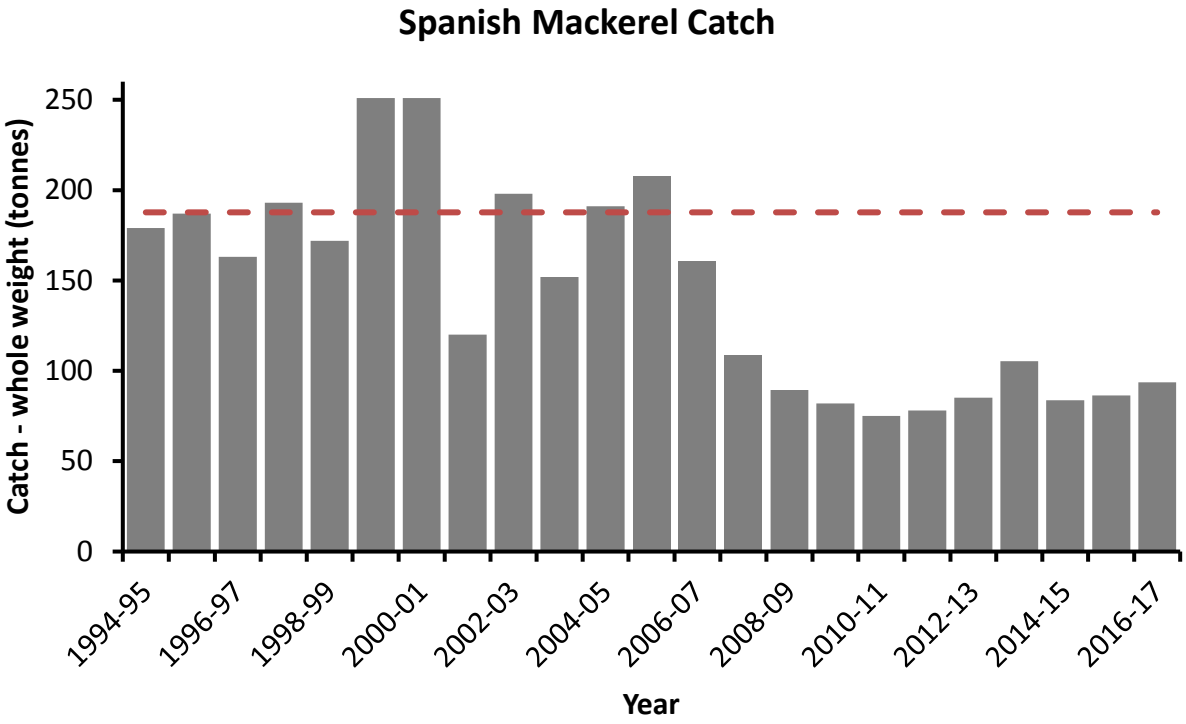


Figure 1: Torres Strait Spanish Mackerel Fishery historical catch records including the previous TAC (187.7t) (source: AFMA docket book/logbook database).

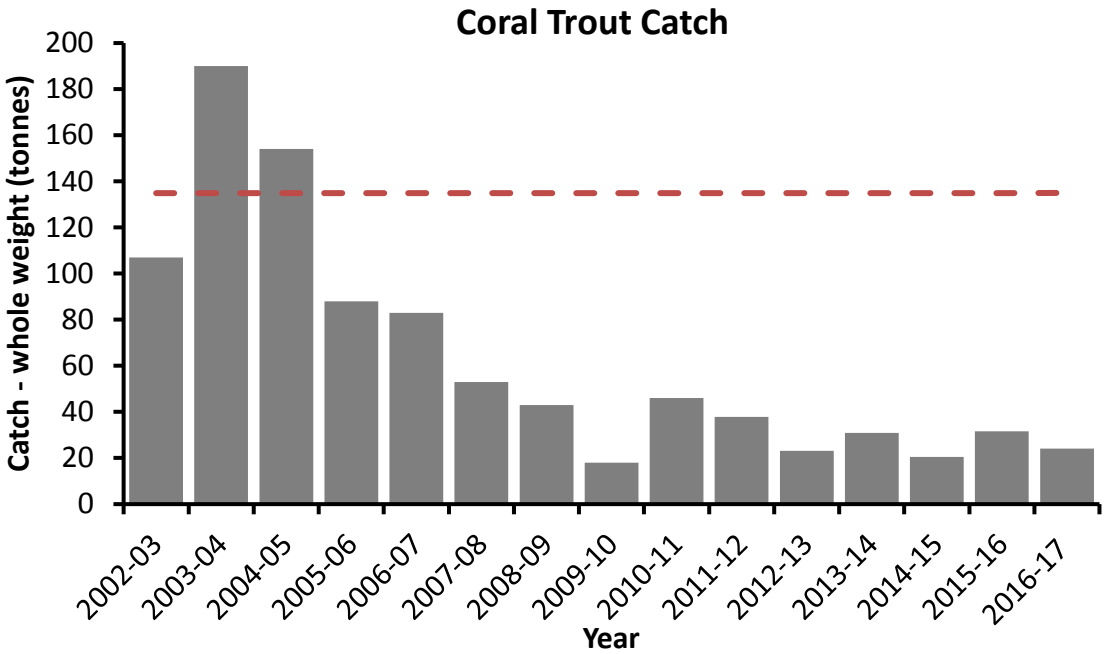


Figure 2: Torres Strait Coral trout historical catch records including the TAC (134.9t) (Source: AFMA docket book/logbook database).

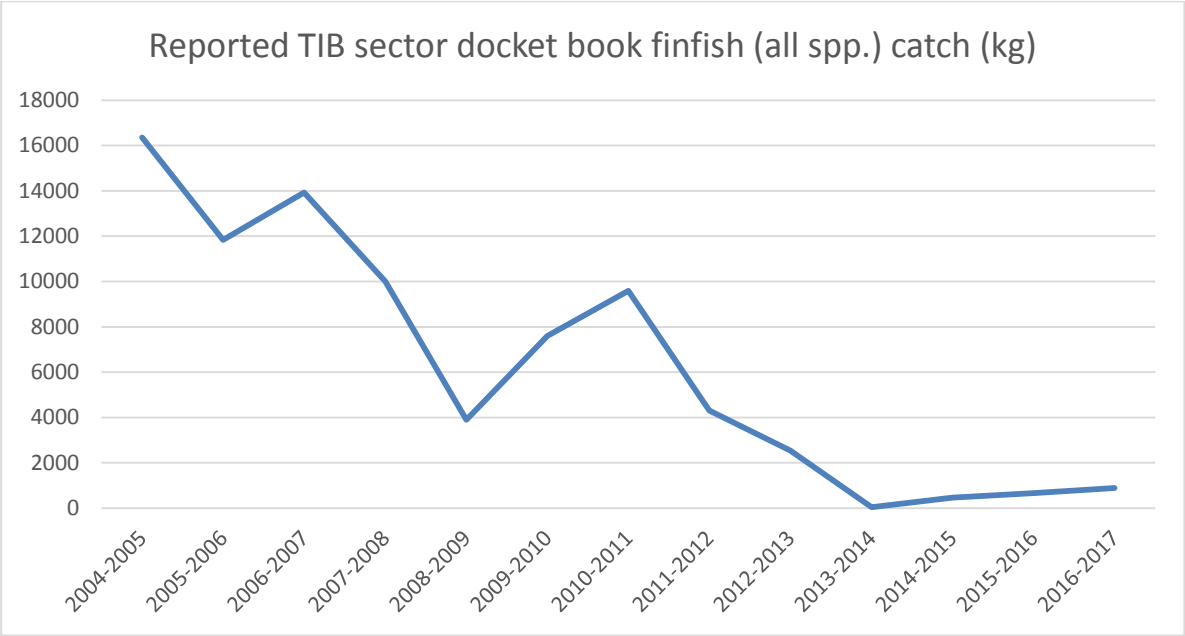


Figure 3. Reported TIB sector docket book catches (fishers selling to buyers) from TDB01 by financial year for all finfish species combined.

Table 1. Seasonal sunset sector catches of other reef-line fish species since the 2008-09 season. Source: AFMA TSF01 logbooks. Average reported seasonal catch of other reef-line species per season is 2.8 tonnes.

Species	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Barramundi cod	542	238	1086	745	429	756	646	1223	782
Red Emperor	223	70	398	202	125	160	207	256	457
Sea Bass	843	10	79				15	84	143
Spangled Emperor	197	68	244	29	35		8	45	56
Emperor	1968				18			4	
Rock cods	125	280	706	1017	480	932	575	1364	655
Trevally	1314					785	649	775	2377
Silver Trevally						172			
Venus Tuskfish		93	341	145	34	79			
Black Kingfish								11	
Jobfish			8					29	
Sea Bream Snapper								43	
Blue-toothed Tuskfish							1	30	
Australian Tusk								4	
Mangrove Jack								9	
Maori Sea Perch								6	
Parrotfishes								6	
Green Jobfish								5	
Total (other species)	**5212**	**759**	**2862**	**2138**	**1121**	**2884**	**2101**	**3894**	**4470**

PZJA TORRES STRAIT FINFISH RESOURCE ASSESSMENT GROUP	Meeting 1 9-10 November 2017
MANAGEMENT ISSUES Short to medium-term data improvements	Agenda Item No. 4.1 For ADVICE

RECOMMENDATIONS

That the RAG:

1. **NOTE** an overview of data issues identified through the recent update to the Spanish mackerel stock assessment; and

2. **DISCUSS** and provide **ADVICE** on any short to medium-term data improvement priorities to be made to Torres Strait Finfish Fishery data to support future management advice.

KEY ISSUES

1. A harvest strategy is being developed for the Fishery. At the last Finfish Fishery Working Group (FFWG) meeting it was agreed that research priorities identified at its meeting in July 2016 would be revisited alongside the development of the harvest strategy. The harvest strategy is expected to assist in identifying future data and research needs.

2. In addition to strategic research needs a range of data needs have been identified (refer to the Background section) particularly during the 2015-2016 update of the Spanish mackerel stock assessment.

3. While AFMA anticipates that the harvest strategy will also guide longer-term strategic data needs for the fishery, AFMA is seeking RAG advice on any priority data-needs in the short to medium term. Subject to available resourcing, a work plan could be developed to begin addressing those data needs alongside the harvest strategy development process.

4. RAG advice is sought on short to medium term priorities for:
    a. how AFMA can improve the reliability of existing data to improve its use for stock assessment purposes; and

    b. how can AFMA improve the utility of existing data collection programs? For example: monitoring and verification that may improve the comprehensiveness and accuracy of fishery dependent data such as logbooks.

5. Additionally, the RAG is asked to give preliminary consideration to suggesting other data collection initiatives that may address our fishery data needs - noting the harvest strategy is under development and the need for cost-effective management.

BACKGROUND

1. Available fishery dependent data for management purposes consists of logbooks supplied by the sunset sector which yield CPUE and spatial data and catch records from docket books supplied by the Traditional Inhabitant Boat (TIB) sector. Docket books

enable broad level reporting of spatial data (large reporting zones) which are not reliably completed and do not provide accurate spatial data.

2. The implementation of a mandatory fish receiver system (catch disposal records for all landed product caught in the Torres Strait) from 1 December 2017 will enable verification of daily fishing logs for the sunset sector. While the revised catch disposal records do have a voluntary section for TIB fishers to report some effort data, this is not mandatory and management does not anticipate that this will yield reliable or comprehensive CPUE data for the TIB sector.

3. With the first catches of live coral trout being taken in the reef-line sector in 2016 (after the 2011 lifting of the live-take ban), there is a need to review the daily fishing logbook. This presents an opportunity to assess the data needs for the fishery and whether there are any barriers to accurate reporting. It is proposed that a workshop be held with fishers in 2018 to get input into this review and to also allow RAG members and harvest strategy project team staff to ground truth data issues with industry.

4. Broad categories of data improvements identified include:

    a. reliability of spatial catch data – need for verification,
    b. incomplete size frequency data,
    c. need to test stock structure assumptions,
    d. CPUE standardisation issues:
        i. how does fisher behaviour influence CPUE – characterise gear setup, are fishers working to freezer capacity, waiting to unload catch to barges etc.?
        ii. improving CPUE date – e.g. recording zero catches, collecting effort data for TIB sector.
    e. possible under reporting of catches, and
    f. potential issue of hyperstability in Spanish mackerel catch data.

5. No fishery independent data is currently collected in the fishery. As the Spanish mackerel stock assessment uses a sex-age structured model the fishery would ideally have in place a program to periodically collect length-frequency and sex data to understand the biological structure of the stock (what aged animals are contributing to the spawning biomass, check the assumptions of fecundity at age, natural mortality etc.)

6. Adjacent jurisdictions such as the Northern Territory have found some utility in crew-based data collection programs such as at-sea length frequency measurement. Such programs are generally feasible for single-piece fishing methods i.e. finfish or shark line fishing methods where one fish at a time is landed and can be sampled.

APPENDIX A
Reported recommendations for data, research and monitoring improvements

Finfish Working Group 12-13 July 2016

The FWG identified the following data and research needs:

Data needs

- Review logbook structure;
- Monitoring of non-commercial take (note partly being addressed through current research project on the traditional take of finfish);
- Improve rate of returns of freezer records for the TIB Sector; and
- Age and length structure data (medium term – relates to Harvest Strategy work, phase 2).

Research needs

- Genetic studies on Spanish mackerel to test single stock theory – particularly if PNG and NE QLD catches increase. This potentially could be achieved by using fishery data, fisher participation and/or a PhD study;
- Management Strategy Evaluation on harvest strategy options; and
- In the event that the western closure line is removed, investigate the potential impact on TAC.

Torres Strait Spanish Mackerel Stock Assessment - O'Neill and Tobin (2016)

The O'Neill and Tobin 2016 assessment made the following research and monitoring recommendations:

a. Verify records on fishing effort and harvest through logbook, docket book and electronic reporting systems [*for harvest and/or standardised catch rate assessments*]. This involves recording and validating:
    i. trip harvests and average fish weights using unload/sale receipts,
    ii. number of dories used and hours fished each operation day,
    iii. the number of and fishing locations of the primary operation and dories using VMS/GPS latitude and longitude coordinates,
    iv. number of fish caught each operation and dory day,
    v. zero catches, and
    vi. days when fishing is stopped due to capacity limitations (too many fish).
b. Monitor and estimate Spanish mackerel harvests taken by non-commercial sectors [*for stock model assessments*].
c. Conduct regular (annual or biennial) long term monitoring of fish age-length structures that are spatially representative of the Torres Strait [*for mortality and/or stock model assessments*].
d. Collect fine scale spatially representative genetic fish samples to test the single stock assumption and define stock boundaries [*for stock model assessments*].

Torres Strait Scientific Technical Finfish Working Group, 10 November 2016

The working group accepted the new assessment as the best available stock assessment for Spanish mackerel whilst also noting sources of uncertainty in the assessment. The working group recognised that a level of uncertainty is expected in fishery stock assessments and that the current assessment should serve to guide future research and data priorities for the fishery.

The Working Group identified the following key uncertainties**:**

1. ***Catch data***: Two potential sources of uncertainty in the catch estimates for the fishery include:
    a. deliberately inflated catch reports ('paper' fish) immediately following the 2002 investment warning. Total catches increased significantly in this period; and
    b. unaccounted changes in the traditional inhabitant (TIB) catch associated with some long term fishers exiting the fishery and some island freezer operations closing down. The working group supported the approach taken for the assessment to impute TIB catch for periods where data are missing based on 18.5% of logbook reported TVH catches.

2. ***Fish vulnerability (availability, selectivity and catchability):*** Industry members advised that operators can target certain sized fish. A better understanding of these behaviours may improve the CPUE standardisation and utility of length frequency samples. By way of example, industry members advised that at times:
    a. some fishers take different size classes of fish due to their gear setup;
    b. fishers limit effort and catches according to onboard / shore based freezer capacity;
    c. fishers may need to halt fishing and wait 3-4 days to unload catch to barges.

3. ***Spatial data***: Spatial data was not used in the assessment due to missing data prior to the introduction of the TSF01 Logbook and a number of other periods where spatial information has not been reported in logbooks. Catch rate analyses were performed for individual vessels rather than over various spatial areas.

4. ***Stock structure***: Biologically there is some uncertainty in stock connectivity between the Torres Strait and adjacent waters, where spatial-temporal patterns of fish movement may affect fish vulnerability and data.

5. ***Hyperstability***: Hyperstability can occur in fisheries that target aggregations. Hyperstability is yet to be explored in the assessment (hyper-stability: where catch rates continue at a set rate over time but the stock abundance is actually declining); and

6. ***Restricted length frequency samples*** (by area and time) and the absence of larger size classes in the samples.

The Working Group **recommended** additional analyses be undertaken to improve the stock assessment including***:***

- sensitivity analyses to examine how the model might perform with 'domed vulnerability' where large fish are assumed to be less available to capture; and
- examination of CPUE data using 'indicator' vessels with known fishing histories as a means to further validate the CPUE time series.

To improve the stock assessment in the longer-term the Working Group **recommended** the following research and data collection/analysis priorities:

- appropriate spatial genetic sampling to clarify the current single Torres Strait stock/population structure assumption (noting the single stock assumption is the most precautionary approach);

- additional length frequency sampling to improve the spatial representativeness of biological data used in the model. This will assist in: a) assessing the fishing mortality and selectivity of the catch i.e. whether the catch size structure is representative of the underlying population age structure and b) validate fecundity at age assumptions;
- further data analysis and consultation with stakeholders to investigate options for improving the accuracy of the TIB catch data series; and
- AFMA and TSRA, in consultation with temporary licence holders, to work on characterising fishing gear selectivity and different fishing practices and identify options for improving the accuracy and level of information collected through logbooks (a pre-season workshop with temporary licence holders was recommended as a starting point).

Stock assessment of the Torres Strait Spanish Mackerel fishery, Begg *et al 2006*

The 2006 Begg Spanish mackerel assessment made the following recommendations for future research and monitoring to improve and develop the stock assessment:

a. Need to develop a long term monitoring program that provides a comprehensive and structured approach to the collection of appropriate age-structured data for Spanish mackerel from both the commercial and traditional non-Islander and Islander sectors. [Urgent & Critical]

b. Need for improved reporting in the compulsory commercial logbooks and Islander docket books. Reporting of catch in both numbers and weight for both individual fish and cartons needs to be more consistent and comprehensive. Fishers need to be encouraged to fill out logbooks in their entirety. Logbook data should be compared to unload/buyer dockets for validation and data checking. [Urgent & Critical]

c. Need for a better measure of effort in the commercial logbooks and Islander docket books to provide a more reliable indicator of CPUE, and in turn, stock abundance. Fishers should be encouraged to record search and fishing times, number of fishers, and days when zero catches occurred to minimise the effect of hyperstable catch rates when these data are used in catch rate analyses and assessment models. [Urgent & Critical]

d. Need to assess the historical commercial logbooks to reconcile differences between the AFMA and DPI&F databases. [Important & Critical]

e. Need for a comprehensive investigation into the population dynamics of Torres Strait Spanish mackerel, including growth, maturity, fecundity and spawning. Samples need to be collected throughout the year from a range of areas to validate biological patterns derived from LTMP data collections which are based on a limited sampling period in October from Bramble Cay. [Important]

f. Need to confirm the single stock assumption for Torres Strait Spanish mackerel. This assumption is currently based on a single collection from Bramble Cay. A more comprehensive sampling program is required to validate the single stock assumption and clarify stock boundaries, particularly those in the Gulf of Carpentaria, the east coast of Queensland and the Gulf of Papua. This sampling program could be integrated with that for a broader population dynamics study. [Important]

g. Need to assess the historical and current impact of neighbouring fisheries, particularly the Indonesian, Taiwanese and PNG gillnet and longline fisheries, on the Torres Strait Spanish mackerel fishery. [Important]

h. Need for a periodic review and update of the assessment as determined by the requirements of AFMA. Operational management objectives, performance measures and decision rules need to be defined for future management strategy evaluation. [Critical]

i. Need for a systematic and transparent stock assessment review process. This process should include the formation of a steering committee involving the representation of all relevant stakeholders, an independent peer-review of the assessment, and all related reports and presentations to have a clear and concise statement of the review process that the assessment has undergone. The formation of a Resource Assessment Group could direct this process. [Critical]

Evaluation of the eastern Torres Strait Reef Line Fishery, Williams *et al 2007*

The Williams et al. (2007) *Evaluation of the Eastern Torres Strait Reef Line Fishery* report made the following recommendations for improvements to monitoring (and research) to improve biological knowledge and further develop the MSE work (pp. 143):

a. Need to develop a long term monitoring program that provides a comprehensive and structured approach to the collection of appropriate age or length-structured data for the main target species from both the non-indigenous, Islander and traditional sectors.

b. Need for improved reporting in the compulsory commercial logbooks and Islander docket books. Reporting of catch in both numbers and weight needs to be more consistent and comprehensive. Fishers need to be encouraged to fill out logbooks in their entirety. Logbook data should be compared to unload/buyer dockets for validation and data checking.

c. Need for a better measure of effort in the commercial logbooks and Islander docket books to provide a more reliable indicator of CPUE, and in turn, stock abundance. Fishers should be encouraged to record search and fishing times, number of fishers, and days when zero catches occurred.

d. Need to obtain more reliable estimates of biological parameters for the target species in the ETS RLF such as the coral trout species and barramundi cod. Specifically, there is a need to collect small and young individuals to provide more reliable estimates of growth and maturity. There is also the need to determine whether spawning of coral trout occurs in other months of the year. Specifically, samples need to be collected during the months December through March.

e. Need to consider specific management arrangements for passionfruit trout, *Plectropomus areolatus*, such as an increase in the current minimum legal size or the introduction of a maximum legal size due to the larger size at sex change compared with other coral trout species.

f. Need to obtain a better description of the reefs and shoal areas that are fished by Indigenous fishers to provide a clearer picture of the total area in which Islanders are able to fish.

g. Need to obtain reliable estimates of subsistence harvest of reef fish to include in future assessments of the fishery.

h. Need to update the MSE once some of the needs listed above have been fulfilled and additional information is available. This may require determining whether stakeholder objectives have changed since the initial model run.

i. Need to obtain a better understanding of the source-sink relationships between reefs, larval dispersal, self-seeding and larval subsidy and to determine the sensitivity of management strategies to different models of larval migration.

TORRES STRAIT FINFISH RESOURCE ASSESSMENT GROUP	Meeting 1 9 – 10 November 2017
RESEARCH Research priorities	Agenda Item No. 3.2 For ADVICE

RECOMMENDATIONS

1. That the RAG **NOTE** research priorities for the Torres Strait Finfish Fishery identified by the Finfish Working Group and the Scientific Technical Working Group.

2. That the RAG **DISCUSS** and **PROVIDE ADVICE** on any changes to strategic research priorities noting the next full call for research funding application will be for projects starting 2019/20.

3. That the RAG **PROVIDE ADVICE** on support for funding a tactical research project for 2018/19 to develop best estimates of other sources of fishing mortality and options for improving the estimates.

KEY ISSUES

1. This is a standing item for the Finfish RAG and Finfish Working Group. Having agreed research priorities aims to achieve a more efficient management process.

2. Generally, the Torres Strait Scientific Advisory Committee (TSSAC) makes an annual public call for funding applications to conduct research to support fisheries management decisions. The call for research identifies research priorities to be addressed. AFMA seeks advice from the PZJA fishery consultative forums on fishery specific research priorities.

3. The RAG is asked to note the table outlining budget commitments for the next financial years (**Attachment A**) and note that due to research funding being almost fully committed for the next two financial years, the next full call for funding applications for research will be for the 2019/20 financial year.

4. There is an opportunity to fund small tactical research projects with AFMA's projected unspent research funds in 2018/19 (88k).

5. AFMA management has proposed funding a small tactical research project to improve our estimates of mortality taken outside of the commercial fishery (noting work in progress on refining subsistence take). Current estimates and the need for review is further considered under agenda item 5.2.

6. AFMA has sought out of session advice from the FWG and RAG on AFMA's proposed tactical research proposal and any other possible priorities. Three members provided

comment all of which supported the proposed project. Any further RAG advice is welcomed.

7. Research and data priorities discussed at the last FWG meeting and previously by the Technical Scientific Working Group are provided below.

8. At the 16-17 March 2017 meeting the FWG agreed to revisit the list alongside the development of the harvest strategy which is expected to assist in identifying future data and research needs.

9. Note that in relation to point 9.a and 10.a (below) AFMA will, subject to resourcing, work to convene an industry workshop in 2018 to work with fishers on clarifying model inputs for the Spanish mackerel assessment and reviewing the fishery logbook.

DISCUSSION

10. The 12-13 July 2016 meeting of the **Finfish Working Group** identified the following general research priorities:
    a. Genetic studies on Spanish mackerel to test single stock theory – particularly if PNG and NE QLD catches increase. This potentially could be achieved by using fishery data, fisher participation and/or a PhD study;
    b. Management Strategy Evaluation on harvest strategy options; and
    c. In the event that the western closure line is removed, investigate the potential impact on TAC.

11. Additionally, the 12-13 July 2016 meeting of the Finfish Working Group identified the following work to address the fishery data needs:
    a. Review logbook structure;
    b. Monitoring of non-commercial take (note partly being addressed through current research project on the traditional take of finfish);
    c. Improved rate of returns of freezer records for the TIB Sector; and
    d. Age and length structure data (medium term – relates to Harvest Strategy work, phase 2).

12. At its 10 November 2016 meeting the **Finfish Technical Scientific Working Group** recommended the following data collection/analysis priorities to improve the Spanish mackerel stock assessment in the longer term:
    a. appropriate spatial genetic sampling to clarify the current single Torres Strait stock/population structure assumption (noting the single stock assumption is the most precautionary approach);
    b. additional length frequency sampling to improve the spatial representativeness of biological data used in the model. This will assist in: a) assessing the fishing mortality and selectivity of the catch i.e. whether the catch size structure is representative of the underlying population age structure and b) validate fecundity at age assumptions;
    c. further data analysis and consultation with stakeholders to investigate options for improving the accuracy of the TIB catch data series; and

d. AFMA and TSRA, in consultation with temporary licence holders, to work on characterising fishing gear selectivity and different fishing practices and identify options for improving the accuracy and level of information collected through logbooks (a pre-season workshop with temporary licence holders was recommended as a starting point).

13. Additionally the **Scientific Technical Working Group** identified the following two additional analyses be undertaken to improve the Spanish mackerel stock assessment including:
    a. sensitivity analyses to examine how the model might perform with 'domed vulnerability' where large fish are assumed to be less available to capture; and
    b. examination of CPUE data using 'indicator' vessels with known fishing histories as a means to further validate the CPUE time series.

STATUS OF TORRES STRAIT RESEARCH PROJECTS

Research projects in progress

14. There are three TSSAC recommended research projects relevant to the Finfish Fishery that are either in progress or starting soon:

    a. *Harvest Strategies for the Torres Strait Finfish* led by Trevor Hutton. Identified as a high management priority (**INITIAL PHASE**). To be actioned at agenda item 6.
    b. *Monitoring the traditional take of finfish species in the TSPZ* (**IN PROGRESS**) led by Nicole Murphy, CSIRO. Update is provided at agenda item 4.1

15. The TSRA has also facilitated research in line with the Finfish Action Plan. The TSRA:
    a. have partnered with FRDC (Fisheries Research Development Corporation) to fund projects investigating the feasibility of:
        - developing Jewfish, barramundi and crab fisheries (update at agenda item 4.2);
        - exporting seafood product directly from the Torres Strait; and
        - developing a Torres Strait fisheries brand;
    b. are undertaking a project internally to investigate the feasibility of a developing baitfish fishery (garfish and sardines) based around Warraber and Poruma;

16. At the last FWG meeting the working group noted that management advice, assessment and planning would be required to support the sustainable development and/or expansion of finfish fisheries and encouraged all related proposals to be tabled with the RAG and FWG for advice.

Recently closed (or in finalisation) projects

17. *Smart phone technology for remote data collection in Torres Strait traditional fisheries* – final report is still pending (**FINALISED**). Verbal update and copies of the final report to be provided by the EO.

18. *Defining the status of Torres Strait Spanish mackerel to inform future fisheries allocation and sustainable fishing* (**IN FINALISATION**). Stock assessment presented and accepted in November 2016 and is to be published. Draft final report of acoustic monitoring component received.

LIST OF ATTACHMENTS

ATTACHMENT A – Table of budget commitments and availability FY2016 to FY2018.

Attachment A

Table 1. Budget commitments and availability for 2016/17 TSSAC project

Funding Years	Project code	Torres Strait Research	Project Budget	2016/17 FY Total (Budget $440)	2017/18 FY Total (Budget $440)	2018/19 FY Total (Budget $440)
14/15		Improved TSPF profitability and pathways for a sustained flow of TSPF benefits to TS Communities	$89,659			
13/14 - 14/15 15/16		Smartphone - data collection (PI Haartmann)	$186,000.00			
13/14 - 14/15		2014 TRL Stock Assessment and TAC (PI Plaganyi-Lloyd)	$627,615.97 ($909,337.42)	$16,000		
13/14- 14/15- 15/16		Defining the aggregating and movement behaviour of Spanish Mackerel to inform future fisheries allocation and sustainable fishing*	$245,590.00	$40,853*		
15/16		Production of a Sea Cucumber product processing training video for Torres Strait Communities	$10,000			
15/16		Consultative and administrative processes for scientific research in the Torres Strait Islands	$16,500			
15/16 16/17		Monitoring the traditional take of finfish in the Torres Strait Protected Zone	$199,802	$59,941.10 (-$59,941.10)		
15/16 16/17		Bêche De Mer Harvest Strategy	$26,721	$37,224	$15,486	
16/17 17/18 18/19		TRL fishery surveys, stock assessment, HCR and RBC	$759,855	$239,030	$243,348	$277,476
16/17 17/18		Finfish Fishery Harvest Strategy	$200,961	$32,580	$123,662	$44,719
		Total costs of proposed projects for Fin Year (A)		**$324,834**	**$382,496**	**$322,195**
		TSSAC Chair/Scientists Sitting fees		Approx.	Approx.	Approx.
		& meeting costs (B)		$29,500	$29,500	$29,500
		(C) - Total costs = (A) + (B) (includes all projects and TSSAC admin costs)		$354,334	411,996	$351,695
		Balance - $440 000 - (C)		**$85,666**	**$28,004**	**$88,305**

	Projects set for completion in 2014/15
	Projects for completion in the 2015/16
	Projects funded through TSRA agreement (i.e. not taken out of $440,000)

PZJA TORRES STRAIT FINFISH RESOURCE ASSESSMENT GROUP	Meeting 1 9-10 November 2017
RESEARCH PROJECT UPDATES Traditional Take Project Update	Agenda Item No. 4.1 For NOTING

RECOMMENDATIONS

1. That the RAG **NOTE** a progress report on the research project titled "*The subsistence coral reef fish fishery in the Torres Strait: monitoring protocols and assessment*.

2. That RAG provide **ADVICE** on the proposed changed scope of the project.

KEY ISSUES

1. To improve estimates of traditional fishing catches for finfish the research project titled "*The subsistence coral reef fish fishery in the Torres Strait: monitoring protocols and assessment"* was funded.

2. Based on outcomes of the initial pilot phase of the project, advice has been sought from the FWG and Torres Strait Scientific Advisory Committee (consultation in progress) on revising the scope the project to focus on achieving:
    a. successful implementation of the data collection system; and
    b. quality catch data, in at least one community.

3. This option was recommended by the project steering committee (**APPENDIX A** - Record of last steering committee meeting 7 September 2017). The project steering committee agreed that in the absence of being able to generate a reliable estimate of traditional take clear priority should be given to understanding how a longer term community-based monitoring program could work. The project steering committee did however note that quality data from one or two communities may be of some use to extrapolate catches for the region.

4. In light of the steering committee advice, CSIRO are:
    a. considering whether one or a small number of community meetings could be covered and still achieve the desired outcome; and
    b. investigate whether extrapolating community results to other areas would be feasible.

5. The proposed change to the research scope was sent to the Finfish Working Group for comment on 26 September 2017. Two FWG members responded in support of the proposed changed methodology.

6. RAG advice is sought on this proposed change to the scope of the research.

7. Following the completion of TSSAC consultation AFMA will advise the RAG of the outcomes and, subject to final approval, supply a revised project plan.

BACKGROUND

8. In 2015 the TSRA Finfish Quota Management Committee recommended that further research be undertaken to estimate current traditional fishing catch levels. The TSRA supported this recommendation and agreed to provide funding. A call for research proposals was undertaken through the Torres Strait Scientific Advisory Committee (TSSAC) resulting in AFMA contracting CSIRO to deliver the project titled: *Monitoring the traditional take of finfish species in the TSPZ.* A copy of the proposal is at **Attachment A.**

9. Objectives of the monitoring project are to:

    a. Characterise current and future data needs for the targeted finfish resources.

    b. Quantify the traditional take of finfish species in the Torres Strait Protected Zone, including the spatial distribution of catches within or beyond the 10 nm zone of each community.

    c. Deliver cost effective and acceptable monitoring options to key stakeholders including options for the long-term continuation of traditional take surveys (potentially across a range of species).

    d. Involve and train Torres Strait islanders (through the My Pathways or Rangers program) to carry out monitoring during the program and into the future.

10. Initial pilot phase survey work on Erub Island returned mixed results and achieved a 'snapshot' single collection of survey data.

11. A milestone report was submitted by the project team in December 2016 (**Attachment B**).

12. The Erub Fisheries Management Association Chairperson advised that to improve survey participation it will be important to:

- advise community members being surveyed upfront that the project was driven by the community;
- don't proceed with the survey if people are uncomfortable;
- use local monitors who are suitable for the role;
- work within the MyPathways program with support from the Rangers - monitoring could be a Mypathway activity and the monitor could be supported by the Rangers for transport (noting transport is not an issue on the other islands); and
- recognise that it may take 3-4 months to get monitoring arrangements established.

13. At the 16-17 March 2017 meeting the Finfish Working Group noted:

- initial pilot phase survey work on Erub Island is now complete. Reports indicate that the project was well received by the Erub community with good attendance and support given at a community meeting introducing the project and CSIRO scientists;
- survey however was unable to engage a long-term community monitor with the pre-arranged candidate falling through due to other commitments. Instead a revised single 'snapshot' survey was taken by the CSIRO staff while on the island. Despite community support, the survey was limited by time and participation levels. Some people were not entirely comfortable with providing their individual catch data;
- Erub fishers association Chairperson remained very positive about the work conducted at Erub noting that it was likely the first step of a longer process required to get monitoring arrangements established;
- the project team had met with Malu Lamar, AFMA and TSRA in 2016 before the project began to get general project guidance advice including community engagement;
- the project had been recommended by the FQMC and subsequently funded by the TSRA (administered by AFMA);
- the project is planning to roll out training of monitors on Poruma and Masig islands with community permission being given. The Mer community is also supportive.

14. In light of findings from the Erub pilot phase the FWG recognised there is a risk that without change the project may not be able:

    - to obtain sufficient data to produce a reliable estimate of traditional take; or
    - to establish an on-going community-based data collection program.

15. The FWG generally agreed however the project will likely provide a baseline for further investment in data-collection and establishing ongoing data collection programmes. It was also noted that realistically achieving these aims could be expected to take some time.

16. The FWG noted the following advice from members:
    - close engagement with the PBCs is central to the success of these kind of projects. Ideally the PBC would be given responsibility to manage the data collection programmes in the same way that they have responsibility for the Turtle and Dugong Management Plans;

    - further community awareness is required to encourage reporting and that small incentives (financial or material) could improve the participation rates;

    - paid positions need to be created at the community level (not within government agencies) to progress and resolve fisheries issues and improve community awareness and communication. This would also provide employment. The TSRA member advised that TSRA were investigating the potential to establish fishery extension officers that could assist communities with these projects.

    - Malu Lamar and the TSRA Fisheries Portfolio member further emphasised that all research projects occurring in the Torres Strait should engage with them before the projects begin to ensure that communities are aware of the purpose of the research and any terms and conditions are agreed and understood.

17. The FWG agreed for that AFMA should to convene another meeting of the traditional-take project team to consider possible options for addressing ongoing project risks in light of lessons learnt from work completed at Erub.

APPENDIX A

Project Steering Committee meeting Record – 7 September 2017

Monitoring the traditional take of finfish species in the TSPZ.

11:00 am, Thursday 7 Sep 2017 via Teleconference.

Present: Selina Stoute & Andrew Trappett (AFMA), Mariana Nahas & Alison Runck (TSRA), Nicole Murphy & Kinam Salee (CSIRO)

Apologies: Kenny Bedford, Maluwap Nona and Jerry Stephen.

1. SC noted that TSRA is not able to commit to forming long term community monitors at this time however are able to assist in the short term with providing a staff member to aid the CSIRO team with liaison at the community level to help explain the project and undertake surveys. TSRA advised that the availability of the TSRA liaison support officer for the project will be dependent on staffing levels at the time.

2. If available TSRA may also be able to provide vehicle support to conduct the household surveys but that those assets need to be booked well in advance.

3. Without additional resourcing in the form of community monitors to extend the coverage of the project, the SC agreed that the options remaining for the project (based on the findings from fieldwork already conducted at Erub) were:

    a. Do not proceed - noting there is a high risk that insufficient data will be collected and communities are unlikely to have gained sufficient experience to continue monitoring independent of the project.

    b. Proceed with the original methodology and community coverage (i.e. undertake fieldwork at 5 communities) noting that this approach is highly unlikely to collect sufficient data to determine a revised estimate of traditional take however it is likely to contribute more broadly to raising awareness of the importance of data/monitoring and example of how it may be achieved. The SC noted that

    c. Revise the scope the project to focus on achieving: i) successful implementation of the data collection system; and ii) quality catch data, in at least one community.

4. The SC preferred option (C). In the absence of being able to generate a reliable estimate of traditional take clear priority should be given to understanding how a longer term community-based monitoring program could work. The SC did however note that quality data from one or two communities may be of some use to extrapolate catches for the region.

Actions

1. CSIRO to provide SC with revised project work plan based on the preferred option (c) above. CSIRO will consider whether one or a small number of community meetings could be covered and still achieve the desired outcome.
2. CSIRO to investigate whether extrapolating community results to other areas would be feasible.
3. AFMA to seek comment from the PZJA Finfish WG on the proposed revision to the project scope

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Monitoring the traditional take of finfish species in the TSPZ

Progress report

Draft Monitoring Program

Nicole Murphy, Mibu Fischer, Tim Skewes and David Brewer

December 2016

A Milestone report for TSRA and AFMA

Australian Government
Australian Fisheries Management Authority

Australian Government

TSRA
www.tsra.gov.au

CSIRO Oceans and Atmosphere Flagship

Citation

Murphy N, Fischer M, Skewes T, Brewer D (2016) Monitoring the traditional take of finfish species in the TSPZ: A draft monitoring strategy. CSIRO, Australia.

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Important disclaimer

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Acknowledgements

This research project was funded by the Torres Strait Regional Authority and CSIRO Oceans and Atmosphere.

1 Introduction

The Torres Strait Finfish Fishery (TSFF) is a multispecies fishery with both commercial and subsistence effort, fished by islanders and non-islanders. The fishery is managed as two separate fisheries, the Torres Strait Spanish Mackerel Fishery (TSSMF) and the Torres Strait Reef Line Fishery (TSRLF). The TSSMF predominately targets Spanish mackerel (*Scomberomorus commerson*), and the Torres Strait Reef Line Fishery (TSRLF) mainly targets Coral trout (*Plectropomus* spp., *Variola* spp.), with smaller catches of tropical snappers and emperors (Lutjanidae), trevally (Carangidae) and cods (Serranidae). There is also an inactive Torres Strait Barramundi Fishery (TSBF).

The TSSMF and TSRL fishery operate in eastern Torres Strait, with the western Torres Strait closed to fishing along a line from Cape York to Dauan Island. The majority of commercial catch is taken at Erub, Masig and Mer islands.

In 2007-2008 all commercial catch entitlements for the TSSMF and TSRLF reverted to the Traditional Inhabitant sector through the voluntary buy-back of Torres Strait Fishing Boat Licences (TVH licenses). Catch entitlements are held in trust by the Torres Strait Regional Authority (TSRA), with non-Traditional Inhabitant fishers participating in the fishery by leasing temporary (Sunset) licences. The TSRA also holds entitlements for Papua New Guinea (PNG) in accordance with the Torres Strait Treaty, where 40 per cent of Spanish mackerel endorsements are made available to PNG fishers (PZJA, 2014).

A management plan for the TSFF was finalised in 2013. The plan includes strategies for setting of a total allowable commercial catch, requirements on gear, size and area restrictions, take, and carry limits. A Quota Management Committee (QMC) determines the quota that will be available annually for non-Traditional Inhabitant leasing. A 10nm closure around the islands of Erub, Mer, Ugar and Masig is also in place for non-Traditional Inhabitant fishers leasing temporary licences.

Reporting of fishing activity and catch in the TSFF is compulsory for Sunset licence holders and Traditional Inhabitant fishers with boats over 7m (there are currently no Traditional Inhabitants operating boats over 7m) (PZJA, 2014). Licenced catch, including target and by-product, is monitored through compulsory logbook (TSF01) returns.

Catch reporting for the entire Traditional Inhabitant sector is non-compulsory. A voluntary reporting system is in place for small vessels (<7m in length) in the Traditional Inhabitant Boat (TIB) sector, with docket book recording introduced by the Australian Fisheries Management Authority (AFMA) in 2004. Fish buyers at community and commercial freezers also report product received from Traditional Inhabitant fishers using the Torres Strait Seafood Buyers and Processors Docket Book (TDB01) (see Appendix H).

Spatial catch data is used by regional management bodies (TSRA, AFMA) and local decision-makers in a co-management framework for catch monitoring, stock assessment and calculation of Total Allowable Catch (TAC) (Table 1).

Table 1. Decision analysis data needs matrix for catch.

DECISION TYPE	ANALYSIS TYPE	DATA NEEDS	TIMING OF DECISION
Catch allocation (leasing)	Committee decision	TAC TSI catch	Annual
TAC (sustainable catch)	Stock assessment Total catch	? Lease and TSI catch data	Annual to 5 yearly
Co-management harvest strategies	Community negotiation within a broad framework	Sustainable catch and stock structure Fisheries biology and ecology	As needs basis

Calculation of total fishery TAC is comprised of input catch data from the Traditional subsistence, TIB commercial, Recreational and Annual leased sectors (Figure 1).

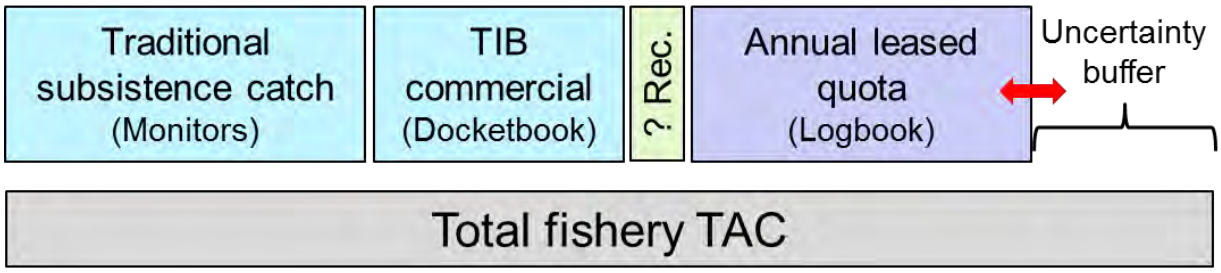


Figure 1. Catch sharing calculations for total fishery Total Allowable Catch.

The subsistence catch for the TIB sector and the traditional subsistence catch is currently not monitored. While the known catch of commercial species is well under the combined indicative minimum Maximum Sustainable Yield (MSY) estimates of about 230 t (80 t for coral trout and 150 t for Spanish mackerel), robust long time series catch data for the commercial and subsistence sectors of the TSFF is required.

Past creel studies of catch for the Torres Strait islands of Darnley, Masig and Murray showed approximately 15% of the annual total catch was retained for subsistence during commercial fishing (Busilacchi et al., 2012). Families of commercial importance including Serranidae, Lutjanidae and Lethrinidae were found to have decreased in catch over time, being targeted in both commercial and subsistence fishing (Busilacchi, 2008). It was also found that most of the commercially important species kept for subsistence, comprised individuals smaller than the minimum legal size (Busilacchi et al., 2012). Mugilidae and Siganidae also decreased in catch over time, suggesting localised over exploitation (Busilacchi, 2008).

Estimates of the subsistence catch of islander communities are essential to protect the Torres Strait finfish fishery from potential overexploitation. This project will produce data on the subsistence catch of Torres Strait Islander communities through an island monitoring program. Overall the project will take a whole-of-fishery and community approach, to facilitate future islander ownership of the program.

1.1 Objectives

- Characterise current and future data needs for the targeted finfish resources.
- Quantify the traditional take of finfish species in the Torres Strait Protected Zone, including the spatial distribution of catches within and if able, beyond the 10 nm zone of each community.
- Deliver cost effective and acceptable monitoring options to key stakeholders including options for the long-term continuation of traditional take surveys (potentially across a range of species).
- Train Torres Strait islanders (through the My Pathways or Rangers program) to carry out monitoring during the program and into the future.

1.2 Outputs

The outputs from the project will include estimates for subsistence finfish catches in Torres Strait. These will be collated with all other finfish data to assess the health of populations, helping to ensure that species remain abundant into the future. Monitoring surveys will also enable important home reef species for islands to be identified and managed sustainably. This knowledge also contributes to the development of a Torres Strait Finfish ID guide that incorporates local islander names for species, which further aids the understanding and utilisation of Torres Strait resources.

The project also provides training to Torres Strait islanders, developing management skill as well as understanding base level fisheries assessment needs and fishery observer practices. This will realise the potential for significant economic development for the TSFF, while protecting the livelihoods of Torres Strait islanders.

2 Categorisation - TSFF sectors

2.1 Torres Strait Spanish Mackerel Fishery

Three fisher types: Non Islander commercial, Traditional Inhabitant commercial and Traditional Inhabitant subsistence. Groups separated on the basis of four characteristics: Licencing, catch/quota, size limit and fishing gear.

2.1.1 **Non Islander commercial**

- Non-Traditional Inhabitants participate in the fishery through leasing a Sunset licence.
- Operate under a quota; allowance of 20 kgs at any one time.
- Permitted to use a general purpose bait net.
- Catch taken using trolling, hand-lining and drop-lining.
- Minimum Legal Size (MLS).

2.1.2 **Traditional Inhabitant - commercial**

- Traditional inhabitants participate in the fishery through TIB licences with mackerel endorsement.
- Operate under a quota; allowance of 20 kg at any one time.
- Permitted to use a general purpose bait net.
- Catch taken using trolling, hand-lining and drop-lining.
- Minimum Legal Size (MLS).

2.1.3 **Traditional Inhabitant – subsistence**

Traditional Inhabitants participate in the fishery, no restrictions.

Motorised boats.

2.2 Torres Strait Reef Line Fishery

Three fisher types: Non Islander commercial, Traditional Inhabitant commercial and Traditional inhabitant subsistence. Groups separated on the basis of six characteristics: Licencing, catch/quota, size limit, fishing gear, species and location.

2.2.1 **Non Islander commercial**

- Non-Traditional Inhabitants participate in the fishery through leasing a Sunset licence.
- Operate under a quota; 50 tonnes of coral trout 2010/11 (AFMA 2010).
- Permitted to use a general purpose bait net, other nets prohibited.

- Line fishing with no more than 6 hooks attached to each line.
- No more than 3 fishing apparatus can be used per boat.

2.2.2 Minimum legal size and Maximum legal size

- Vessels must be less than 20m.
- No take species.
  - Serranidae, Lutjanidae and Lethrinidae.

2.2.3 Barramundi

PNG coast, Saibai, Boigu, Moimi, Kaumag, Aubusi and Dauan Islands.

Hand spears, hand set monofilament gill nets.

2.2.4 Traditional Inhabitant - commercial

- Traditional inhabitants participate in the fishery through TIB licences with reef line endorsement.
- Operate under a quota.
- Permitted to use a general purpose bait net, other nets prohibited.
- Line fishing with no more than 6 hooks attached to each line.
- No more than 3 fishing apparatus can be used per boat.
- Minimum legal size and maximum legal size.
- Vessels must be less than 20m.
- No take species.
  - Serranidae, Lutjanidae and Lethrinidae.

2.2.5 Traditional Inhabitant – subsistence

- Traditional Inhabitants participate in the fishery, no restrictions.
- Single gear; hand lines.
- Permitted to use nets.
- Motorised boats.
- Mugilidae and Siganidae; targeted by gears from shore.
- Species fished:
  - Mugilidae and Siganidae, targeted by gears from shore; traditional inhabitant subsistence, traditional inhabitant commercial.
  - Serranidae, Lutjanidae and Lethrinidae, Non islander commercial and Traditional inhabitant commercial.

3 Islander consultation

3.1 Finfish Inception Meeting

See Appendix A for full meeting transcripts.

Monitoring the traditional take of finfish species in the Torres Strait Protected Zone, meeting held on 17th February 2016, Thursday Island, Torres Strait Regional Authority LMSU Building.

Representatives from Malu Lamar, My Pathway, TSRA, AFMA and CSIRO attended, where project approach, island involvement and implementation process were discussed.

3.2 Islander involvement

This project involves Torres Strait Islanders, both in the design, development and undertaking of the survey, as well as the interpretation of results. Initially, collaboration will involve the TSRA and AFMA to identify appropriate communities and stakeholders, and to design suitable communication materials for use during the project.

Once focus communities are identified, we will contact local community stakeholders including TSIRC Councillors, Prescribed Body Corporate Chairs and Fisher Group representatives to explain the project through an introductory letter and project fact sheet, and to seek approval and advice from communities. Interested communities will then be supplied with the project plan and appropriate background materials in common use language.

Prior to survey commencement, island stakeholders and the community will be met with in person to seek approval for the work, and to provide the opportunity for information sessions where further support and advice will be requested from the community.

3.2.1 **Project introduction letter**

OCEANS AND ATMOSPHERE

EcoSciences Precinct: Boggo Road, Dutton Park, QUEENSLAND 4102
GPO Box 2583, Brisbane QUEENSLAND 4001, Australia
T +61 1300 363 400 • ABN 41 687 119 230

PBC Chair
c/- TSIRC Torres Strait Island
Torres Strait Island
via Thursday Island QLD 4875

July 2016

Dear Councillor

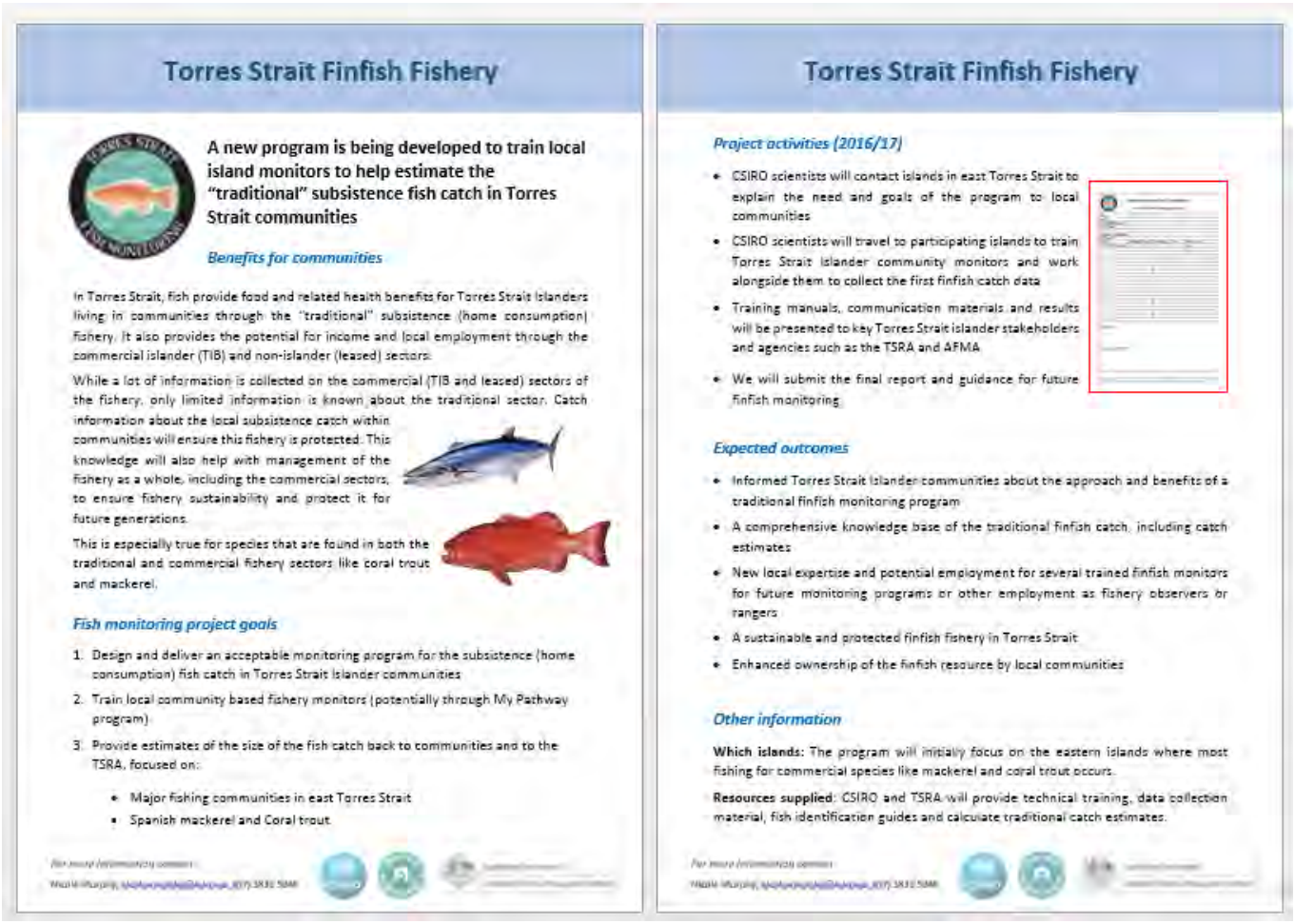
I would like to introduce myself please. My name is Nicole Murphy and I work for CSIRO Oceans and Atmospheric Research in Brisbane, Queensland. I understand Mr Tim Skewes recently contacted you in relation to a new program that is being developed to help estimate the 'traditional' subsistence fish catch in Torres Strait communities. It was great to hear that you were interested in the project and were happy for some further information to be provided, please find attached a project information sheet.
I will be involved with helping to organise and train the island fishery monitors. I would like to ask for your support and guidance please for this part of the project, in order for the most successful outcome of the new program.

If there is broad island agreement for the program, the project team will plan to visit sometime in late August for community consultation and potentially training of monitors.
Please feel free to contact me with any questions, my direct number is (07) 3833 5948 and my email address is nicole.murphy@csiro.au

Yours sincerely

Nicole Murphy

3.2.2 **Project factsheet**



Torres Strait Finfish Fishery

A new program is being developed to train local island monitors to help estimate the "traditional" subsistence fish catch in Torres Strait communities

Benefits for communities

In Torres Strait, fish provide food and related health benefits for Torres Strait Islanders living in communities through the "traditional" subsistence (home consumption) fishery. It also provides the potential for income and local employment through the commercial islander (TIB) and non-islander (leased) sectors.

While a lot of information is collected on the commercial (TIB and leased) sectors of the fishery, only limited information is known about the traditional sector. Catch information about the local subsistence catch within communities will ensure this fishery is protected. This knowledge will also help with management of the fishery as a whole, including the commercial sectors, to ensure fishery sustainability and protect it for future generations.

This is especially true for species that are found in both the traditional and commercial fishery sectors like coral trout and mackerel.

Fish monitoring project goals

1. Design and deliver an acceptable monitoring program for the subsistence (home consumption) fish catch in Torres Strait Islander communities
2. Train local community based fishery monitors (potentially through My Pathway program)
3. Provide estimates of the size of the fish catch back to communities and to the TSRA, focused on:
    - Major fishing communities in east Torres Strait
    - Spanish mackerel and Coral trout

Torres Strait Finfish Fishery

Project activities (2016/17)

- CSIRO scientists will contact islands in east Torres Strait to explain the need and goals of the program to local communities
- CSIRO scientists will travel to participating islands to train Torres Strait Islander community monitors and work alongside them to collect the first finfish catch data
- Training manuals, communication materials and results will be presented to key Torres Strait Islander stakeholders and agencies such as the TSRA and AFMA
- We will submit the final report and guidance for future finfish monitoring

Expected outcomes

- Informed Torres Strait Islander communities about the approach and benefits of a traditional finfish monitoring program
- A comprehensive knowledge base of the traditional finfish catch, including catch estimates
- New local expertise and potential employment for several trained finfish monitors for future monitoring programs or other employment as fishery observers or rangers
- A sustainable and protected finfish fishery in Torres Strait
- Enhanced ownership of the finfish resource by local communities

Other information

Which islands: The program will initially focus on the eastern islands where most fishing for commercial species like mackerel and coral trout occurs.

Resources supplied: CSIRO and TSRA will provide technical training, data collection material, fish identification guides and calculate traditional catch estimates.

4 Finfish Monitoring

4.1 Project approach

4.1.1 Goal

To estimate island TIB and subsistence catch with as precise and accurate an estimate as possible. Catch data to include undersize individuals and if possible, spatial and temporal components of the catch.

4.1.2 Design criteria

- Several design criteria were identified to best avoid misinterpretation and poor quality data (see Appendix E), these included:
- Census approach rather than sampling
- Community self-reporting
- Paper reports that can be collected and entered onto a central database
- Need for dedicated person on each island to act as facilitator and primary driver for data collection
- Making households the primary sampling unit on each island to ensure maximum coverage

4.1.3 Species

The survey will attempt to include all species, but specifically target:

- Tier 1: Spanish mackerel and Coral trout
- Tier 2: Barramundi cod, Lutjanids (commercial species), Cod (commercial species)
- Tier 3: All other finfish with initial focus on important species groups for islands (Trevally, Mullet, Siganids)

4.1.4 Islands

The first surveys will focus on the eastern and central islands where most Spanish mackerel and Coral trout are caught in Torres Strait.

4.1.5 Data collection

- Individual households will be given an ID code to protect their privacy
- Data sheets to record weeks catch in numbers by species and to be filled out by the fisher/household in the presence of the monitor

- Island monitor to co-ordinate data collation and transfer to a central facility eg. CSIRO or Thursday Island (AFMA/TSRA)
- Monitors to collect data on a set day
- Monitors to best manage their time eg. one village one day, other village next; as long as day of the week consistent

4.1.6 Data sheets

Catch monitoring will be recorded on data sheets and capture the following information:

- Species counts
- Use of fish for subsistence and/or income
- If fish are sold and where
- Island fisher demographic
- Length and/or weight data during dedicated sampling or when the opportunity arises

4.1.7 Data integrity

Data will be entered by CSIRO or by AFMA/TSRA staff and held in a central, secure facility. This will ensure a level of accuracy and comprehensiveness for the monitoring survey.

4.1.8 Analysis

Robust statistical approaches will be applied to counter bias and ensure sufficient precision. Any occurrences in the survey of missing time i.e. the monitor is unable to carry out his/her duties can be managed, but missing households will be difficult to recuperate.

Household data collected in addition to the fishing census will provide the capacity for sampling statistics. The final statistic for the survey analysis is identified as weight, with weight able to be calculated from length and conversion factors available from other Torres Strait data (Figure 2). Weight is also able to be calculated from average weight, using methods from other studies and existing size sampling of catch from the literature (Figure 3).

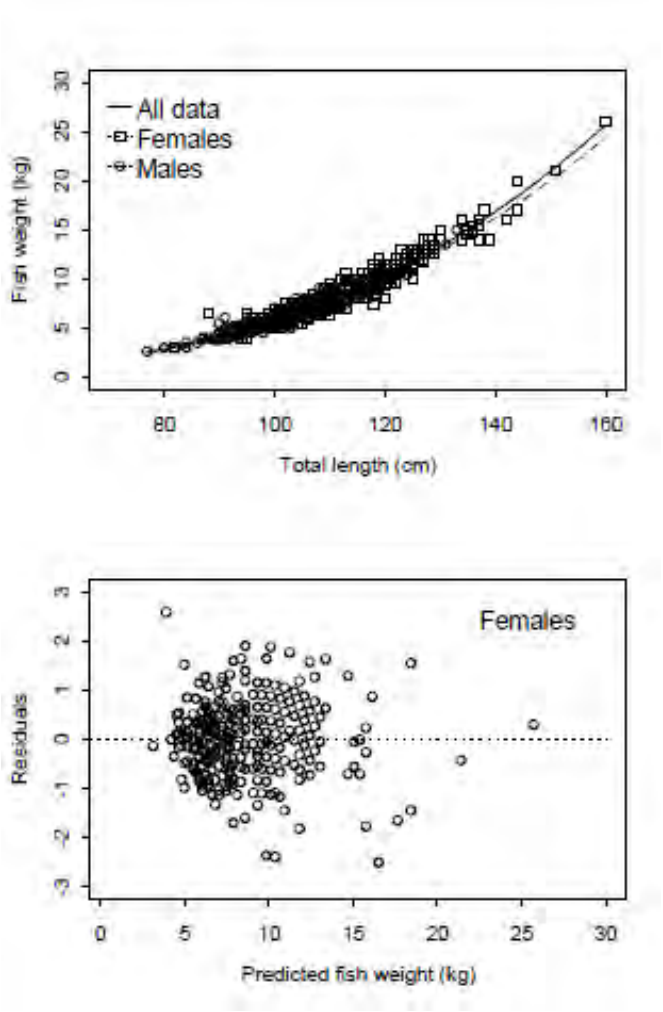


Figure 2. Total length (cm) – weight (kg) sex-specific relationships of Spanish mackerel (Begg et al., 2006).

Females: $Wg = 2.960e - 6(TL^{3.148})$

Males: $Wg = 4.224e - 6(TL^{3.068})$

All data: $Wg = 2.718e - 6(TL^{3.165})$

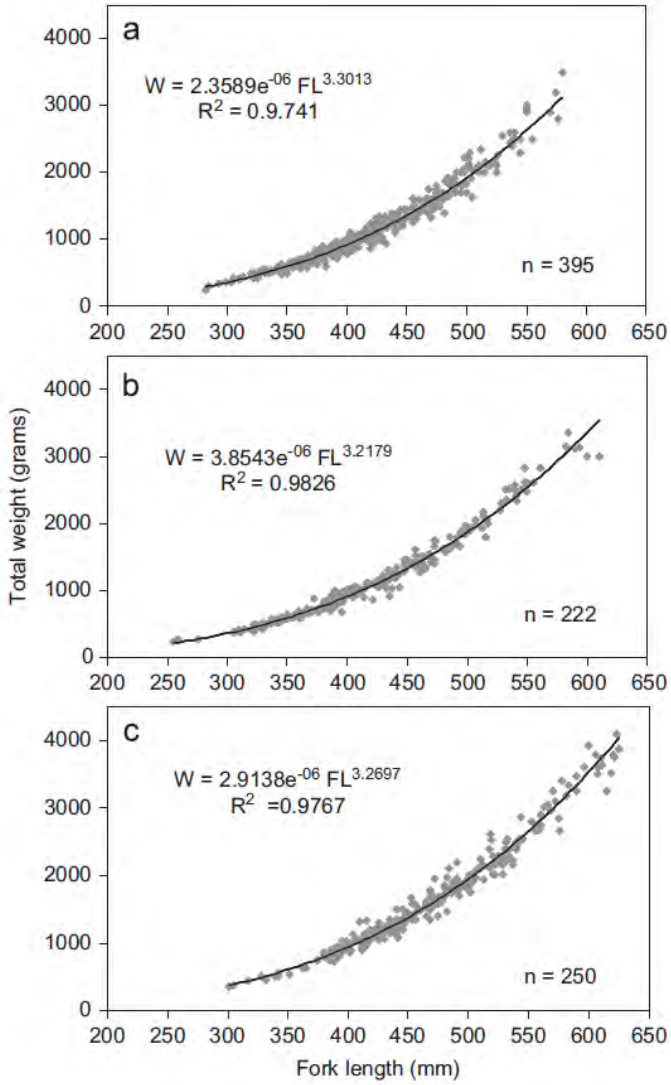


Figure 3. Length at weight data and fitted power curves for (a) *Plectropomus leopardus*, (b) *P. maculatus* and (c) *P. areolatus* from eastern Torres Strait (Williams et al., 2008).

$W = 2.3589e^{-06} FL^{3.3013}$ *Plectropomus leopardus*

$W = 3.8543e^{-06} FL^{3.2179}$ *P. maculatus*

$W = 2.9138e^{-06} FL^{3.2697}$ *P. areolatus*

4.1.9 Island monitors

Training for one, or more community members as monitors to carry out the survey will be instigated through the My Pathway and/or TSRA ranger program. The monitor will be identified by an island basis that best reflects community needs. Monitors will also have exposure to basic stock assessment principles and fishery population dynamics through the course of the project.

4.1.10 Communities

Depending on approval from Torres Strait communities for project involvement, the initial focus will be on the eastern and central islands of Erub, Masig, Mer, Poruma and Ugar. The most recent

fishing activity having occurred in this region, particularly for the commercially important species of mackerel and trout. Previous subsistence monitoring studies are also from this region, allowing for data comparisons for some species and years (Busilacchi, 2008).

The first finfish monitoring survey will begin as a pilot study at Erub Island, as proof of concept and to actively develop survey techniques through community input. This approach will allow for a more comprehensive roll out to other islands during the current project, or in the future.

5 Project risk

The finfish monitoring project will rely on a designated island monitor to document household catch on a weekly basis and submit records to a central holding facility. A comprehensive snapshot of island catch data will be obtained during island monitor training and when the first survey is undertaken. If further data recorded by monitors is patchy or non-existent, the initial data capture of island catch will enable correlation to previous work by Busilacchi (2008) for the islands of Erub, Mer and Masig. If this is the case, we believe the benefits of the finfish monitoring exercise with respect to knowledge generation concerning fishing dynamics, islander engagement and identifying issues related to Traditional Ownership far outweigh the project risk.

6 Ethical conduct

6.1 Traditional Knowledge

Special consideration will be taken with all Traditional Knowledge (TK) collected during the project. TK will only be used with the express permission of the traditional owners. Guidance will be sought from the TSRA and local island leaders to ensure full local support and agreement over the handling of TK information.

6.2 CSIRO Ethics Approval

All human research conducted by CSIRO must comply with the values, principles, governance and review processes specified in the National Statement on Ethical Conduct in Human Research (2007), the Australian Code for the Responsible Conduct of Research (2007) and any relevant state and national legislative requirements.

The Finfish Monitoring project has gained approval from the CSIRO Ethics committee and as such participants are required to sign a consent form detailing their role in the project (Figure 4), and be provided with specific project information and project contact details. Participants are able to withdraw from the project at any time and there is no risk of prosecution following disclosure of fishing information (Figure 5).

RESEARCH PARTICIPANT CONSENT FORM
Finfish Monitoring

Dear Participant

Please review the information below and sign where required if you agree to participate in this research project.

I _____ acknowledge that:

- I have agreed to participate in the above project being conducted by the CSIRO.
- I understand my participation in the research will involve a weekly interview about whether I went fishing during the last week and what I caught.
- I have been provided with contact details of the investigating officers and understand that I can contact them at any point during the study. I have also been provided with the contact details of an independent ethics officer at CSIRO should I wish to raise any concerns or complaints about the conduct of the research.
- I understand that my participation in the project is entirely voluntary and that I am free to withdraw from the study at any time and without having to provide a reason for my withdrawal.
- I understand that I may ask for part of all of the information provided by me to be removed from the study without penalty or explanation.
- I understand that the information I provide for this research will be used for the following purposes: *Design of an acceptable, long term finfish monitoring program* and will be treated confidentially. I will not be identified in any publications resulting from the study except where I have given my written permission for this to occur.
- Information provided by me will only be accessed by members of the research team and used for the purposes outlined above. It will be stored securely by the CSIRO and retained in archival storage.

Name: _____

Signature: _____

Date: _____

We thank you for your agreement to participant in this research.

Nicole Murphy and Kiriam Salee, CSIRO

Figure 4. CSIRO Ethics human research consent form for participants.

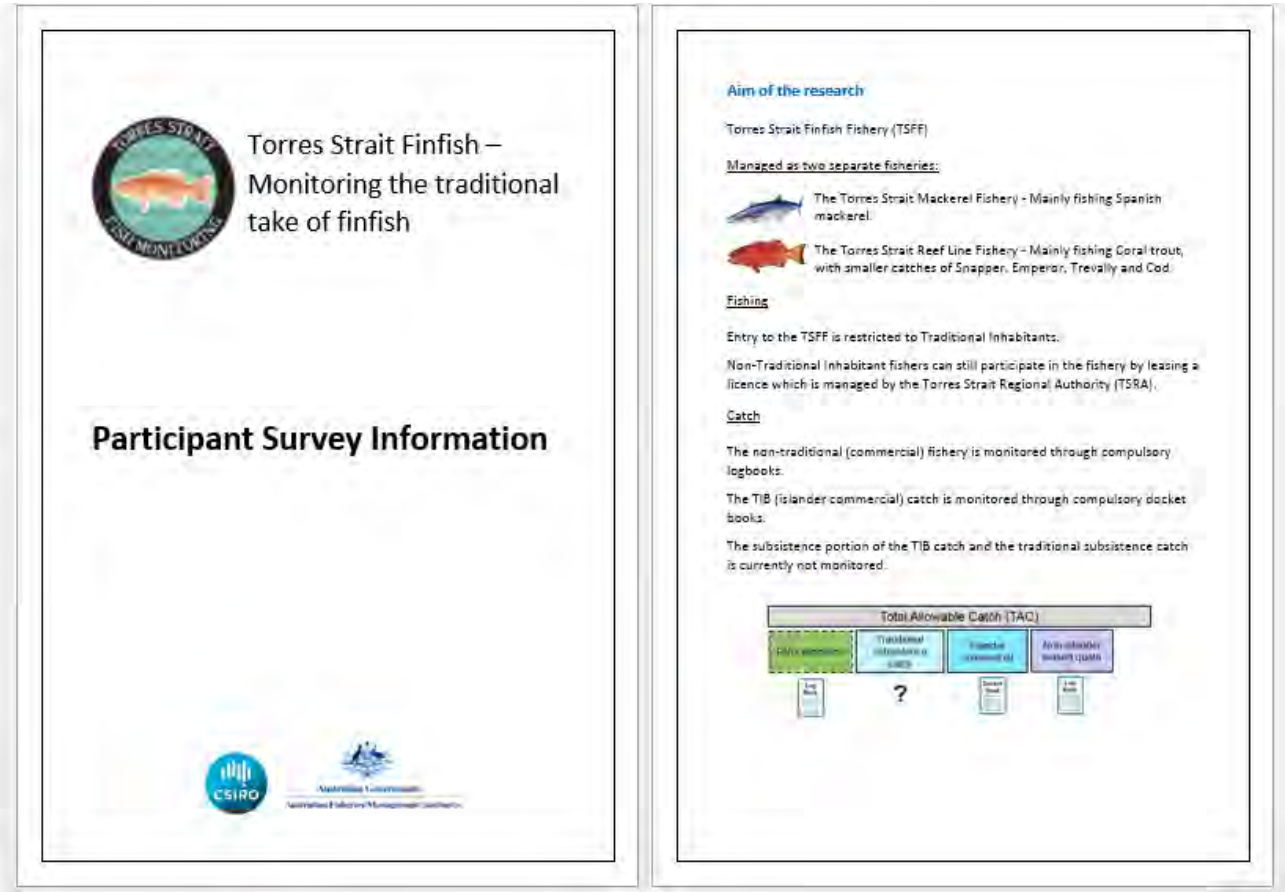


Figure 5. Finfish project information for participants.

6.3 Culturally appropriate approaches

An important component of this project will be the promotion and inclusion of traditional language and approaches. Terminology and language is critical and will be incorporated where possible.

A list of local island names for target finfish species will be developed alongside a fish ID guide for islands and be provided to communities. These will be updated as the project progresses. Islander names for target species will also be recorded to best enable identification of finfish.

7 Island surveys

7.1 Target species list

A target species list of finfish for the survey was compiled from literature reviews, fisher and islander advice (Table 2). This list was based on commercially important species, as well as species that are important home reef species for island communities.

Table 2. Finfish monitoring project target species list for Torres Strait.

Scombridae – Mackerel, tuna, bonito	
Fish species	**Common name**
Scomberomorus commerson	Spanish mackerel, Narrow-barred Spanish mackerel
Grammatorcynus bicarinatus	Shark mackerel
Scomberomorus queenslandicus	School mackerel
Scomberomorus semifasciatus	Grey mackerel
Serranidae – Sea basses, groupers, fairy basslets	
Fish species	**Common name**
Plectropomus leopardus	Common coral trout, Leopard coral grouper, Leopard coral trout
Plectropomus maculatus	Barcheek coral trout, Spotted coral grouper
Plectropomus laevis	Bluespotted coral trout, Black saddled coral grouper, Chinese footballer
Plectropomus areolatus	Passionfruit coral trout, Square tail coral grouper
Cephalopholis miniata	Coral cod, Coral hind
Chromileptes altivelis	Barramundi cod, Humpback grouper
Variola louti	Yellow edge coronation trout, Yellow-edged lyretail, Coronation trout
Variola albimarginata	White edge coronation trout, White-edged lyretail
Labridae - Wrasses	
Cheilinus undulatus	Humphead maori wrasse, Humphead wrasse, Double-headed maori wrasse
Choerodon schoenleinii	Blackspot tuskfish
Choerodon venustus	Venus tuskfish
Lethrinidae - Emperors	
Lethrinus miniatus	Red throat emperor, Trumpet emperor, Sweetlip emperor
Lethrinus nebulosus	Spangled emperor
Lethrinus laticaudis	Grass emperor
Lethrinus lentjan	Redspot emperor, Pink eared emperor
Lethrinus mahsena	Yellow tailed emperor
Lutjanidae - Snappers	
Lutjanus carponotatus	Stripey bass, Spanish flag snapper, Stripey perch
Lutjanus bohar	Red bass, Two-spot red snapper
Lutjanus sebae	Red emperor, Emperor red snapper
Lutjanus russellii	Moses perch, Russell's snapper
Lutjanus johnii	John's snapper, Golden snapper, Fingermark
Lutjanus argentimaculatus	Mangrove red snapper, Mangrove jack
Lutjanus erythropterus	Crimson snapper, Big mouth nannygai
Lutjanus malabaricus	Malabar blood snapper, Small mouth nannygai
Aprion virescens	Green jobfish
Pristipomoides multidens	Goldbanded jobfish, Goldband snapper, Stripey
Siganidae - Rabbitfishes	
Siganus lineatus	Goldline Rabbitfish, Golden-lined spinefoot
Scaridae - Parrotfish	
Scarus ghobban	Blue barred orange parrotfish, Blue-barred parrotfish
Carangidae – Jacks and pompanos	

Gnathanodon speciosus	Golden trevally
Caranx fulvoguttatus	Yellowspotted trevally
Caranx ignobilis	Giant trevally
Elagatis bipinnulata	Rainbow runner
Mugilidae – Mullet	
Valamugil buchanani	Bluetail mullet
Haemulidae – Grunts	
Plectorhinchus gibbosus	Brown sweetlip, Harry hotlips

7.2 Fish ID guide

A finfish ID guide for Torres Strait was compiled from the target species list for the Finfish project (Figure 6). The guide was developed to assist those participating in the survey to avoid possible misidentification. The guide will be updated from feedback as the project progresses.

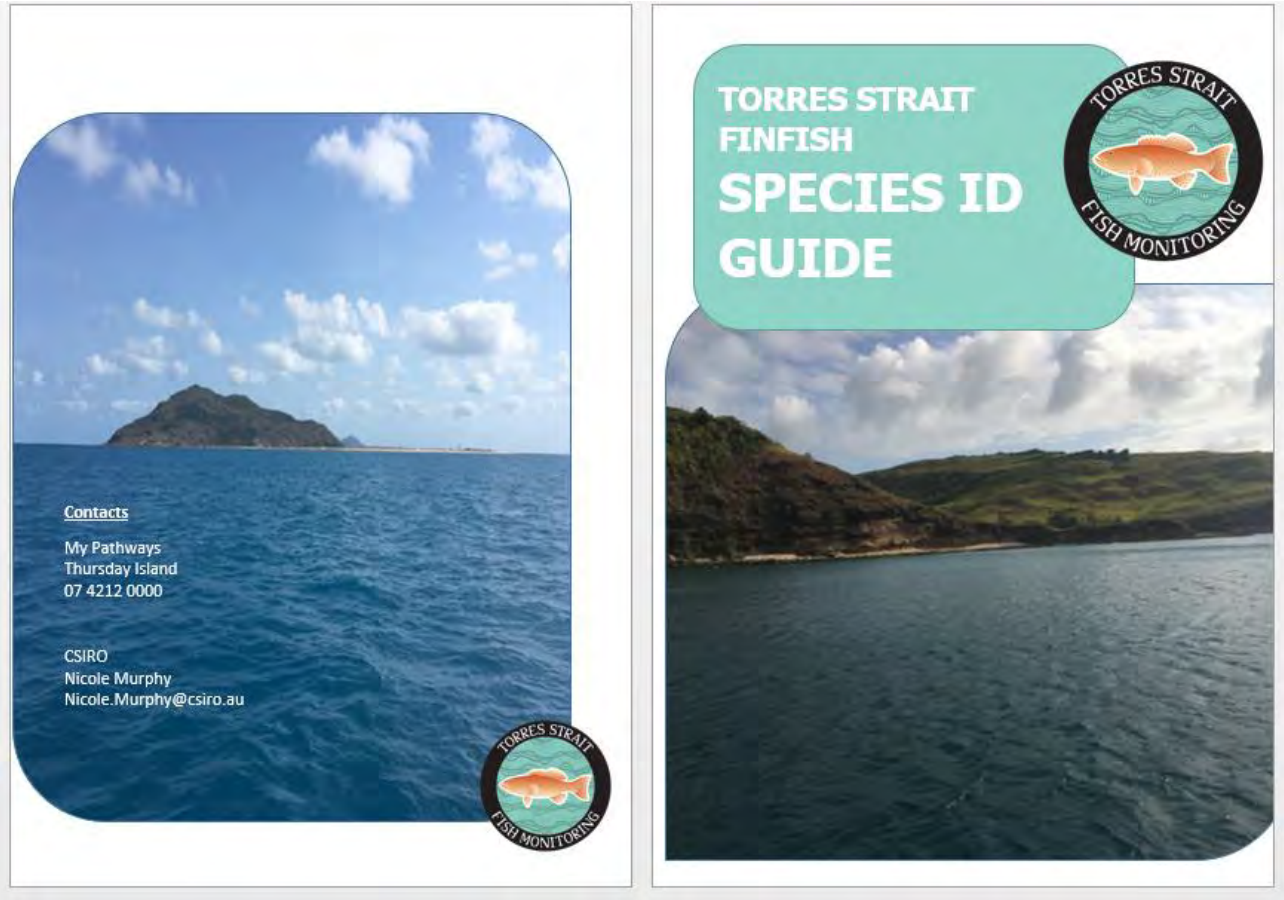


Figure 6. Finfish monitoring project species ID guide for Torres Strait.

7.3 Island names for common fish species

Island names for the Finfish project target species were compiled from the literature and verbal feedback, with Torres Strait language and island derivations also included (Table 3). The list will be updated and added to as the project progresses.

Table 3. Finfish project islander names for target species including Torres Strait language and island derivation.

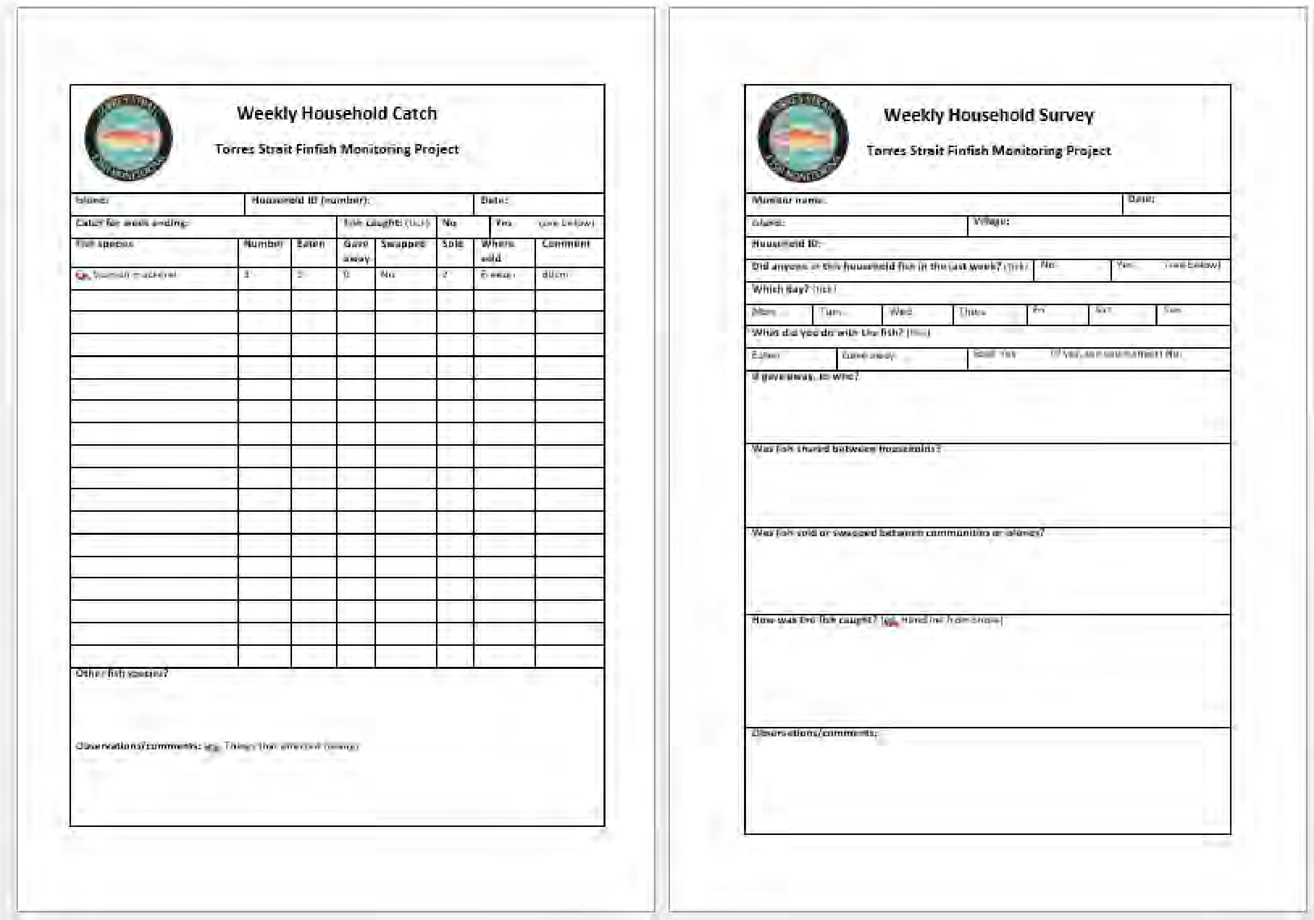
Serranidae – Sea basses, groupers, fairy basslets					
Island name	**Scientific name**	**Common name**	**Language**	**Island**	**District/region**
Mamamlar, Koit, Witi, Withi	*Plectropomus leopardus*	Coral trout, Common coral trout, Leopard coralgrouper, Leopard coral trout	-	-	East TS, West TS
Neud	*Plectropomus laevis*	Bluespotted coral trout, Black saddled coral grouper, Chinese footballer	-	-	East TS
Garum, Gorom	*Cromileptes altivelis*	Barramundi Cod, Humpback grouper	-	Darnley, Murray, Yorke	East TS, West TS
Mamamlar	*Variola louti*	Yellow edge coronation trout; Yellow-edged lyretail, Coronation trout	-	-	East TS
Siar	*Cephalopholis miniata*	Tomato cod, Coral cod, Coral hind	-	-	East TS
Scombridae – Mackerel, tuna, bonito					
Island name	**Scientific name**	**Common name**	**Language**	**Island**	**District/region**
Duboi, Kaper	*Grammatorcynus bicarinatus*	Shark mackerel	-	-	East TS
Argi, Dhubo, Dabu, Dabor, Debu, Dubai Gaigai, Geigi	*Scomberomorus commerson*	Spanish mackerel, Narow-barred Spanish mackerel	-	Mabuiag	East TS, West TS
Carangidae – Jacks and pompanos					
Island name	**Scientific name**	**Common name**	**Language**	**Island**	**District/region**
Matei, Maui, Yalo waitpis	*Gnathanodon speciosus*	Golden trevally	Creole	Mainly Mer	Eastern TS
Lutjanidae - Snappers					
Island name	**Scientific name**	**Common name**	**Language**	**Island**	**District/region**
Patu	*Lutjanus sebae*	Red emperor, Emperor red snapper	-	Darnley, Murray, Yorke	-
Tanik	*Lutjanus johnii*	John's snapper, Golden snapper, Fingermark	-	-	-
Teunab	*Pristipomoides multidens*	Goldbanded jobfish, Goldband snapper, Stripey	-	-	-
Siganidae - Rabbitfishes					

Island name	Scientific name	Common name	Language	Island	District/region
Parsar	*Siganus lineatus*	Goldlined rabbitfish, Golden-lined spinefoot, Spiny spinefoot	-	Darnley, Murray, Yorke	-
Sphyraenidae - Barracudas					
Island name	**Scientific name**	**Common name**	**Language**	**Island**	**District/region**
Mugarir, Mugaral	*Sphyraena* spp.	Barracuda	-	Mabuiag	-
Mugilidae - Mullet					
Island name	**Scientific name**	**Common Name**	**Language**	**Island**	**District/region**
Muragudal	*Ellochelon vaigiensis*	Northern mullet, Diamond scale mullet, Squaretail mullet	-	Mabuiag	-
Mallet, Simalet, Zogar	-	Mullet, Big mullet	Creole	-	-
Haemulidae - Grunts					
Island name	**Scientific name**	**Common Name**	**Language**	**Island**	**District/region**
Buz, Taur	*Pomadsys kaakan*	Javelin grunter, Queensland trumpeter, Spotted javelinfish	Miriam	Mabuiag	Eastern TS

7.4 Data sheets

The Finfish project has five data sheets to be filled out (Table 4. Example of Finfish project data sheets. Two are required at the start of the survey, these are the survey participation agreement form for all participants, and a Household Number Assignment form where each house is assigned a unique number by the finfish monitor for confidentiality purposes. On a weekly basis, there will be three forms to fill out, these include the Weekly Household Catch form recording species caught, a Weekly Household Survey form detailing fishing and a Weekly Island Summary form filled out by the Finfish Monitor to record the households surveyed.

Table 4. Example of Finfish project data sheets.


Weekly Household Catch

Torres Strait Finfish Monitoring Project

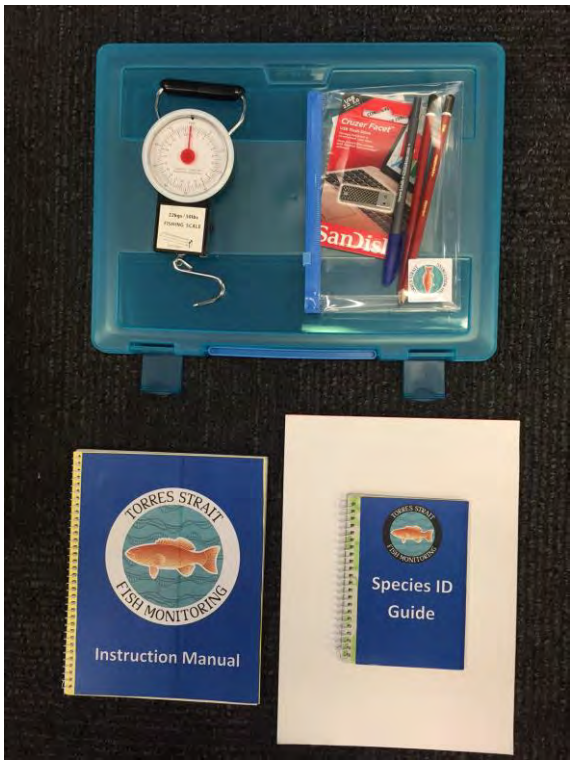
Weekly Household Survey

Torres Strait Finfish Monitoring Project

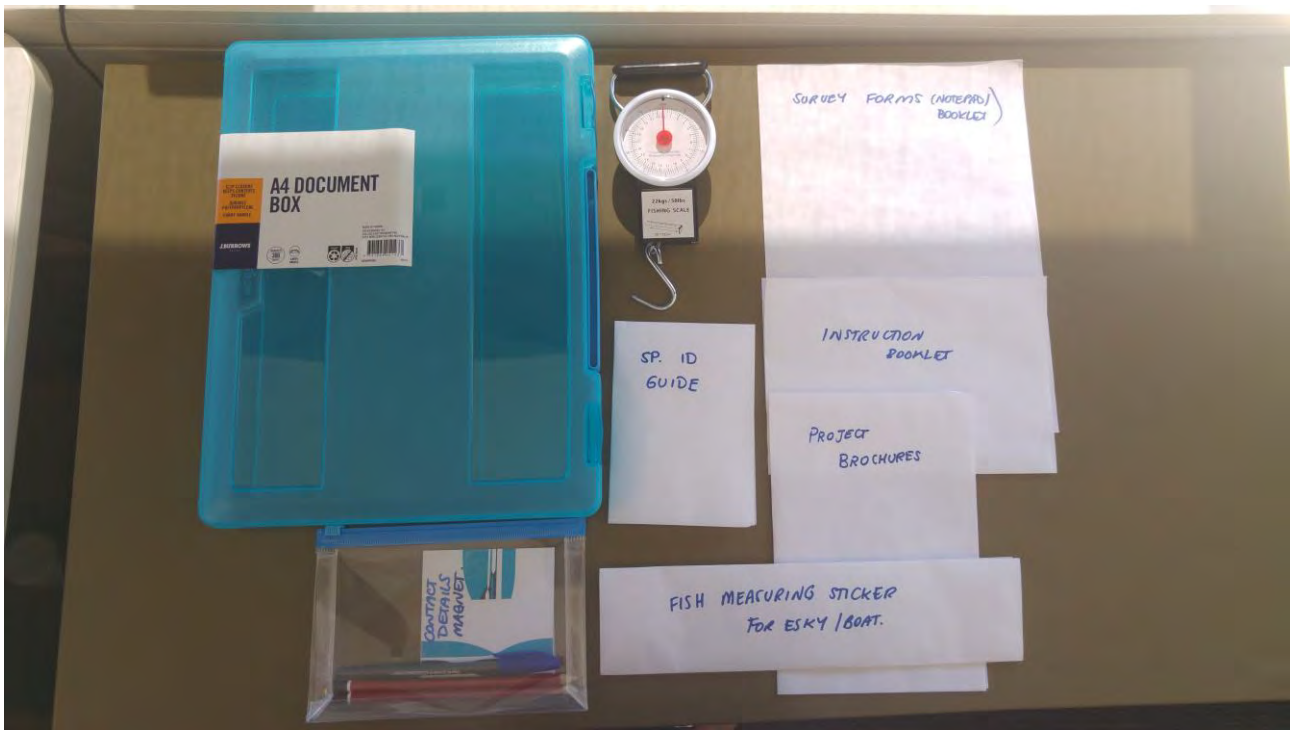
7.5 Monitoring gear

Each Finfish Monitor will be provided with a vest for identification, a project manual, participant information handout, any supplies and a backpack for undertaking the surveys. Participating households will also be provided materials to assist with the project where needed.

7.5.1 **Island monitor kit**



7.5.2 **Household kit**



8 Future work

8.1 Surveys

A pilot survey will be undertaken at Erub Island as prove of project and to streamline the survey process. It is then planned for subsequent surveys to be rolled out to the islands of Masig and Poruma, with Mer and Ugar to follow.

8.2 Data entry and analysis

Submission of data will be co-ordinated with the Finfish Monitor to determine the most suitable method. This may be:

- Monitors to post survey forms to CSIRO in Brisbane using addressed prepaid envelopes
- Monitors to scan sheets and email or dropbox nicole.murphy@csiro.au
- Monitors to enter data (eg. into Microsoft Excel) and email or dropbox nicole.murphy@csiro.au
- Development of an electronic survey (SurveyMonkey) to use on a tablet

8.3 Quality assessment

Entering of Finfish project data into a central holding facility will allow for ongoing critical assessment of data quality. Data will also be compared with previous creel surveys of the islands of Erub, Masig and Mer as well as comparison with freezer docket books. Weekly reporting of survey data will also enable 360 degree feedback from the Finfish Monitor and participating households.

8.4 Final reporting

Final reporting from data analysis will involve estimates of the overall traditional fishery take and composition, catch per island per year, monthly catch and spatial data if available. Where possible, factors affecting catch, estimates of fishing stock status including the status (if any) of exploited subsistence stocks, and interactions with subsistence and commercial catch for Spanish mackerel and reef line commercial fisheries will be included.

8.5 Outcomes

The outcomes from this project will produce the most comprehensive knowledge base to date for the traditional finfish catch in Torres Strait, contributing towards a sustainable finfish fishery for islanders. Impacts of the commercial finfish fisheries can be mitigated with data from the project used to assign priority when allocating species quotas, allowing for protection of the subsistence fishery. Island communities will additionally benefit from enhanced ownership of finfish resources

from further understanding of the socioeconomic importance of the subsistence sector. New local expertise in finfish monitoring and management through the engagement of trained monitors will also value add to Torres Strait livelihoods.

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Appendix A Finfish Monitoring Project Inception Meeting

A Finfish Inception Planning workshop was held on the 17th February 2016 at the TSRA LMSU Building, Thursday Island.

Notes from meeting

A.1 Attendees

Name	Agency	Job title	Contact
Maluwap Nona	Malu Lamar	Torres Strait Regional Sea Claim Title holders	maluwap.ali.nona@gmail.com 0428 309 337
Kenny Bedford	Erub Fishers association	President	kennybedford@hotmail.com
Mariana Nahas	TSRA	Office responsible for fishery matters	mariana.nahas@tsra.gov.au 07 4069 0745
Selina Stoute	AFMA	Torres Strait fishery manager	Selina.Stoute@afma.gov.au
Steve Hall	AFMA	Fishery manager	steve.hall@afma.gov.au
Tim Skewes	CSIRO	Project scientist	tim.skewes@csiro.au
David Brewer	CSIRO	Project scientist	david.brewer@csiro.au

A.2 Meeting objectives

- Introduce the project and gain broad agreement on project objectives.
- Outline and discuss the project approach and work-plan, including focus communities.
- Gather information on various aspects of the project consultation and implementation process.

A.3 Current finfish fishery in Torres Strait

A.3.1 Fisher types

There was some discussion of the fisher types that occur on Torres Strait Island communities. The following categories were recognised:

- Subsistence only. Mostly fishing from shore or boating out a short distance.
- TIB/subsistence mixed. Islander fishers catching fish for sale and for subsistence (sometimes the latter being undersized fish). This include 3 subtypes (based on point of sale):

a. Selling to an island freezer or island based middle-man;
b. Selling directly to a processor on TI or the mainland;
c. Selling internally islanders on the island - a within-island "commercial" sector (probably not huge, but important to take into account).

➢ TIB sell only sector. Currently none of these.

A.3.2 Subsistence catch

There was some discussion and difference of opinion on the size and composition of this sector. CSIRO presented an analysis of the most recent subsistence catch monitoring from the eastern islands that indicated a substantial subsistence catch with significant numbers of commercial species. It was noted that this catch is most likely quite variable in time and location.

CSIRO reiterated that this project is focused on the subsistence catch of finfish, particularly of the commercial species that consumed within island communities. This was recognised by the meeting participants as a difficult undertaking and that monitoring other sectors would potentially detract from this primary objective.

A.3.3 TIB Sector

The TIB (Islander commercial) sector includes islander fishers selling fish to islander freezers and other buyers via selling directly to processors on the mainland or locally. Erub (Darnley) Island is the only community freezer currently active. There are some other private buyers (sole operators) on several islands (e.g. Mer, Erub, Ugar) that fish, buy and sell to processors in Cairns or locally. Some Torres Strait islanders are in the process of obtaining larger vessels (but not there yet) which will catch fish and process on board for sale down the supply line.

The point was strongly made that the local commercial fishery catch (catch sold by islanders to other islanders) should be captured and included as a subsector. This is an important fishery component for the TSRA and AFMA to quantify for the overall management and promotion of the fishery.

AFMAs Docket book program is primarily focussed on quantifying the TIB catch that goes through the island freezers. AFMA expressed a view that any commercial sectors in the islander fishery could/should be captured using a Docket book /logbook. This needs further discussion but should be promoted as part of the overall project justification.

The current Docket book program is being run by AFMA. It is considered unreliable and not comprehensive. It is currently being used on Erub, however it is not clear whether it is being actively supported and collected by an AFMA officer. The TSRA rep indicated that she would be willing to re-invigorate the Docket book program back to the TSRA for consideration with AFMA.

CSIRO committed to try and structure the monitoring program to account for the internal commercial fishery catch. CSIRO made the point that the overall monitoring approach needed to be simple to administer and apply and that any additional complexity was a risk to the ongoing success of the program. Additionally, there may be tax and other implications associated with the internal commercial fishery that will need to be handled sensitively (see ethics section). We also needed to consider being careful not to double count fish in the subsistence and artisanal catch.

It was stated that, based on a Centre for Aboriginal Economic Policy Research (CAEPR) economic report that looked at the small-scale commercial fishery (sometimes called “black market” fishery), black market sales can be detrimental to fisheries operations in the Torres Strait, business set ups, economic returns etc (Arthur, 2005) . CSIRO will get the CAEPR report and integrate its findings into our justification of the project. Again, this will have to be treated sensitively as there are potential implications for this sector.

ACTION: TSRA and AFMA to consider renewed focus and support for the Docket book program, including application to small scale fish sellers on eastern islands.

ACTION: The fishery conceptual diagram needs to be updated by CSIRO to reflect the internal commercial sector.

A.3.4 Recreational sector

There was some discussion of the recreational and charter sector, its size and potential for monitoring. The rec sector is made up of non-islanders visiting or living in Island communities, and charter boats. There was general agreement that the sector was increasing. Although it was not a big issue when the sector was small, with more boats and more people it’s becoming a concern regarding the volume of take. The catch of charter and recreational fishing is currently unknown but there is anecdotal reports of quantities of mackerel and coral trout being taken.

There has been reports of large charter boats fishing out of Murray in the last few years – including the Outer Barrier and Ashmore Reef. Typically charter vessels will have up to 6 dorries plus technology to find fishing spots. The trend and concern is that they may becoming more substantial.

These fishing operations haven’t come through any formal approval process. Traditional owners (TOs) at the meeting expressed the view that we were talking about traditional native title sea country here so different to other areas in Qld. One issue around this is that TO catches will be monitored but not the catch from non-traditional owners. This, along with likely increases in the take from the rec sector has prompted a need to consider recording the catch from this sector.

However, while this is potentially an important sector to monitor, the PZJA/SAC had no mandate to manage rec fishing. It was generally agreed that this issue be followed up (particularly by Malu Lamar) and will be raised at appropriate fora, such as the upcoming finfish working group meeting. Malu Lamar indicated that they will write a letter to the PZJA to let them know of their concern over the growing recreational fish take.

There was general agreement that the recreational fishing sector will be dealt with separately (not in this project). Non-islanders living in communities could be included in the subsistence catch monitoring project (they should not be selling the catch in any case).

ACTION: Stakeholders to raise the monitoring of the recreational and charter sector with the PZJA and Finfish working group.

ACTION: CSIRO to include non-islander rec fishers in the monitoring protocol.

A.3.5 TVH sector

It was recognised that there could be some advantages to engaging with the TVH (non-islander) sector:

- build continuity between all stakeholders
- foster a better relationship with industry
- managing the fishery from a whole-of-industry point of view
- training and value adding

The best forum for this would be the Finfish working group which will meet sometime this year.

There is also the potential to interact with the Torres Strait Maritime Pathways Program (TSMPP), which is a partnership between the Australian Maritime Safety Authority (AMSA), Maritime Safety Queensland (MSQ) and the Torres Strait Regional Authority (TSRA). It has been working since 2013 to develop maritime skills and capabilities for Torres Strait Islander and Aboriginal people.

A.4 Project scope

A.4.1 Focus communities

Although the project proposal was focused on the communities of the Torres Strait PZ (i.e. outer islands), the meeting agreed that an initial project implementation on all communities of the TSPZ would not be feasible, and that the focus would be on the eastern and central islands which would be treated as a pilot for a future, broader implementation across the TSPZ. Most of the recent fishing activity has occurred in this region, particularly for commercial species such as mackerel and trout (although it may extend into other parts of Torres Strait in the future). Also the most recent subsistence monitoring research is from this region (Busilacchi, 2008).

ACTION: CSIRO will need to clarify the regions of focus for the project.

A.4.2 Species monitored

It was reiterated that the focus of this project is on the commercial quota species that were caught in the subsistence fishery. However, CSIRO will either include other non-quota species or design the program so that other species can be included in the future.

A.4.3 Spatial resolution of catch data

The TS SAC have suggested that the fish caught should be identified as being within 10nm of communities. The meeting recognised that this may be important for local depletion concerns, and for providing more detail on the interaction between the islander and non-islander sectors of the fishery. In fact, very few fish are currently caught by community members outside the 10nm zone (at the moment).

CSIRO suggested that this aspect could be covered using an occasional questionnaire – e.g. maps – ‘what proportion of your fish comes from outside the 100 nm zone?’. There was general agreement for this approach.

A.5 Monitors engagement

An important aspect of this project is payment for the island based monitors being trained during (and potentially after) the project. CSIRO reiterated that there was no provision in the budget for payment for island based monitors. There were 2 possible sources of monitors considered:

- Rangers. These would probably require a fee for service arrangement.
- My Pathway. There will probably be a payment structure built onto this via the standard MyPathways processes.

It was also suggested that the training count towards an accreditation (TAFE, My Pathway can investigate, Tagai College)?

ACTION: CSIRO will investigate the potential support offered by My Pathway for engaging and supporting the monitoring positions (Kenny Bedford offered to discuss this further).

A.6 Consultation and human ethics

There was some discussion about the importance of appropriate and comprehensive consultation and consent from the TOs (e.g. tribal elders). TO consent can be complex to negotiate and achieve. However, it's important that we interact with the TOs through the elders. They should understand what is happening and be supportive.

The permissions should be mostly aimed at Prescribed Body Corporate (PBC) (and through them to the elders) and the Councillor as the administrative contact on the islands. After that come the Board members and Fisher group reps. Sometimes the Council of Elders will be naturally present at a community meeting. If not then it is probably important to seek them out.

Everyone thought an agreed MOU would be a good idea for the ongoing implementation of the project.

A.6.1 Verbal versus written consent

Malu Lamar is potentially able to provide some advice about the levels of consent and the need for prior written consent versus verbal consent. There was some agreement that a written consent form may present some challenges.

The committee generally supported the approach to gaining informed consent by the CSIRO project. CSIRO will draft up the written and verbal consent tools and send back to the committee for approval. We will then send to the CSIRO Ethics committee.

There is a current study/review being done by Professor Nakata (JCU) looking at extending the protocols for research consent. CSIRO will look at any findings it produces that has relevance to this project.

ACTION: CSIRO to draft the written and verbal consent tools and send back to Steering and CSIRO Ethics committees for approval.

ACTION: CSIRO to review study by Prof. Nakata (JCU) on extending protocols for research consent and will identify any findings relevant to this project.

A.6.2 Participation information sheet

This should outline the objectives and origins of project, as well as the benefits and incentives, and risks. It should also be easy to digest and understand.

RECOMMENDATION: - CSIRO will develop our permission approach and then send back to members of the Steering committee.

A.6.3 Culturally appropriate approaches

An important component of this project will be the promotion/inclusion of traditional language and approaches.

Steve Hall has a list of the local names. It was recognised that terminology and language will be critical and we need to incorporate as much as possible. Traditional/subsistence/kai kai fishery – talk to Sara Busilacchi as well.

ACTION: CSIRO and AFMA, in consultation with Steve Hall to incorporate traditional language and approaches in full measure.

A.7 Post project

After this project, the PZJA (via the SAC) will need to decide how finfish monitoring should continue: e.g. an ongoing continuous basis, or a survey every 3 years or other. Repercussions include levels of continued commitment to employment of monitors.

A.8 Project support

Attendees were generally supportive of the project objectives and approach. They were also happy to help with advice regarding the Island nation names and other traditional language issues.

Continued support from Malu Lamar and others in the PBC area will be critical to the success of the project.

Although we anticipate a high level of support from participating communities, we will have to be ready to respond to a rejection of involvement by Islander representatives and communities.

9.1 Project approach

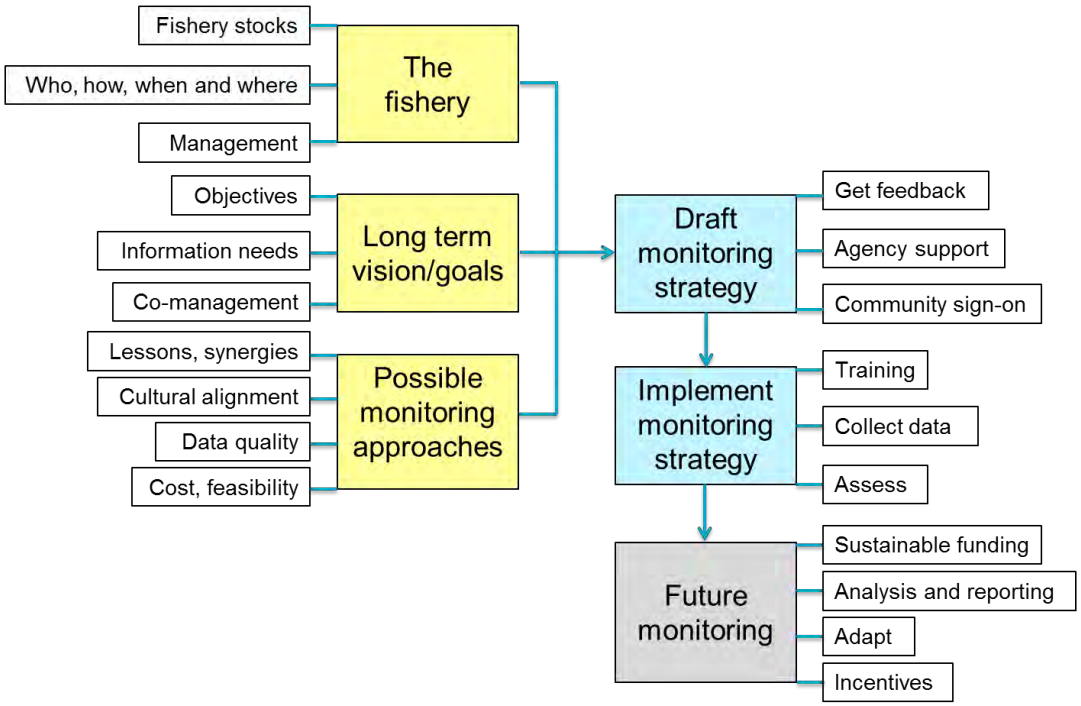


Figure 7. Project approach

9.2 Consultation and communication

Figure 8. Consultation and communication

Appendix B **Review of the Torres Strait Finfish Fishery**

B.1 Commercial fishery

B.1.1 Spanish mackerel

The Torres Strait Spanish Mackerel Fishery (TSSMF) operates predominantly in the eastern Torres Strait (Figure 9) within the Torres Strait Protected Zone (TSPZ). The narrow-barred Spanish mackerel (*Scomberomorus commerson*) is mainly targeted, with the fishery expanded in 1999 to include School mackerel (*Scomberomorus queenslandicus*), Grey mackerel (*Scomberomorus semifasciatus*), Spotted mackerel (*Scomberomorus munroi*) and Shark mackerel (*Grammatorcynus bicarinatus*) (PZJA, 2014).

Catch

In 2013-14, 105.4 t of Spanish mackerel was caught, 85.2 t in 2012-13 and 88 t in 2010, catch in 2010 was worth around $0.78 million (catch records are provisional with fishing data from Traditional Inhabitants collected through a non-compulsory docket book system) (AFMA, 2010; ABARES, 2015). The decline in catch from >250 t in 2005 to around 100 t in 2007 onwards, reflects catch entitlements reverting to the TIB sector with the voluntary buy-back of all TVH licenses (Figure 10; Figure 11) (PZJA, 2014).

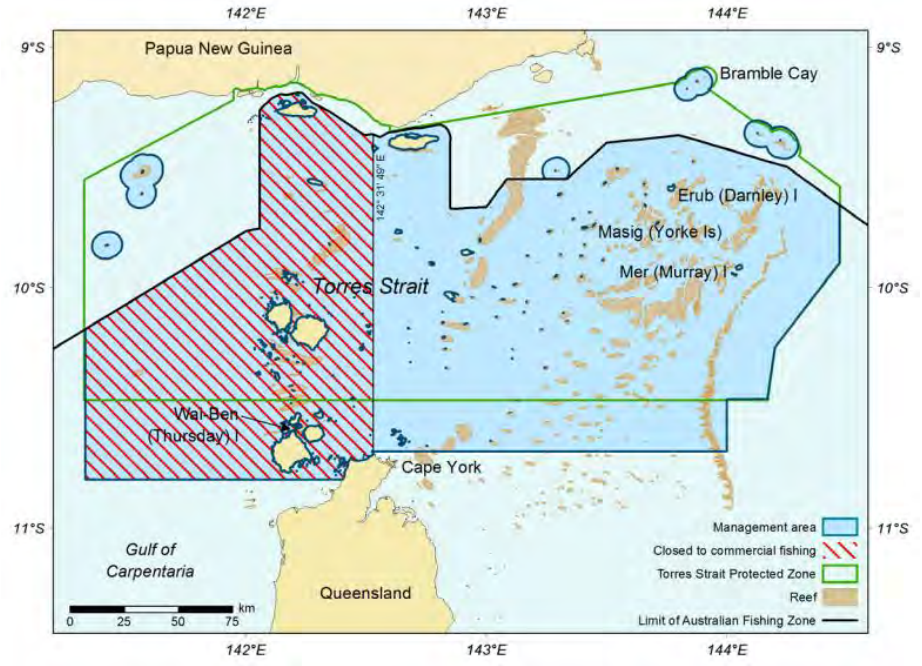


Figure 9. Map showing area of Spanish Mackerel Fishery in Torres Strait (PZJA, 2014a).

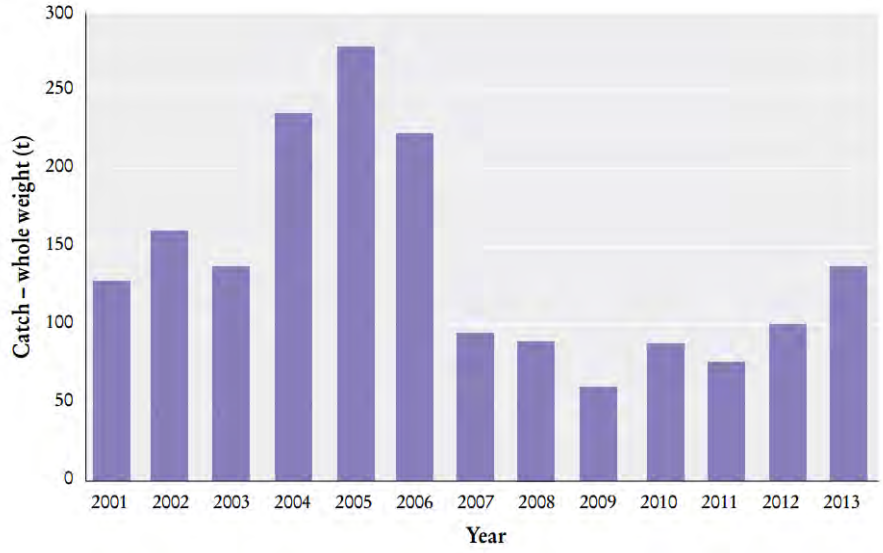


Figure 10. Catch history for Spanish mackerel in the Torres Strait Finfish Fishery (reported in calendar years) (Source: Logbook data docket book data 2004 to 2013 and other records 2001 to 2013) (PZJA, 2015).

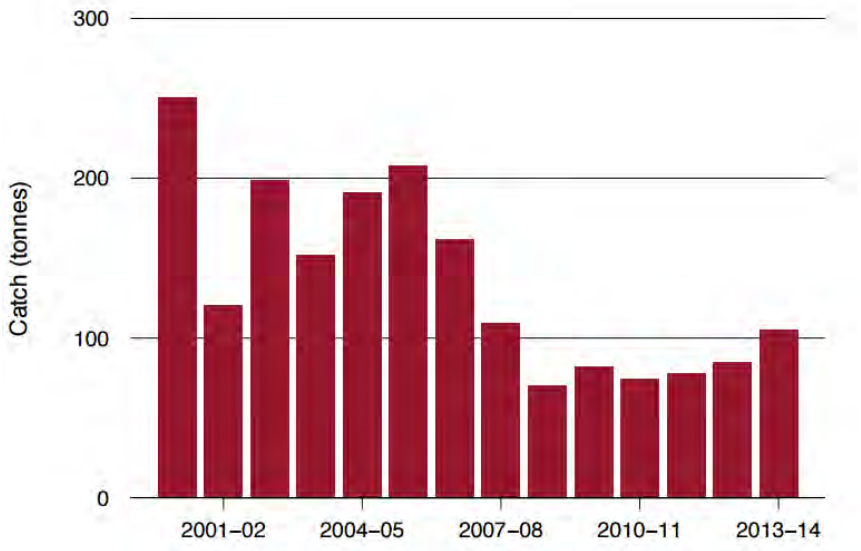


Figure 11. Catch history for Spanish mackerel in the TSSMF, 2000–01 to 2013–14 (reported in financial years) (ABARES, 2015).

The quantity of Spanish mackerel taken for traditional purposes is unknown. Busilacchi (2012) study showed that between 6-25% of subsistence catch taken during commercial fishing is Spanish mackerel and likely undersized individuals (PZJA, 2014).

Effort

Spanish mackerel are fished by trolling, generally from dories and/or dinghies operating by themselves or from a primary vessel. The majority of catch is taken by commercial operators leasing Sunset licences (PZJA, 2014).

In 2013-14, 136 TIB licences with mackerel endorsements were issued, with 135 in 2012-13, 131 in 2011 and 161 in 2009. Five Sunset licences were leased to fish the TSSMF in 2013-14 and four in 2012-13 (AFMA 2010, ABARES, 2015) (PZJA, 2014).

B.1.2 Reef line species

The Torres Strait Reef Line Fishery is a multi-species fishery targeting a variety of reef fish species (Figure 12). The fishery focuses primarily on higher valued species including Coral trout (*Plectropomus spp.*), Barramundi cod (*Cromileptes altivelis*), mixed reef fish (*Lutjanus spp.* and *Lethrinus spp.*) and species of Rock cod (*Epinephelus spp.*).

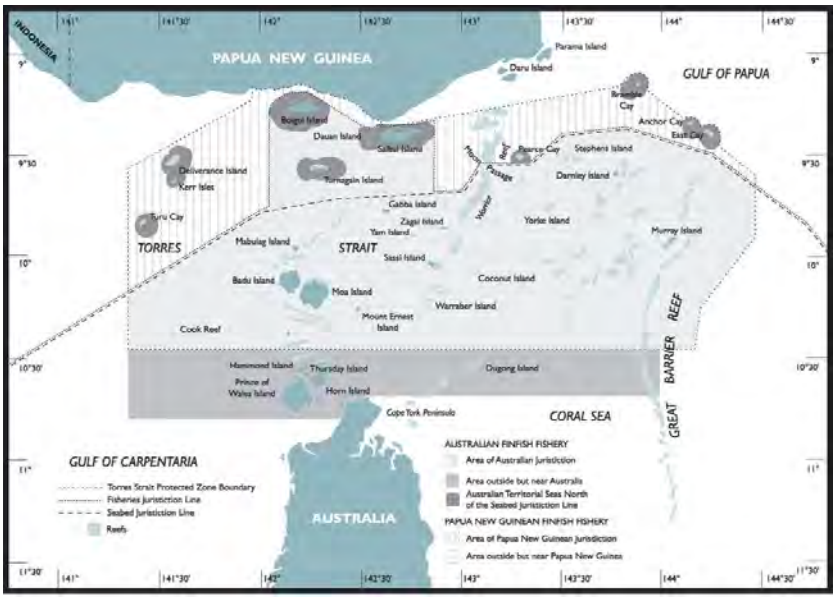


Figure 12. Map showing area of Reef Line Fishery in Torres Strait (PZJA, 2014).

Catch

- Commercial

Between 2001 and 2004 catches of Coral trout were similar 130-150 t, declining markedly in 2006 to around 60 t. This correlates with reduced effort from the banning of nets throughout the TSPZ, and fewer operators participating in the fishery (Figure 13) (PZJA, 2013).

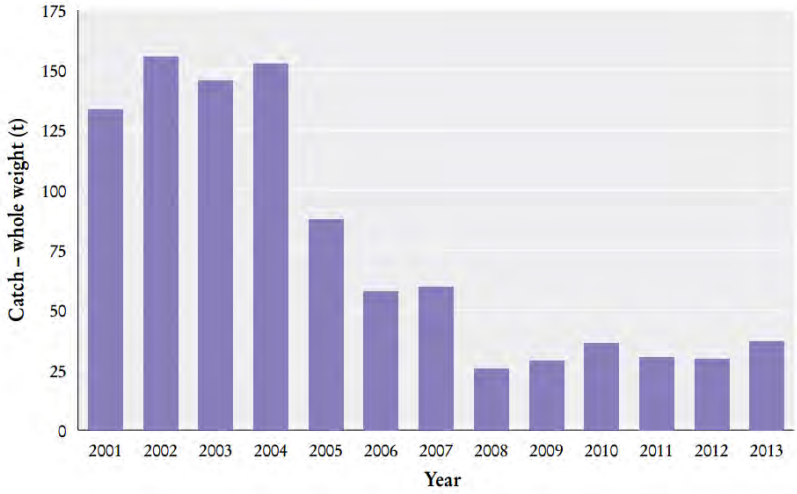


Figure 13. Catch history for coral trout in the Torres Strait Finfish Fishery (reported in calendar years) (Source: Logbook data 2001 to 2013, docket book data 2004 to 2013 and other records) (PZJA, 2015).

A further reduction in catch from >50 t to around 30 t in 2008 onwards, coincides with the voluntary buy-back of TVH licences endorsed to fish the TSRLF, where all catch entitlements were transferred to the Traditional Inhabitant sector (PZJA, 2014).

In 2010, landed species for the TSRLF totalled 39.6 t, with Coral trout composing the majority of the catch (36.2 t) (Table 5Table 5. Logbook catch data from the Torres Strait Reef Line Fishery (including catches from both TIB-licensed boats and Sunset-licensed boats) received during 2010 (PZJA, 2014). (Collection of catch data from Traditional Inhabitant fishers is voluntary; catch records for 2010 are provisional (PZJA, 2014)). The 2010 season catch of 36.2 t of Coral trout had an estimated value of $0.69 million. In 2013-14, 30.9 t of Coral trout and 2.1 t reef fish was caught and 23.1 t of Coral trout and 1.3 t of reef fish in 2012-13 (AFMA 2010; ABARES, 2015; PZJA, 2014).

Table 5. Logbook catch data from the Torres Strait Reef Line Fishery (including catches from both TIB-licensed boats and Sunset-licensed boats) received during 2010 (PZJA, 2014).

Species	Catch (kg)
Coral trout	36,195
Red emperor	327
Barramundi cod	926
Other	2169
Total	39,617

An unknown quantity of finfish are taken during the course of traditional fishing (PZJA, 2014b).

Effort

Finfish are generally taken by hand lines, with the use of nets banned throughout the TSPZ and outside but near area since December 2005 (PZJA, 2014). The use of nets for traditional fishing is still allowed.

In 2007 the PZJA agreed on a nominal TAC of 134.9 t for Coral Trout for the TSPZ, with 145 TIB licences holding reef line entries issued to Traditional Inhabitants in 2010. In 2013-14, 132 TIB licences with reef line entries were endorsed, with 122 in 2012-13,131 in 2011, 145 in 2010 and 161 in 2009 (ABARES, 2015). One sunset licence was leased to fish the TSRLF in 2013-14 and 2012-13, and one in 2010-11 with a 50 t quota (ABARES, 2015; AFMA 2010; PZJA, 2014).

The closure of a freezing facility on Murray Island in late 2010 is believed to have negatively affected profitability and interest in the Torres Strait Finfish Fishery. Fishers have limited access to freezing capacity and there has been inconsistent supply to processors. This has led to a negative impact on marketability, prices and catch (TSRA, pers. comm., 2011).

B.1.3 TIB Sector

The TIB (Islander commercial) sector includes islander fishers selling fish to islander freezers and other buyers via selling directly to processors on the mainland or locally. Erub (Darnley) Island is the only community freezer currently active. There are some other private buyers (sole operators) on several islands (e.g. Mer, Erub, Ugar) that fish, buy and sell to processors in Cairns or locally.

Some Torres Strait islanders are in the process of obtaining larger vessels (but not there yet) which will catch fish and process on board for sale down the supply line.

B.1.4 TVH sector

Torres Strait Spanish Mackerel Fishery

The majority of the catch is taken by a small number of commercial operators utilising primary boats carrying tenders. Sunset licences are leased through the TSRA with agreed conditions for fishing in the fishery, including a Total Allowable Catch (TAC) and area closures (PZJA, 2014).

Five sunset licences were leased to fish the TSSMF in 2013-14 and four in 2012-13 (AFMA 2010, ABARES, 2015) (PZJA, 2014).

Torres Strait Reef Line Fishery

One sunset licence was leased to fish the TSRLF in 2013-14 and 2012-13, and one in 2010-11 with a 50 t quota (AFMA 2010, ABARES, 2015).

Commercial important species commonly targeted included those from Serranidae, Lutjanidae and Lethrinidae (Busilacchi, 2008).

B.2 Recreational and charter sector

The recreational and charter sector catches are unknown and considered relatively minor. (Busilacchi, 2008).

The recreational sector is made up of non-islanders visiting or living in Island communities, and charter boats. There is general agreement that the sector is increasing (Inception Planning Workshop, 2015). Although it was not a big issue when the sector was small, with more boats and more people it's becoming a concern regarding the volume of take. The catch of charter and recreational fishing is currently unknown but there is anecdotal reports of quantities of mackerel and coral trout being taken.

There has been reports of large charter boats fishing out of Murray in the last few years – including the Outer Barrier and Ashmore Reef. Typically charter vessels will have up to 6 dorries plus technology to find fishing spots. The trend and concern is that they may become more substantial.

These fishing operations haven't come through any formal approval process. Traditional owners (TOs) at the meeting expressed the view that we were talking about traditional native title sea country here, so different to other areas in Qld. One issue around this is that TO catches will be monitored but not the catch from non-traditional owners. This, along with likely increases in the take from the recreational sector has prompted a need to consider recording the catch from this sector.

However, while this is potentially an important sector to monitor, the PZJA/SAC had no mandate to manage recreational fishing. It was generally agreed that this issue be followed up (particularly by Malu Lamar) and will be raised at appropriate fora, such as the upcoming finfish working group

meeting. Malu Lamar indicated that they will write a letter to the PZJA to let them know of their concern over the growing recreational fish take.

There was general agreement that the recreational fishing sector will be dealt with separately (not in this project). Non-islanders living in communities could be included in the subsistence catch monitoring project (they should not be selling the catch in any case).

Stakeholders will raise the monitoring of the recreational and charter sector with the PZJA and Finfish working group. CSIRO to include non-islander rec fishers in the monitoring protocol.

B.3 Barramundi

Barramundi (*Lates calcarifer*) fishing is restricted to territorial waters adjacent to the Australian islands of Saibai, Boigu, Moimi, Kaumag, Aubusi and Dauan, in the north-west of Torres Strait near the PNG coast. Barramundi are taken using hand spears and hand set monofilament gill nets, with the fishery mainly exploited for subsistence (PZJA, 2013; PZJA, 2014).

An unknown amount of Barramundi are harvested from Boigu and Saibai islands. All harvested Barramundi are under legal commercial size limits and are eaten locally. There are no recent records of commercial sale (PZJA, 2014a).

B.4 Traditional take

Increases in catch and effort for traditional fishing have been observed over time (Busilacchi et al., 2013a; Busilacchi et al., 2013b). However, there has not been an associated decrease in catch rates between the early 1990s and 2005 (Figure 14) (Busilacchi, 2008).

Suggested reasons for increased catches are a result of social, cultural and economic factors driven by modernisation on islands. Islanders have greater access to motorised boats and modern fishing gears (e.g. nets), allowing them to travel further and improve catch rates (Busilacchi, 2008; Busilacchi et al., 2013; Busilacchi et al., 2013b).

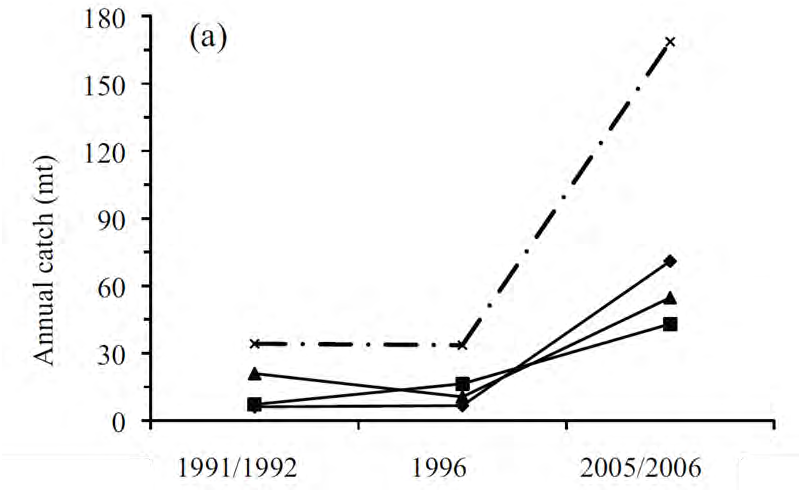


Figure 14. Estimated subsistence catch in 1991/1992, 1996 and 2005/2006 on Darnley (diamond), Murray (square) and Yorke (triangle) Islands; combined island catch (dash) (Harris et al., 1997, Busilacchi et al., 2013).

Appendix C **TSFF Management plan**

C.1 Commercial fishery

A management plan for the TSFF was finalised in 2013, comprising strategies for setting of total allowable commercial catch. The TSFF is currently managed under input controls which are enforced under the Act through Fisheries Management Instrument No. 8 (Prohibitions Relating to the Taking, Processing and Carrying of Finfish) and No. 79 (Prohibitions Relating to the Taking, Processing and Carrying of Spanish Mackerel). Both notices outline the requirements on gear, size and area restrictions, take and carry limits. Other supporting legislation that governs the management of these fisheries includes the Torres Strait Fisheries Regulations 1985 and the Torres Strait Treaty 1985 (PZJA, 2014).

As the buyout of non-traditional inhabitant licences resulted in a marked decrease in TSFF catch, a quota system was considered unnecessary on commencement of the management plan. The plan allows for quota to be introduced in the future if required, with provisions allowing for maximum flexibility such that the most appropriate quota management system can be introduced based on the status of the fishery at the time (PZJA, 2014).

In 2007-2008 all catch entitlements reverted to the Traditional Inhabitant sector with the voluntary buy-back of Torres Strait Fishing Boat Licences (TVH licenses). Entitlements are held in trust by the Torres Strait Regional Authority (TSRA). The TSRA also holds entitlements for Papua New Guinea (PNG) in accordance with the Torres Strait Treaty, where 40 per cent of Spanish mackerel endorsements are made available to PNG fishers (PZJA, 2014).

To fish commercially in the TSFF, licenses are granted as either Traditional Inhabitant boat (TIB); available only to Traditional Inhabitants residing in the Torres Strait or Sunset licences; available to both Traditional Inhabitants and non-Traditional Inhabitants under lease agreements with the TSRA. Entries are attached to licences that allow the licensee to commercially fish in either the Reef Line fishery and/or the Mackerel fishery. A limited number of Sunset licences are held by the TSRA that may be temporarily transferred to non-Traditional Inhabitants to enable them to participate in the fishery as per PZJA policy. The number of TIB licences is currently not restricted (PZJA, 2014). (see Appendix G).

A Quota Management Committee (QMC) determines the quota that will be available annually for non-Traditional Inhabitant leasing, with the quota based on a TIB harvest allowance and supply required by processors and purveyors. Leasing arrangements specify agreed conditions for fishing in the fishery including a Total Allowable Catch (TAC) and area closures. A 10nm closure around the islands of Erub, Mer, Ugar and Masig is in place for non-Traditional Inhabitant fishers leasing temporary licences (Table 6) (Busilacchi, 2008).

Table 6. Reported Total Allowable Catch and Maximum Sustainable Yield for Spanish mackerel and Coral trout.

Statistic	Source	Spanish mackerel	Coral trout
Nominal TAC (t)	PZJA website	112.6	134.9
	PZJA Annual report	188*	135
MSY (t)	ABARES	169/150[1]	

* with 40% allocated to PNG under treaty catch sharing arrangements

Note: There are differences in the catch (SM and CT) and TAC reported (for SM in any case) between the PZJA and ABARES documents.

[1] Begg et al. 2006

Future management strategies for the TSFF subsistence fishery need to encompass increased fishing effort from modernisation of fishing techniques, catch being shipped off islands and retaining of catch for subsistence purposes during commercial fishing (Busilacchi, 2008) (Williams et al. 2008).

C.1.1 Spanish mackerel

Management objectives for the Torres Strait Spanish Mackerel Fishery were developed in conjunction with the Torres Strait Fisheries Act 1984 and the Torres Strait Treaty and set by Protected Zone Joint Authority (PZJA, 2014b) (Torres Strait Fisheries Act 1984 https://www.legislati on.gov.au/Details/C2015C00482; Torres Strait Treaty http://www.austlii.edu.au/au/other/dfat/treaties/1985/4.html) (http://pzja.gov.au/the-fisheries/torres-strait-spanish-mackerel-fishery).

Objectives

- To manage the mackerel resource so as to achieve its optimal utilisation;
- To maximise the opportunities for Traditional Inhabitants of both Australia and Papua New Guinea to participate in the commercial fishery; and
- To promote the fishery as a line fishery.

Regulations

- The taking of mackerel is restricted to trolling, hand-lining and drop-lining only;
- Commercial mackerel operators are permitted to use a general purpose bait net to take bait for their own use;
- An allowance of up to 20kgs of Spanish mackerel and/or reef fish may be carried at any one time by all holders of a Torres Strait fishing licence granted under section 19(2) or 19(3) of the Act; and
- Minimum legal size limits measured from the snout to caudal fin tip apply (Table 7).

Table 7. Minimum legal size limits for mackerel species.

Species	Size (mm)
Spanish mackerel (*Scomberomorus commerson*)	750
Spotted mackerel (*Scomberomorus munroi*)	600
School mackerel (*Scomberomorus queenslandicus*)	500
Grey mackerel (*Scomberomorus semifasciatus*)	500

Arrangements

A management plan for the Torres Strait Spanish Mackerel Fishery is under development. Interim management arrangements continue to apply to all fishers as per Fisheries Management Notice (FMN) No.79. A nominal TAC of 112.6 t for Spanish mackerel is also used as a guide for sustainable management of the Australian resource.

Many of the management arrangements for the Spanish Mackerel Fishery are included in Prohibition relating to the Taking, Processing and Carrying of Finfish (Gear, Size and Area Restrictions and Take and Carry Limit) including :

- Fishing method is restricted to line fishing (unless in the course of traditional fishing) with no more than 6 hooks attached to each line;
- No more than 3 fishing apparatus can be used per boat;
- Commercial net fishing with a net other than a bait net is prohibited (see FMI No.8 for bait net specifications);
- Minimum size limits apply to all species taken commercially and maximum size limits apply to some species (see FMI No.8 for specific details);
- A seasonal barramundi closure exists (for commercial fishing) from midday 1 November each year to midday 1 February the following year;
- A permanent area closure by net fishing methods in that part of the finfish fishery west of 142°09', and in part of the fishery east of 142°09' and north of 10°28';
- A permanent closure by line fishing methods in the area of the fishery west of 142°31'49" (except in the course of traditional fishing);
- Vessels must be less than 20 metres in length;
- The removal of fins from a shark and subsequently disposing of its torso is prohibited; and
- The following species are listed as no take species:
    - Potato Cod (*Epinephelus tukula*)
    - Queensland Groper (*Epinephelus lanceolatus*)
    - Chinaman Fish (*Symphorus nematophorus*)
    - Paddletail (*Lutjanus gibbus*)
    - Humphead Maori Wrasse (*Cheilinus undulatus*)
    - Hammerhead Shark (*Sphyrna lewini*)

- Grey Nurse Shark (*Carcharias taurus*)
- Tiger Shark (*Galeocerdo cuvier*)

Strategic Assessment

The TSSMF was strategically assessed under the Environment Protection and Biodiversity Conservation Act 1999 during 2008, and was formally accredited as a Wildlife Trade Operation in late November 2008. The Torres Strait Finfish Fishery Management Plan 2013 came into effect on 16 July 2013 (PZJA, 2014).

C.1.2 Reef line fishery

The objectives for the Torres Strait Finfish (Reef Line) Fishery were developed in conjunction with the Torres Strait Fisheries Act 1984 and the Torres Strait Treaty, and set by Protected Zone Joint Authority (PZJA, 2014) (http://pzja.gov.au/the-fisheries/torres-strait-finfish-reef-line-fishery).

Objectives

- To manage the resource so as to achieve optimum utilization.
- To maximise opportunities for Traditional Inhabitants of Australia and PNG to participate in the commercial fishery.

Regulations

A management plan for the Torres Strait Finfish (Reef Line) Fishery is under development and will be included in the Torres Strait Spanish Mackerel Fishery. Catch entitlements are also held aside to provide for catch sharing arrangements for Papua New Guinea if required. A Finfish Working Group has been established to provide advice to the PZJA on issues related to the Reef Line Fishery (PZJA, 2013).

Strategic Assessment

The TSRLF was strategically assessed under the Environment Protection and Biodiversity Conservation Act 1999 during 2008 and was formally accredited as a Wildlife Trade Operation in late November 2008. The Torres Strait Finfish Fishery Management Plan 2013 came into effect on 16 July 2013.

C.2 PNG Shared stocks

Catch sharing arrangements exist between Australia and PNG for Spanish mackerel as an Article 22 fishery (http://pzja.gov.au/the-fisheries/catch-sharing-with-papua-new-guinea/).

Appendix D **Stock assessment - TSFF**

D.1 Spanish mackerel

The most recent stock assessment for the TSSMF was undertaken in 2006. A sex and age structured population model was used which resulted in stock considered to be fully exploited (Begg et al., 2006; Busilacchi et al. 2012).

The buyback of non-traditional TIB licences over 2007-08 resulted in a reduction of catch and effort, with the fishery not considered to be overfished or subject to overfishing in 2010 (ABARES, 2015; PZJA, 2014; Woodhams et al., 2011)

Information available for the TSSMF indicates the stock has been relatively stable during a period of several decades. Limited exchange is believed to occur between Spanish mackerel stocks in Torres Strait, the Gulf of Carpentaria and the east coast of Queensland (PZJA, 2014b).

D.2 Coral trout

The status of Coral trout, the main target species is unknown due to a lack of any formal stock assessment (Williams et al. 2011). A management strategy evaluation of the fishery using 2004 data concluded that strategies at the time would maintain Coral trout stocks above 40% virgin biomass (Williams et al. 2007). In 2009 and 2010, Coral trout species (*Plectropomus* spp. and *Variola* spp.) in the TSPZ were not considered overfished (PZJA, 2014; Finn et al., 2015; FRDC, 2014).

In 2010, the TSRLF was considered under exploited with catch rates below historic levels, indicating stock is not over fished (PZJA, 2014). The fishery is currently classified as sustainable. (Woodhams & Mazur, 2009).

Appendix E **Review of traditional catch monitoring approaches**

By Mibu Fischer

E.1 Past monitoring approaches

- Creel surveys (with questionnaires)
  - Roving reporters (CSIRO/AFMA) (1990-2004)
  - Embedded researchers e.g. Kwan (2004); Busilacchi (2008)
- Fisher catch recording
  - Smartphone fisher recording (2011)
- Community monitoring
  - Rangers (Dugong) current. Not assessed? Culturally sensitive.
- Commercial logbooks
    - TVH/Sunset TIB (>7 m) compulsory logbook (TSF01)
    - TIB through freezer docketbooks (2004) TIB sector. Not compulsory. Limited coverage and success?

Monitoring non-commercial (e.g. recreational and traditional) fishers around the world is generally a challenge for resource owners, fisheries managers and scientists. In addition there may be a certain level of wariness from fishers towards fisheries management organisations who, in the past, have enforced restrictions on species after surveys have been conducted (NRC, 2006). A traditional subsistence fishery, where there is usually limited management agency regulation and a strong cultural link, is even more difficult to survey due to the irregular/patchy nature of the activity, where fishers do not necessarily fish every day or for the same period of time.

Various monitoring approaches have been used to gather information about subsistence fishing. Around the world and in Torres Strait a number of methods have been trialled, the most common methods include access surveys, creel surveys, and frame and bus route surveys. In Torres Strait a number of these methods involved an observer/interviewer placed within a community, where they record observations of fishing activity at certain locations and/or times, or conduct interviews with community members. A snapshot of these methods is described below.

In Australia Indigenous Fisheries have been investigated by a few researchers, many of these studies are focused between Broome and Cairns (Henry & Lyle, 2003), as well as the Great Barrier Reef. Surveys have also been conducted in Northern New South Wales, around the Tweed region and Victoria (Schnierer, 2011).

Historical traditional catch monitoring has occurred several times in Torres Strait, including previous CSIRO monitoring of the Traditional catch on Yorke Island in 1984-86 (Poiner & Harris, 1991), and for all Torres Strait communities in 1991-2001 (Harris et al., 1997; Skewes et al., 2004), and a study of the traditional catch from three eastern Torres Strait communities in 2005/06 (Busilacchi, 2013b).

Choosing the right style of survey is important yet difficult for fisheries scientists as they can be expensive, as well as have a higher level of error if the wrong survey technique is used (Table 8).

Table 8. Comparison of census versus sampling approaches.

Approach	Advantages	Disadvantages
Census	More precision	Expensive
Sampling	Cheaper	Lower precision Harder to implement

E.2 Sampling Approach

Surveying recreational and traditional fisheries can be difficult, especially settling on a survey method that provides accurate and timely information, that includes both good coverage and at an acceptable cost (Griffiths et al., 2010; NRC, 2006). It can be difficult due to the variances in fishing activity namely spatial distribution and temporal scales (Smallwood et al., 2011). Despite this there are a myriad of sampling approaches used by fisheries scientists and managers when gathering information about recreational and traditional fisheries.

E.2.1 Frame Surveys

The frame survey method is a census-based approach involving roving observers to collect data on both the catch and effort for a single day of fishing within a set area. This data is then extrapolated using a formula that includes data of all the fishing 'vessels' and gear that could be operating in a given area (Stamatopoulos, 2002). A survey conducted by Harris et al. (1994) used the 'Frame' survey method from Bazigos (1974) to collect fishing information on Torres Strait Islander fishing activities. The information gathered from the survey was compared to population information from the Australian Bureau of Statistics (ABS). Harris et al., (1994) split the survey areas in accordance with the ABS sampling districts and the observers stayed within these set 'districts' (Harris et al., 1994). Although this technique has been applied to numerous fisheries studies it is expensive due to the need to have an observer actively gathering information (Harris et al., 1994; Smallwood et al., 2011).

E.2.2 Access Point Surveys

A traditional access point survey involves observing a portion of the target fishery, collect catch and effort data in the selected portion and then expand the observations to the whole fishery (Pollock et al., 1994; Pollock et al., 1997; Robson & Jones, 1989). The observation generally occurs at an 'access point' i.e. boat ramp or jetty where fishers coming in from a day's fishing can be interviewed by survey agents waiting at the access point. Traditional access point surveys are

complete surveys, meaning that the survey agents gather all the information about an interviewee for a single day, compared to an incomplete survey which would only gather a portion of information on fishers throughout the day and use an equation to quantify their total catch for the day (Smallwood et al., 2011).

E.2.3 Bus Route Surveys (BRS)

Bus Route Surveys (BRS) are described in Pollock (1994) and Robson & Jones (1989), and is a popular method for sampling recreation fisheries (e.g. Dews et al., 1993; Harris et al., 1995; McGlennon & Kinloch, 1997). BRS incorporate access point survey methods which were designed to assess fisheries that cover a wide geographic area (Robson & Jones, 1989), whereby a survey agent waits at an access point (e.g. boat ramp) to observe fisher behaviour or to interview fishers about their fishing activity (Robson & Jones, 1989). BRS differ from traditional access point surveys as survey agents do not spend their whole survey time waiting at the one access point, instead the survey agent as a set time period at various access points and has to travel between them in a pre-determined random order for each survey day, the travel order generally changes each day.

There have been a number of BRS conducted within Torres Strait (Busilacchi et al., 2013b; Dews et al., 1993; Harris et al., 1995). Dews et al. (1993) in conjunction with frame surveys used bus route surveys to cover large areas of island communities where there are numerous fishing locations. The communities were monitored in this fashion from 3 to 10 days before moving on to another community and returning every 3 months. This survey involved an observer recording the quantity, fish species and fishing method used by a community throughout the entire day and if possible, including the weight of all catches. In some cases the observer would interview a fisher the next day if they ran out of time the previous day. This information is based on memory only and hence a more subjective form of data. Within the survey there was also an option to record that a fisher was seen, but an interview was unable to be conducted. The different observations were given different weightings in relation to the type of observer/fisher interaction (Dews et al. 1993).

In addition to the fishing information the observer also gave an ‘effectiveness’ score at the end of each sampling day. The purpose of this was to determine what percentage of fishing activity the observer felt they had recorded over an entire day. For example, if an observer gave an effectiveness score of 100 percent, they felt that they had recorded all the fishing activity for the community on that sampling day, this type of scoring can be illusory in favour of the observer.

Another BRS was conducted on the reef fishes of Torres Strait by Busilacchi et al. (2013b). This study used the BRS method supported by semi-structured interviews. The BRS were split into two shifts AM (0700 – 1300) and PM (1300 – 1900). Night surveys were not conducted for safety reasons. It was noted that the majority of night fishers started their fishing between 1800 and 1900 hours, so only the night activity for the last site of the day was recorded.

McGlennon & Kinloch (1997) looked at the effectiveness of BRS in a South Australian scalefish fishery. They suggest that BRS are more affordable than traditional access surveys and that survey teams can reach smaller sites that would generally be ignored in a larger survey, despite this affordability in relation to Torres Strait Islands where there are numerous islands across a large spatial area this method is still quite costly.

E.2.4 Video surveillance

Alternative survey approach is to monitor sites through video cameras, the study conducted by Smallwood et al. (2011) in Western Australia placed cameras at 4 access points, although the initial process of placing the cameras at each site were cheap the cost to analyse the footage is costly, allows bias for determining fishing activity and can only include information that is seen from the camera location.

E.3 Data Collection Method

Within in each survey approach comes the data collection method, this method can vary and the same type of method can be used with different sampling approaches. Generally there are two kinds of data collection methods recognized, they are onsite and offsite collection (NRC, 2006). Onsite collection refers to data that is collected in the field either though observation or interviewing fishers access points. Whilst offsite collection indicates data that is collected via a phone interview or self-reporting methods (NRC, 2006).

E.3.1 Interviews

The use of interviews to gather fishing information is a costly process, it relies on the communication techniques of the survey agent and the relationship they develop with the interviewee. There can be two types of interviews onsite and offsite, with onsite interviews the survey agent often combines a question and answer style with pre-determined questions, with what is known as a creel survey (defined below), this type of interview is costly and time consuming for the researchers. This led surveys to become offsite interviews allowing fishers to nominate a preferred interview time for the telephone survey agent to call and ask a set of questions about their fishing activity. In addition to the survey agent needing telephone training the answers are still subjective to the information the fisher is willing to divulge. As Torres Strait communities span across a wide spatial area this also increases the cost of face-to-face interviews, however there are both positive and negatives to both interview methods. No matter the type of interview, the questions asked are always an important feature, there are multiple types of questions to allow varying styles of answers, the study by Dews et al. (1993) and Harris et al. (1995) originally had a set structured interview however, the set questions were changed to allow open ended answers to gather more information about the nature of the fishery studied. Busilacchi et al. (2013b) had a semi-structured interview that was recorded, to allow analysis at a later date and to prevent any bias in recording information. The point of this was, like Harris et al (1995) and Dews et al. (1993), to allow fishers responses to gather more information about the fishery than was previously known. In regards to recording surveys to prevent bias this comes with an added cost of the time taken to analyse each interview which can vary in length.

E.3.2 Creel surveys

One of the most used survey approaches in recreational fisheries, a creel survey is when a fisheries manager collects catch information directly from a fisher's 'basket'. This information can include, but is not limited to: species caught, size of individual fish, gear used, time spent fishing, type of

boat used and other such information. Creel surveys along with many other methods are used in conjunction with other approaches.

E.3.3 Self-reporting

Smart-phone application that was used by French, Hartmen & Lyle (in prep), although the full report is not available as yet, the study showed participation in self-reporting methods using technology is not fully supported. Their data showed that there were high participation rates to begin with, but as the survey time frame went on, the number of fishers reporting their catches via the app reduced drastically. The researchers also placed a self-reporting application on a tablet at the local community freezers and that data showed that participation rates from fishers at that location were one hundred percent when compared to the individual reporting apps.

Another log-book survey was completed, alongside other survey methods, by Schnierer (2010) in NSW north coast around the Tweed River targeting Indigenous fishers in the area. This study was conducted in an area where identifying Indigenous fishers in a large community is more difficult. Fifty-six fishers participated in the survey who were found using a 'snow-ball' sampling technique, all fifty-six completed a questionnaire, whilst only 20 participated in filling out cultural fishing log-books.

Log-book surveys generally only work when a known sampling frame is understood, such as fishing licenses (Smallwood et al., 2011), however this method is cost-effective when utilized with appropriate fisheries. Researchers can still gather log-book information from fisheries where there is no sampling frame, but this data would be supporting another collection method (Bray & Schramm, 2001).

Appendix F **Traditional fishing study, Torres Strait**

F.1 Review of study by Sara Busilacchi for Darnley, Yorke and Murray Islands

F.1.1 Which species?

- Coral trout, Groupers, Tropical snappers, Emperors and Lutjanids (Busilacchi et al., 2012).

Mugilidae and Siganidae are commonly targeted using gears from shore. Carangidae have increased in importance as a target group in subsistence fishing, both in traditional and commercial practices. Commercially important species of Serranidae, Lutjanidae and Lethrinidae are also taken for subsistence during commercial fishing (Busilacchi, 2008).

Species of economic importance where individuals smaller than the Minimum Landing Size (MLS) were retained for subsistence included *Lutjanus carponotatus*, *Pletropomus leopardus* and *P. maculatus* (Busilacchi et al., 2012).

F.1.2 Composition of catch

Differences in subsistence catch composition between islands were mainly a result of location. Fishers on Murray Island have access to the outer barrier reefs unlike fishers from the inner islands. The absence of *P. maculatus* and the presence of *Variola louti* in the catch of Murray Island fishers reflects their relative abundance on the outer reefs (Busilacchi et al., 2012).

Catch composition was found to change when commercial species were declared no take eg. *Symphorus nematophorus*, because of high ciguatera toxicity. Proportions of this species in the subsistence catch would increase accordingly (Busilacchi et al., 2012).

Variation in catch composition was also found with changes in MLS for species eg. *Cheilinus undulatus* (new MLS at 75 cm and maximum size at 120 cm) and *Cromileptes altivelis* (new MLS at 45 cm). These changes in regulations corresponded to increases in proportions of these species in subsistence catch (Busilacchi et al., 2012).

Similar to other tropical reef fisheries around the world, price fluctuation of several species of minor economic importance is a factor determining inter-annual changes in subsistence catch composition. Fishers often decide to retain for subsistence those species fetching low prices on the market (Busilacchi et al., 2012).

F.1.3 Catch

Spanish mackerel was found to comprise between 6-25% of subsistence catch during commercial fishing trips and were most likely undersized (Busilacchi, 2012).

An unknown quantity of reef fish is taken each year during the course of traditional fishing (PZJA, 2014b).

F.1.4 Condition of fishery

In 2005-06 levels of subsistence catch were up to 6 times higher than those estimated from data collected at the same islands in 1991-92 and 1995-96 (Figure 15) (Figure 16) (Busilacchi et al., 2013). Increased yields are comparable to reference points of sustainability for fisheries in the South Pacific (Busilacchi, 2008).

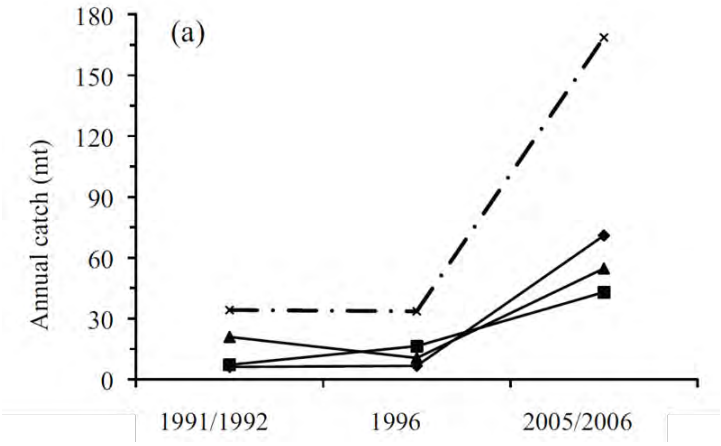


Figure 15. Estimated subsistence catch in 1991/1992, 1996 and 2005/2006 on Darnley (diamond), Murray (square) and Yorke (triangle) Islands; combined island catch (dash) (Harris et al., 1997, Busilacchi et al., 2013)

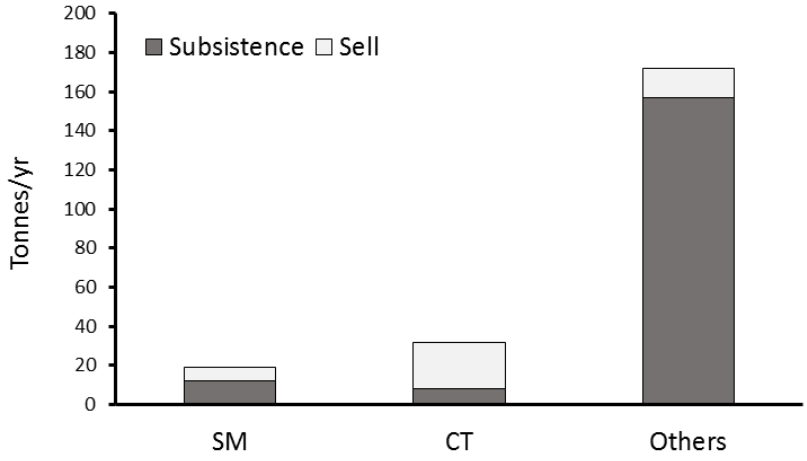


Figure 16. Annual catch for Darnley, Masig and Mer Islands, 2005/6, subsistence and TIB fishers (Bussilachi, 2008)

Approximately 15% of the annual total catch for Darnley, Yorke and Murray islands was retained for subsistence during commercial fishing. Subsistence catch of the most commercially valuable species almost entirely comprised individuals smaller than the minimum legal size (Busilacchi et al., 2012).

Mugilidae and Siganidae have decreased in catch over time suggesting localised over exploitation. Families of commercial importance including Serranidae, Lutjanidae and Lethrinidae have also decreased in catch over time, being targeted in both commercial and subsistence fishing (Busilacchi, 2008).

Overall catch rates for single fishing gears suggest signs of localized exploitation (Busilacchi, 2008). Catch rates of gillnet and castnet from shore have decreased over time, and current values are low in comparison to similar reef fish fisheries in the South Pacific (Busilacchi, 2008).

Appendix G **Licensing**

www.pzja.gov.au/resources/publications/annual-reports

Table 9. Number of Master Fisherman's licences by combinations of Torres Strait fisheries (current as at 30 June 2011).

Fishery	Licences
Tropical rock lobster	22
Tropical rock lobster, reef line, Spanish mackerel, and pearl	5
Tropical rock lobster, reef line, and prawn	1
Tropical rock lobster, reef line, Spanish mackerel, pearl, and prawn	6
Tropical rock lobster, and Spanish mackerel	2
Tropical rock lobster, Spanish mackerel, and pearl	35
Tropical rock lobster and pearl	5
Reef Line	5
Reef line and Spanish mackerel	4
Reef line, Spanish mackerel, and prawn	4
Reef line and prawn	48
Spanish mackerel	7
Pearl	3
Prawn	39
Bêche-de-mer	5
Total	191

Table 10. Number of TIB licences in each Torres Strait fishery (current as at 30 June 2011).

Fishery	Licences
Bêche-de-mer	38
Crab	65
Tropical rock lobster	277
Reef line	119
Spanish mackerel	132
Pearl shell	39
Trochus	63

Table 11. Number of Torres Strait Sunset Fishing Boat Licences in each Torres Strait fishery (current as at 30 June 2011). Numbers provided for boat licences exclude those held in "No Boat" status.

Fishery	Primary	Tenders	Total
Reef line	1	4	5
Spanish mackerel	3	5	8

Appendix H **TIB Docket Books**

Torres Strait Seafood Buyers and Processors Docket Book

RECIPIENT CREATED TAX INVOICE

Seller:	Jonny Roger	Boat symbol:	DY143	Book No.	Page No.
Seller's ABN:	64 333 666 999	Seller's Licence No.	QF 123		
Seller's Address:	21 Coconut Drive Darnley Island			Date:	11/2/14

Fishing effort and boat details – Traditional Inhabitant Boat (TIB) only

No. of divers/fishers: 2

Days fishing: 1 — Area fished: (From map (write no. of area most fished)) 16

Methods used: (tick box, use more than one if needed) ☐ Hookah (MDH) ☑ Handline (LHL) ☐ Drop line (LDR) ☑ Free dive (MDF) ☐ Rod and reel (LRR) ☐ Other–specify ☐ Lamp fishing (MLF) ☐ Troll (LTL)

Non Traditional Inhabitant Boat (TIB) fishers & buyers of PNG & east coast product only

Region Fished: (tick box) ☐ Torres Strait ☐ East Coast Queensland ☐ Papua New Guinea

Has the seller recorded their catches elsewhere?: (tick box) ☐ YES (please indicate) → ☐ TRL04 Logbook ☐ TSF01 Logbook ☐ Other → ☐ No

Details of catch being sold

Species	Processing Code	Grade	Kg	$/Kg	$/Kg	Amount
Rock Lobster	L	1-2 kg	10.5	25		$262.50
Rock Lobster	T	—	7.2	48		$374.40
Coral Trout	GG	under 1 kg	14.4	7		$100.80
Coral Trout	GG	1 kg plus	4.1	8		$32.80

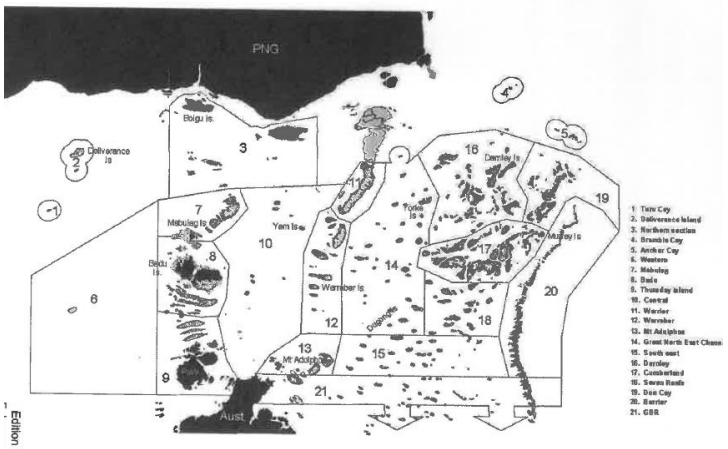
Completed by:	Mick	Subtotal	770.50
Signature:	Mick Joes	GST	77.05
Payment received:		TOTAL	847.55

Australian Fisheries Management Authority, PO Box 376, Thursday Island QLD 4875 — For assistance Phone: (07) 4089 1990 Fax: (07) 4089 1277

WHITE COPY: Fisher (seller) YELLOW COPY: AFMA PINK COPY: Buyer (you)

Edition Date: 1/1/14

AREAS FOR TORRES STRAIT DOCKET BOOK



Use area where most catch was taken

Torres Strait Seafood Buyers & Processors Docket Book - TDB01

How to Complete

Page Header Section

Enter the seller's name, the seller's boat symbol, the seller's ABN (Australian Business Number), the seller's licence number (if applicable), seller's address and the date here.

Fishing Effort and Boat Details - Traditional Inhabitant Boat (TIB) Only Section

Boat symbol
Enter the distinguishing symbol (mark) of the dingy that caught the fish or the primary vessel if fishing using tenders or if fishing from the primary vessel. If the seller's vessel does not have a distinguishing symbol leave blank.

Days fishing
Record the number of days the seller spent fishing to catch the fish being sold.

Number of divers / fishers
Record the number of divers or fishers used to catch the fish being sold.

Area fished
Refer to the map provided and write down the number of the zone where the majority of the fish being sold were caught.

Method
Tick which method was used to catch the fish being sold, if the method used isn't listed tick 'other' and write in the method used.

Non Traditional Inhabitant Boat (TIB) Fishers & Buyers of PNG and East Coast Product Only Section

Region fished
Tick which area most of the catch being sold came from.

Have you recorded catches elsewhere?
Tick box to indicate yes or no.
If you answered yes, indicate where else catch information has been recorded. For example catches of tropical rock lobster may have been recorded in the Tropical Rock Lobster Daily Fishing Log (TRL04).

Details of Catch Being Sold Section (All Fishers)

Record the species being sold, the processing code (see codes on fold out flap), grade, and the weight being sold in kilograms.

Two columns are provided to record dollars paid per kilo, choose the first column if you are happy to provide price per kilo information to AFMA. If you do not want to provide price information use the second column. The last column is to record total amount paid, this will not transcribe to AFMA's copy.

Sending Returns to AFMA

Please send yellow copies of completed docket sheets to AFMA in the reply paid envelopes provided or post them to:

The AFMA Logbook Coordinator
PO Box 376
Thursday Island QLD 4875

Please send docket sheet returns in once a month

CONTACT US

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PZJA TORRES STRAIT FINFISH RESOURCE ASSESSMENT GROUP	Meeting 1 9 – 10 November 2017
RESEARCH PROJECT UPDATES Scoping study for barramundi, black jewfish and crab in top-western Torres Strait communities	Agenda Item No. 4.2 For ADVICE

RECOMMENDATIONS

1. That the RAG **NOTE** the update provided by Andrew Tobin on the projects objectives, methodology and progress to date.

2. That the RAG **DISCUSS** and **PROVIDE ADVICE** on likely future research or data collection required to support growth in fishing for these species.

KEY ISSUES

1. A scoping study has been funded by the TSRA through FRDC to determine if harvests from local fin fish and crab populations, combined with available fishing and business skills and knowledge, infrastructure, supply chain and marketing pathways can combine to support fishing related economic growth for the region (**APPENDIX A** – Project Proposal).

2. The objectives of the study are to:
   a) complete a desktop scoping and current knowledge review of fisheries opportunities for mudcrab, barramundi and jewfish in top western Torres Straits;

   b) use field surveys to estimate local stock abundance and model commercial fishing feasibility at appropriate scales

   c) review current infrastructure, and available skills and capabilities to support the identified fishing business opportunities;

   d) Extend project results among communities and stakeholders and provide hands on business support and mentoring to prospective fishers in selected Torres Strait top western communities.

3. At its meeting in March 2017, the FWG noted an update on the project by Andrew Tobin, the Principle Investigator for the project. Mr Tobin advised that the project has four elements:
   a) A desktop scoping study. Collate past research findings etc.
   b) Field surveys to understand local stock abundance and whether it could support a local fishery. Aim to commence field work after Easter.
   c) A stop-go review to determine if there is enough industry interest and stock available to justify proceeding with the study.
   d) An evaluation of infrastructure, skills and business needs to support an active fishery.

4. The FWG noted the PZJA will likely require advice from the FWG to evaluate any proposal to develop and/or expand new fisheries to ensure they are sustainable. The

FWG encourage early engagement with the FWG to ensure any future proposals may be considered in a timely manner.

5. Mr Tobin will provide a further update to the RAG at the meeting.

6. Supporting research that may assist in developing new fishing opportunities for Traditional Inhabitants is consistent with the objectives of the *Torres Strait Act 1984*, in particular to manage commercial fisheries for optimum utilisation.

7. Due to timing constraints on field work in the study, it may be difficult to yield meaningful data on stock abundance. Further work may be required to develop a strategic data collection program together with risk-based management arrangements to best support the sustainable development of these fisheries.

8. The purpose of this agenda item is to advise the RAG of the project but also seek any preliminary advice on likely future research or data collection required to support growth in fishing for these species.

BACKGROUND

9. There has been longstanding community interest in developing barramundi and crab fisheries in the top western communities. Feasibility studies and stakeholder consultation were conducted as early as 1994 (Torres Strait Fisheries Assessment Group) and 2006 (AFMA Discussion Paper), however the past reports have identified a number of reasons the development has not occurred including:

    a. Failure of the fisheries ventures to attract island fishers, particularly full time fishers, and the lack of success in business establishment.
    b. Focus of fishing has been for subsistence purposes with little excess catch being landed to commercial businesses.
    c. Challenges associated with the supply chain in a remote area, the high cost of air freight and attracting suitable buyers and markets for product.
    d. Broader socio-economic issues including reported welfare dependency issues.

Proposed survey

10. The project proposes to conduct seven day fishing surveys involving community fishers in Boigu, Saibai and Duan communities. The objectives of this field work are to provide estimates of local stock abundance, assess catch and effort rates, identify fishing grounds and model the feasibility for a commercial fishery in these communities.

11. Fishing is proposed to be conducted using crabs pots (an authorised method) and large mesh monofilament gillnets (three 100 metre length nets, 165 millimetre (6.5”) mesh, 25 meshes depth) which are currently prohibited in the fishery. This gillnet setup is commonly used in targeted barramundi fisheries (for example the Northern Territory barramundi fishery). Commercial fishing for reef-line finfish (like barramundi and jewfish) is also prohibited west of longitude 142° 31’49” (the western line closure). The Boigu community lies within this closure.

Considerations for supporting future growth

12. To effectively support growth and development of fisheries for the barramundi, crab and jewfish, stakeholders will need to be engaged in the management process to consider key management issues outlined below. This is important both to ensure businesses may make informed investment decisions and that risks to the stocks are managed effectively. Considerations for supporting future growth may include:

    1. The use of a prohibited fishing method:
        i. Mesh nets have been a prohibited commercial fishing method since November 2005 when the PZJA closed the commercial Torres Strait Net Fishery based on concerns over bycatch issues.
        ii. Mesh nets may only be used for subsistence fishing - not for commercial purposes - with a maximum dimension of 100m in length, 2.5 m in depth and having a mesh size no greater than 100 millimetres. This mesh size is not suitable for targeting large finfish such as barramundi or jewfish.
        iii. The project is seeking to trial 165 millimetre sized mesh nets with the intention of providing advice to support their introduction in future.

    2. Impacts of removing the western line closure:
        i. The western line closure has been identified as a remanent of previous management arrangements and serves no relevant management purpose.
        ii. The matter of removal of the western line closure is under consideration by the Finfish Working Group. Industry members of this forum, in conjunction with Malu Lamar have called for further community consultation with the western communities and consideration of sustainability risks and how access to the area could be managed to benefit both commercial and tourism industries.
        iii. AFMA will seek scientific advice (through the Finfish RAG) on the possible impacts of removing the closure on stocks, noting advice that the fishing grounds/habitat may be different in the west compared to the eastern area.

    3. Catch monitoring and regulating catches:
        i. Current levels of fishing for barramundi, crab and jewfish in the top western communities are largely unknown but have historically been considered low.
        ii. Catches are currently unreported and status of the stocks are unknown.
        iii. Any development of the barramundi or jewfish fisheries will need appropriate management measures to monitor catches and ensure the stocks remain sustainable.

    4. Shared barramundi stock with PNG:
        i. It is likely that Barramundi present on Saibai and Boigu are part of a stock shared with PNG.
        ii. Research has identified the key spawning habitat for the PNG stock is adjacent to Boigu and Saibai islands (Sigabadaru village westwards to the Indonesian border).
        iii. At the last two Australia-Papua New Guinea Fisheries Bilateral meetings PNG-NFA have raised concerns with the status of the Barramundi stock from their waters. Any development of Torres Strait fisheries needs to occur in collaboration with PNG-NFA.

5. Illegal Unreported Unregulated (IUU) Fishing:
    i. Illegal fishing is known to occur involving Papua New Guinea (PNG) nationals and prohibited gear types.
    ii. There is growing market demand for jewfish and barramundi swim bladders (fish maw) both in Australia and Papua New Guinea which may drive further IUU.
    iii. Development of these fisheries will require compliance considerations.

6. Fishing for subsistence needs:
    i. Barramundi are known to play a role in meeting subsistence needs among Boigu, Saibai and adjacent PNG Treaty village communities, particularly the annual harvest from the drying inland swamps and lagoons which are progressively cleared of impounded fish.
    ii. The role of black jewfish and crabs for subsistence needs requires investigation.
    iii. Consideration of the impacts of commercial barramundi, jewfish or crab fisheries on subsistence needs would need to occur in the context of the PNG management arrangements and the Australia-PNG Treaty.

APPENDIX A – Project Proposal

Need

The project has been commissioned by the Torres Strait Regional Authority (TSRA). It recognises the fundamental importance of fisheries related business development for the region to enhance employment and economic development for traditional inhabitants. The project is also consistent with other important legislative and policy objectives including:

- The Torres Strait Fisheries Act, Closing the Gap and Indigenous Advancement Strategies, and Regional Development Plans

- TSRA Fisheries & Economic Development Programs, including the recently developed Finfish Action Plan.

The Torres Strait is a fish rich region and mud crab, jewfish and barramundi are known to occur in the waters of the top western region. Some existing small scale operations are currently operating in the area. Recent community consultation for the TSRA's Finfish Action Plan also identified local support for more targeted finfish related business development.

The need also extends to ensuring the development and operation of new fisheries is sustainable and appropriate from a biological, ecological, and social/cultural perspective.

Enabling the establishment of viable finfish businesses in this top western area may also balance actual and perceived support of finfish businesses across the broader region (e.g. previous investment has focussed on supporting the established fishery for coral trout and mackerel in the eastern region).

A well designed and executed top western fisheries scoping study can determine if harvests from local fin fish and crab populations, combined with available fishing and business skills and knowledge, infrastructure, supply chain and marketing pathways can combine to support fishing related economic growth for the region.

Objectives

No.	Details
1	Complete a desktop scoping and current knowledge review of fisheries opportunities for mudcrab, barramundi and jewfish in top western Torres Straits
2	Use field surveys to estimate local stock abundance and model commercial fishing feasibility at appropriate scales
3	Review current infrastructure, and available skills and capabilities to support the identified fishing business opportunities
4	Extend project results among communities and stakeholders and provide hands on business support and mentoring to prospective fishers in selected Torres Strait top western communities

Methods

Following feedback on the EoI, the project now includes 4 distinct tasks, with a go or no-go point after the first two tasks have been completed. Determination of the go or no-go will be

the responsibility of the TSRA, community members and the FRDC with supporting advice from the project team.

Task 1. Desktop scoping, knowledge review and community engagement.

Review existing knowledge including previous research, local ecological knowledge, and traditional/cultural knowledge of fishing with a specific focus on mudcrab, black jewfish and barramundi in the Top Western Torres Strait region. Review context will be established by considering the area and species of interest relative to similar commercial fisheries operating on the east coast of Queensland, in the Gulf of Carpentaria, and Papua New Guinea. The knowledge review will include biology and ecology; fisheries management; fisheries practices; and ecological (environmental) risk assessment. Bodsworth has recently completed the Torres Strait Finfish Action Plan and insights from that project will be carefully considered. Tobin has been heavily involved in research around inshore fisheries (ecological risk assessments, biology/ecology of target species, gear development to minimise risks to Species of Conservation Interest (SOCI)) and is familiar with the relevant literature and operational practice of commercial net, line and pot fishing in northern fisheries.

Community consultation on each of the three islands is proposed, comprising a group meeting and workshop complemented by face to face meetings with key fisheries and community representatives. Consultation with the AFMA Torres Strait Finfish Working Group will also be undertaken. Consultation and engagement with traditional inhabitants and their communities will be guided by ³A Guide for Fisheries Researchers Working in Torres Strait (Dr Martin Nakata)´

Task 2. Stock surveys and economic feasibility analysis

Guided by outcomes of the desktop scoping (Task 1), local community knowledge, and community consultation, stock surveys will identify likely fishing grounds. Where possible field work will involve suitable community members. Structured surveys of likely fishing locations using standardised fishery-dependent gears will identify prospective commercial fishing area. Surveys will measure effort and catch in a way that allows comparisons between Torres Strait locations and other commercial fisheries occurring outside of the Torres Straits. Catch rate analysis and economic modelling will focus primarily on the nominated species but also explore value adding prospects including harvest of female mud crabs (as supported by recent research), high value fish maw (swim bladders from black jewfish and barramundi), and by-product species such as threadfin salmon, grunter and shark. Indicative costs of operation will be modelled and include costs of initial gear acquisition and construction, day-to-day fishing activity, handling and processing, and freight to marketplaces.

Acknowledging likely entry and uptake barriers to community members becoming active commercial fishers (e.g. start-up capital, fishers¶skills and confidence) the project will explore two fishing activity models: shorebased fishing and dinghy and potentially larger vessel operations. For shore based operations nets and/or pots are set in intertidal zones at low tide, the tide floods and ebbs and fish and crabs are caught. Very low infrastructure costs means initial setup and investment can be minimal. Dinghy-based fishing allows more fishing grounds to be explored and for fishing to occur throughout all stages of the tidal cycle, though the costs of setup and operation are higher. Feasibility of larger vessel operations e.g. larger ice boats and/or freezer vessels will be explored.

Go or no-go point.

If the outcomes of Tasks 1 & 2 indicate viable commercial fishing is possible, the following additional Tasks focus on enabling commercial fishing so that viable commercial fishing for finfish and/or mudcrab becomes likely.

New Tasks 3 & 4 (identified in EOI as optional additional tasks)

Task 3 - Local fishing skills development & practical support

Likely future fishers within each community will be identified during Tasks 1 and 2. They will learn some fishing related skills during field surveys, and benefit from additional more focused skills development. Tobin has significant expertise in this area, including proven and practical knowledge of the skills and capabilities required to be a safe, self-sufficient and financially viable fisher. Skills development will focus on: familiarity with fishing gears, their construction, use and repair; setting out, checking and retrieving gears; best practice handling of product; bycatch, protected species and environmental considerations around fishing; and marketing opportunities including value adding, seasonal influence, access and freight. This task will incorporate a mix of classroom theory as well as hands-on practical training both on-land and on-water. A simple plain English technical document will be designed and provided to all interested parties to support these processes and for future reference.

Task 4 - Business planning, feasibility, implementation/mentoring and periodic review

The remoteness of the target communities mean business operating costs (e.g. sourcing equipment, day-today operations and business support and subsequent supply chain and marketing activities) can be substantial. This task envisages a hands on mentoring approach to support fishing business development and develop and enable strategies to mitigate principal business start-up barriers.

The mentoring will include building supply chain relationships (e.g. gear suppliers and seafood buyers) to help mitigate the challenges facing remote communities. Mentoring will be designed to encourage and give confidence in day-to-day business planning and management, including availability of simple and practical fishing business and cash-flow models.

Building on Task 3 (fishing skills development) the project team will visit each of the target communities, allowing enough time to work face to face with identified fishers to support initial development of suitable local fishing business opportunities. This in-situ mentoring will be augmented with remote support via phone, email and video/skype subsequently and as required. Linkages to, and/or leverage off, existing or planned TSRA and other economic development training, mentoring and development will also be explored.

The budget allows for 2 days of face to face mentoring in each of the three target communities including all travel and operating expenses. This can be increased or decreased depending on prospective fishers and their availability and motivation, or extended over a longer timeframe to offer ongoing support if required.

Performance Indicators

The project will be successful and meet its objectives if:

1. The desktop review clearly and efficiently summarises existing knowledge about commercial fishing for finfish and/or mudcrab; and community engagement builds motivation, confidence and relationships with prospective traditional inhabitant fishers and local and regional supply chain businesses.
2. Field surveys are completed that lead to robust estimates of possible commercial catch rates and subsequent modelling of commercial viability
3. The go no-go point provides evidence based advice to relevant stakeholders and project staff about the costs and benefits of proceeding or not.
4. Future fishers will be skilled and independently capable of initiating commercial fishing for finfish and/or mudcrab in the top western area.
5. Infrastructure needs and business development requirements are identified and solutions and pathways identified
6. The project outputs and outcomes are clear and shared appropriately with key stakeholders and throughout the communities; and viable commercial fishing is benefiting fishers, supporting businesses and the broader community.

Risk Analysis

Threat: Key staff not being available to complete the project.

Contingency: This is a short-term project that should mitigate this risk. Key project staff are available and have the experience and skills to complete the project to a high standard. Threat: Failure to engage effectively with future fishers within the communities.

Contingency: The relationships and consultations built during the Finfish Action Plan and via the Finfish Working Group; and close and regular consultation with community leaders and representatives will help mitigate this risk.

Threat: Weather conditions (particularly wet-season) prevent/delay travelling and/or conduct of field surveys Contingency: travel arrangements will be as flexible as possible and recognise local conditions; field surveys and visits to be conducted in the most suitable periods.

Outputs & Outcomes

Principal outputs and outcomes will be:

Knowledge concerning the viability of commercial fishing for the species of interest. Communities and individuals will benefit. If local abundance of the species of interest can support commercial fishing, business investment and development will reward individuals and communities. Conversely, if local abundance is low, that output will warn against investment and development that is likely futile.

The outputs of the skills and infrastructure review will guide an outcome of practical training in required fishing skills as well as tailored advice regarding infrastructure

development and/or investment. Practical training will include where necessary skills in gear construction, maintenance, and fishing deployment; skills in handling, processing and marketing catch; and simple and practical business and cashflow models to enable fishing business development

PZJA TORRES STRAIT FINFISH RESOURCE ASSESSMENT GROUP	Meeting 1 9-10 November 2017
MANAGEMENT ISSUES Recommended Biological Catches for 2018/19, 2019/20 and 2020/21 fishing seasons	Agenda Item No. 5.1 For ADVICE

RECOMMENDATIONS

1. That the Finfish RAG **DISCUSS** and **PROVIDE ADVICE** on Recommended Biological Catches (RBCs) for Spanish Mackerel and coral trout the 2018/19, 2019/20 and 2020/21 fishing seasons – the likely time required to get PZJA agreement on a harvest strategy for the fishery, and in doing so advise on:
    a) likely risks to the stocks;
    b) how any increases in uncertainty may be mitigated; and
    c) any necessary monitoring and breakout rules to support multi-year RBC advice.

2. That the RAG **NOTE** that the harvest strategy will guide future advice on RBCs based on pre-agreed reference points and control rules. The harvest strategy will also guide any significant AFMA investment in research and data collection for the fishery in the future.

KEY ISSUES

1. A harvest strategy is under development for the Torres Strait Finfish Fishery which will guide advice on recommended harvest levels for Spanish mackerel and coral trout based on agreed reference points and decision rules. It is likely that this harvest strategy will be first used for setting TACs for the 2021/22 fishing season.
2. AFMA is seeking RAG advice on multi-season RBCs for Spanish mackerel and coral trout for the 2017/18, 2018/19 and 2020/21 fishing seasons, whilst the harvest strategy is being developed.
3. Subject to the RAGs advice, multi-season RBCs (to be used to set multi-year TACs) will provide industry with a level of certainty on available catch whilst the longer-term management framework is developed and where possible improvements to existing data inputs are achieved. The harvest strategy is likely to guide any future significant AFMA investment in research and data collection for the Fishery.
4. RAG is advice is sought on the likely risks to stocks, need to monitor available indicators, the need for specific break-out rules and/or the need to account for any increased uncertainty in the recommended biological catches for Spanish mackerel and coral trout across the seasons.
5. RAG advice will enable consideration of the possible risk-catch-cost trade-off with considering multi-year RBCs compared with reviewing RBCs annually.
6. In seeking advice on this approach AFMA notes that the:
    a. Spanish mackerel stock assessment has been updated and accepted. In recommending the notional TAC for 2017/18 an interim target reference point was agreed by the Finfish Working Group. The PZJA Standing Committee has agreed that in the absence of new or updated information, future Spanish mackerel catches should be managed in line with the RBC of 125t; and

b. Management Strategy Evaluation conducted by Williams *et al.* 2007 using four constant catch scenarios (80-170 t) predicted biomass of at least 70 % of unfished biomass by 2025 and reported catches since then have averaged well below the notional TAC of 134.9 t (which represents average catch from 2001 to 2005). The Harvest Strategy project will offer the first opportunity to develop agreed reference points, decision rules and assessment methods for the coral trout stock.

7. Advice from the RAG will be tabled with the Finfish Working Group for consideration in March 2018.

RECOMMENDED BIOLOGICAL CATCH

Spanish mackerel

8. The 2006 Spanish mackerel stock assessment was updated in 2015-16 (O'Neill and Tobin (2016) **Tabled Paper C**)**.** The Spanish mackerel notional TAC was first set in 2008 and was based on average catches between 2001 and 2005.

9. The FFWG and Scientific Technical Working Group (STWG)[1] have accepted the updated Spanish mackerel stock assessment. The STWG accepted the new stock assessment as the best available assessment, while also noting sources of uncertainty in the assessment. The STWG recognised that a level of uncertainty is expected in fishery stock assessments and that the current assessment should serve to guide future research and data priorities for the fishery (**Tabled Paper B** – STWG Meeting Record November 2016).

10. The FFWG and STWG agreed an interim target reference point of B60 and a Recommended Biological Catch (RBC, or 'total kill') of 125 t. The RBC is based on an estimated median total harvest (tonnes) of the preferred stock analysis 1 and 2 for the exploitable biomass at B_{60}.

11. A higher biomass target above B_{MSY} (assumed to be B_{40}) was supported to ensure a healthy population biomass and catch rates in order to achieve and balance sustainability, economic, social and cultural objectives. It was noted the target reference point is to be used in the interim, until the formal harvest strategy currently in development for the fishery is agreed by the PZJA.

12. An RBC of 125t is expected to rebuild the stock at a natural rate. To assist the STWG in providing advice on the likely impacts of exceeding the RBC for the 2017/18 fishing season Dr O'Neill provided an example risk profile illustrating the future projected probability of falling below B_{40} (the estimated current biomass) over the next four years for five different harvest levels (**Figure 1**). The STWG noted (**Tabled Paper E** - April 2017 OOS meeting record) the analysis indicated that:

    - catch scenarios over 150 t, have a higher probability of reducing the stock below current estimated levels (B_{40}), particularly after one year;
    - the catch scenario of 150 t has a 30 per cent probability of reducing the stock below current estimated levels (B_{40}) and it is unlikely the stock will rebuild towards the agreed target reference point B_{60}; and
    - catch scenarios of 100 t and 125 t have a significantly reduced probability of the stock falling below current estimated levels (B_{40}) and it is likely that the stock will rebuild towards the target reference point B_{60}.

13. The STWG recommended (**Tabled Paper E**) that the total allowable catch for the 2017/18 fishing season remain at or below the 125 t RBC noting that:

[1] The FWG recommended that a Technical Scientific Working Group be convened to review the stock assessment update to allow for full consideration of inputs and outcomes (**Tabled Paper A** – FFWG July 2016 meeting record).

- due to uncertain catch estimates a precautionary approach should be adopted; and
- it is unlikely the fishery will be meeting the agreed management target of building to B_{60} if catch is around 150t. The 150t catch scenario has a 30 per cent probability of reducing the stock to below current estimated levels (B_{40}) and it is unlikely the stock will rebuild towards the agreed target reference point B_{60}.

14. Subject to further advice from the STWG the FWG supported a step-down in the TAC for the 2017/18 fishing season only (TAC plus best estimates of other catches at the time of meeting meant a 'total kill' of 137t) (**Tabled Paper D** – FWG meeting record 16-17 March 2017 pp. 11).

15. The PZJA Standing Committee agreed that a maximum estimated Spanish mackerel commercial catch for the 2017/18 fishing season of 132 tonnes (comprising proposed sunset leasing of 110t and estimated TIB catches of 22t) should be implemented for the 2017/18 fishing season on the basis that:

    a) the stock biomass is estimated to be around B_{40} which is considered to be B_{MSY};

    b) a step down approach in reducing the catch limit from the current notional 187t to the Recommended Biological Catch (RBC) of 125t will provide an adjustment period for industry and additional time to further refine estimates of all sources of fishing mortality and agreed estimates of Traditional Inhabitant Boat (TIB) sector catches.

    c) the total estimated maximum catch (137t, inclusive of a revised subsistence catch estimates of 5t for surveyed parts of the fishery - see Agenda item 5.2) in 2017/18 would be above the RBC of 125t but less than 150t (assessments indicate that for harvest over 150t there is expected to be little building towards the recommended interim target reference point of B_{60}).

16. The PZJA Standing Committee agreed that in the absence of new or updated information future catches should be managed in line with the RBC of 125t.

Future work – Spanish mackerel

17. There has been no further stock assessment work completed for Spanish mackerel. Further refinement of the stock assessment, in line with recommendations from both the STWG (and now RAG) are expected as part of the harvest strategy project. The harvest strategy will also provide an informed basis to revise (if necessary) and agree longer-term reference points.

18. The STWG recommended additional analyses be undertaken to improve the stock assessment including***:***
    - sensitivity analyses to examine how the model might perform with 'domed vulnerability' where large fish are assumed to be less available to capture; and
    - examination of CPUE data using 'indicator' vessels with known fishing histories as a means to further validate the CPUE time series.

19. To improve the stock assessment in the longer-term the STWG recommended the following research and data collection/analysis priorities:
    - appropriate spatial genetic sampling to clarify the current single Torres Strait stock/population structure assumption (noting the single stock assumption is the most precautionary approach);
    - additional length frequency sampling to improve the spatial representativeness of biological data used in the model. This will assist in: a) assessing the fishing mortality and selectivity of the catch i.e. whether the catch size structure is representative of the underlying population age structure and b) validate fecundity at age assumptions;

- further data analysis and consultation with stakeholders to investigate options for improving the accuracy of the TIB catch data series; and
- AFMA and TSRA, in consultation with temporary licence holders, to work on characterising fishing gear selectivity and different fishing practices and identify options for improving the accuracy and level of information collected through logbooks (a pre-season workshop with temporary licence holders was recommended as a starting point).

20. Subject to resourcing, AFMA may commence work to address high priority data needs alongside the harvest strategy project. This will be further discussed under Agenda Item 3.1.

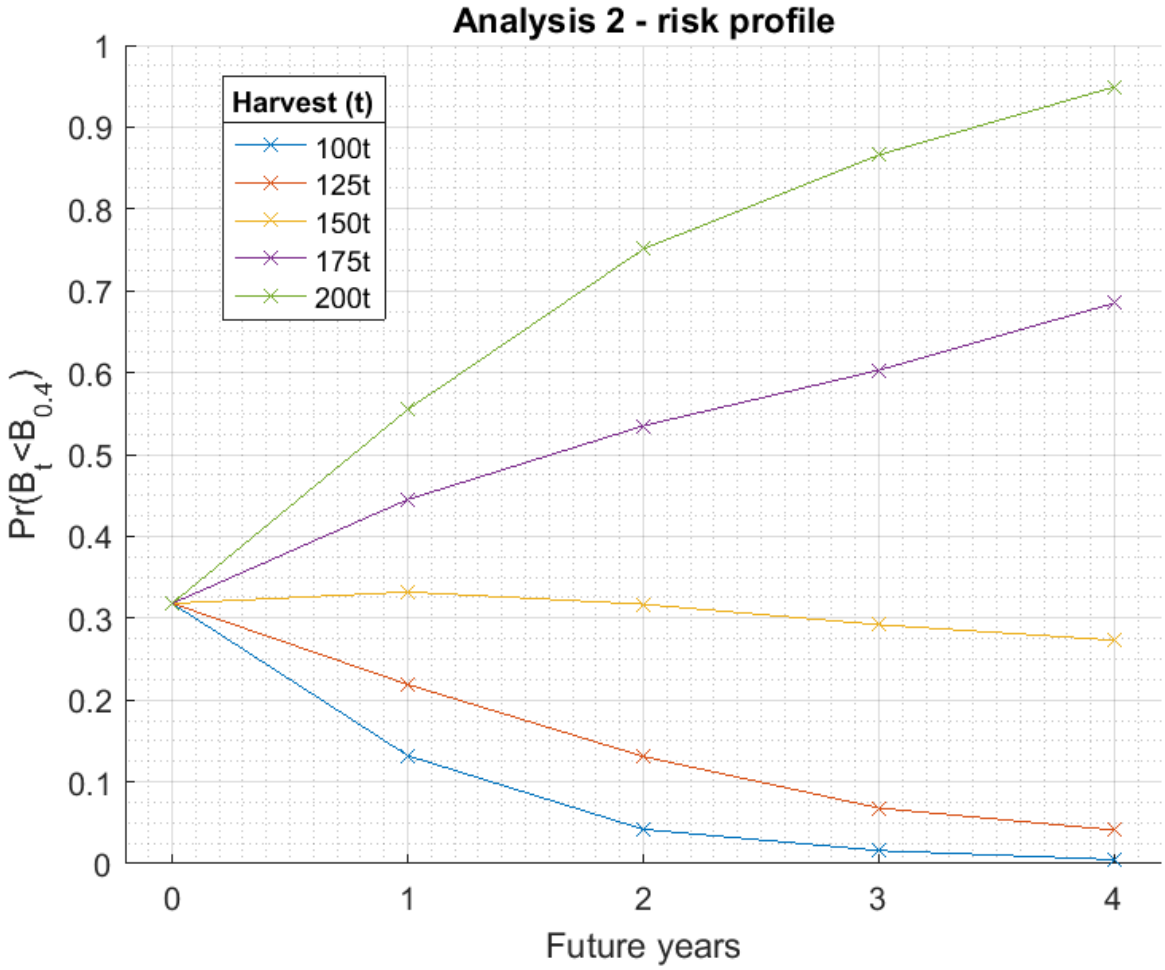

Figure 1. An example risk profile illustrating the future projected probability of exceeding the reference point (B_{40}) (where biomass B_t in future years *t* falls below 40% of virgin unfished levels of biomass) over the next four years for five different harvest levels 100 to 200 t. The figure vertical y-axis indicates probability (or percentage if x 100). The figure was generated from Analysis 2 MCMC simulations.

Coral trout

21. In the absence of a formal stock assessment, the status of the coral trout stock has been evaluated against the results of Management Strategy Evaluation work (Williams *et al.* 2011, 2007). In this MSE work four constant catch scenarios of 80, 110, 140 and 170 tonnes were tested which all achieved a biomass of at least 60 per cent of virgin total biomass by 2025 (Figure 2).

22. The biomass in 2004 was estimated to be more than 60 per cent of unfished levels (Williams *et al*. 2011, 2007).

23. Commercial catch in recent years has been below historical catch levels and well below the lowest catch level simulated in the MSE (80 t per year).

24. The results of the 80 t catch simulation indicated that the stock would increase to more than 80 per cent of the unfished biomass within 20 years at that catch level (Williams et al. 2007, 2011).

25. Although based on older data, this MSE work represents the best available evidence for decision making and supports the 134.9 t TAC for coral trout. The MSE suggests that catches up to 170 tonnes would support a healthy biomass (Figure 2) with building occurring.

26. The FWG has considered the coral trout notional TAC for the last two fishing seasons (2016/17 and 2017/18) and recommended that the coral trout TAC (134.9 t) remain unchanged. In considering its advice for the 2017/18 fishing season, the FWG noted that there was no new information to guide a different recommendation at the time. It was further noted that the harvest strategy to be developed will guide future assessments and TAC recommendations.

Future work for coral trout

27. The harvest strategy project will provide the first opportunity to develop agreed reference points, assessment approaches and decisions rules.

28. There is potential for a coral trout assessment to be performed during 2018 alongside the Queensland East Coast assessment.

29. Subject to resourcing, AFMA may also work to address high priority data needs as discussed under Agenda Item 3.1

ESTIMATING CATCHES TAKEN OUTSIDE THE FISHERY

30. Consistent with Australian Government policy (detailed in the *Commonwealth Fisheries Harvest Strategy Policy and Guidelines 2007*), all sources of mortality (catch) must be taken into account when setting a TAC. This generally means the TAC equates to the Recommended Biological Catch (RBC) (previously referred to as 'total kill' by the FWG) for the species minus expected catches to be taken outside of the fishery.

31. Estimates of other sources of mortality were used to revise the Spanish mackerel notional TAC for 2017/18. For Coral trout however, an adjustment was not recommended.

32. Based on Coral trout catches being significantly below the TAC (reported catches remaining around 20-40t) the FWG did not deem it necessary to reconsider the 2017/18 TAC to discount estimates of other fishing mortality (e.g. subsistence take) at this time. The FWG however agreed that this should be undertaken when new information becomes available to review status of the stock and subsequent TACs.

33. AFMA is seeking RAG advice on improving estimates of catches in all sectors for both Spanish mackerel and coral trout as priority. Agenda Item 5.2 addresses this priority and will seek input from Finfish RAG on agreeing estimates of mortality and work to support our understanding.

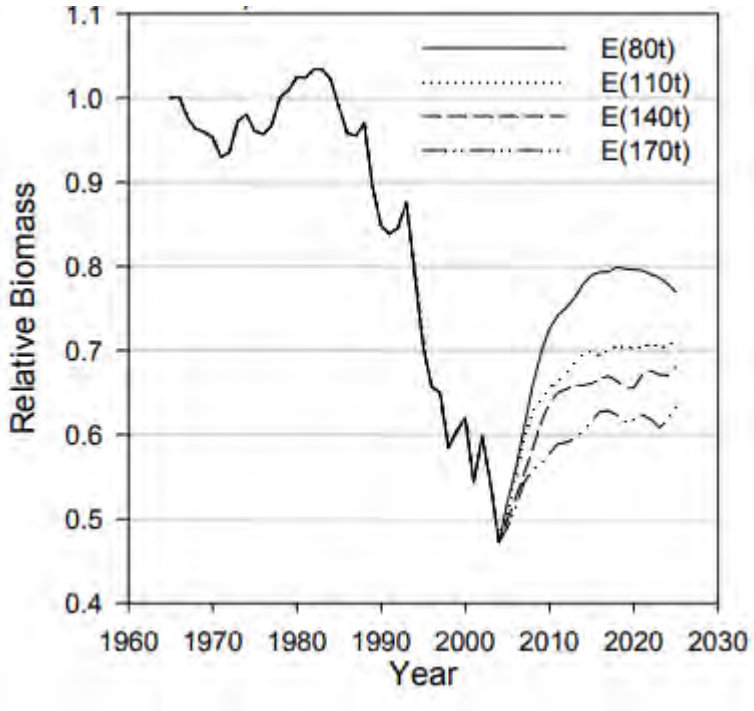

Figure 2: Trajectory of total biomass relative to virgin biomass averaged over ten simulations for four effort levels corresponding to TACs of 80, 110, 140 and 170 tonnes (Source: *Evaluation of the eastern Torres Strait Reef Line Fishery*, Fishing & Fisheries Technical Report, Williams et al. 2007).

SUPPORTING MULTI-SEASON RBCs (Spanish mackerel and coral trout)

34. Performing regular stock assessments allows managers and stakeholders to have the robust understanding of the status of a stock over time. In some fisheries multi-season TACs are set to cover intervening years between scheduled assessments.

35. This approach is often evaluated in terms of a risk-catch-cost trade off. Multi-season TAC's are being proposed for the Torres Strait Finfish Fishery as a one-off option while a harvest strategy is developed (unless agreed under the harvest strategy). In balancing likely stock risks and potential lost catches, supporting measures will need to be cost-effective and efficient.

36. Supporting measures may include:

    a. monitoring available indicators (e.g. CPUE changes, catch composition);

    b. applying specific break-out rules (e.g. if new stock assessment information becomes available, significant over-catching recorded); and/or

    c. accounting for any increased uncertainty in the recommended biological catch over time.

37. The RAG may identify other considerations.

38. Under a multi-season TAC arrangement it is common practice in the period between assessments for the RAG to check on how the stock might be tracking. This is done by assessing the most recent datum point e.g. the last seasons catch per unit effort average and examine how this datum compares to an established time series or a reference period where the stock has been deemed to be healthy.

39. A time series of raw catch and effort data for Spanish mackerel and coral trout are available at present for the sunset sector. Raw catch and effort data (i.e. non-standardised) could be

presented by management in the interim period to support RAG analysis. A standardisation of mean catch rates for Spanish mackerel was performed during the 2016 assessment update (refer Figure 14 of the 2016 O'Neill assessment **Tabled Paper C**). Standardisations could be generated by science-providers for periodic analysis; though the time and costs involved in doing so might almost be comparable to performing an assessment update- meaning this may not be a cost-effective option.

40. With the introduction of the Fish Receiver System (mandatory catch disposal records) on 1 December 2017 an improvement in TIB sector catch reporting is expected over time. The returns from this system will be examined by management as part of preliminary feedback to fishers. It will likely be a few seasons before a data series of TIB finfish catches can be established to support analysis of emerging trends or relative changes in catches/ catch rates. Catch disposal records will likely not yield any reliable TIB sector effort data meaning CPUE analysis will not be feasible.

LIST OF TABLED PAPERS REFERENCED and APPENDICES

Tabled Paper A – Finfish Working Group July 2016 meeting record

Tabled Paper B – Scientific Technical Working Group - November 2016 meeting record

Tabled Paper C – Updated Spanish mackerel stock assessment 2016 (O'Neill and Tobin).

Tabled Paper D - Finfish Working Group – March 2017 meeting record

Tabled Paper E - Scientific Technical Working Group – April 2017 out of session meeting record

5.1 Appendix A (below) – Schedule of proposed TACs while harvest strategy is under development.

5.1 Appendix B (below) - Example standardised catch rate series for Spanish mackerel

Table 1. Proposed schedule of total allowable catches for upcoming seasons

Season	**Spanish mackerel**	**Coral Trout**
2016-17 Last season	187.7 t nominal TAC, assessment performed for 2017-18 season.	139.5 t nominal TAC. - no change recommended by Working Group for 2017/18 season.
2017-18 Current season	132 t nominal TAC in place.	139.5 t nominal TAC Potential for assessment to be performed in 2018.
2018-19	Proposed multi-year TAC based on RBC of 125 t (minus agreed estimates of mortality)	Potential for assessment to be performed in 2018.
2019-20	Proposed multi-year TAC based on RBC of 125 t (minus agreed estimates of mortality).	Potential for revised TAC based on 2018-19 assessment.
2020-21	Proposed multi-year TAC based on RBC of 125 t (minus agreed estimates of mortality). New assessment to be performed for 2021-22 season	Potential for revised TAC based on 2018-19 assessment.
2021-22 Harvest strategy in place	New TAC based on assessment in previous cycle	Revised TAC in line with harvest strategy.

5.1 APPENDIX B

Example standardised catch rate series for Spanish mackerel.

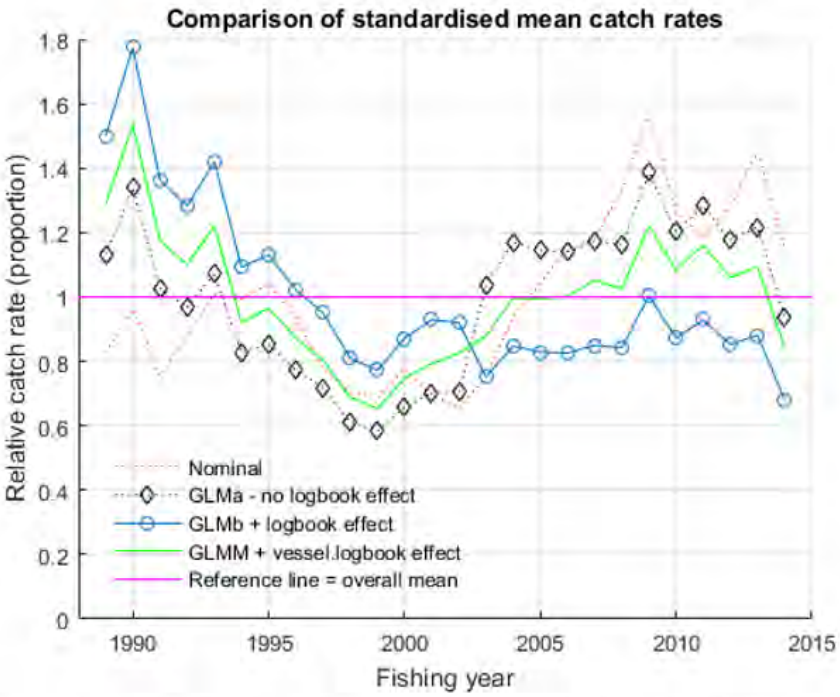

Figure 14. Comparison of Spanish mackerel average catch rates by fishing year 1989–2014. The plot compares nominal reported catch rates against three different standardised predictions. Each catch rate time series was scaled relative to its overall mean (y-axis = 1, reference point line for overall mean catch rate). Note the new TSF01 logbook was introduced in 2003 fishing year.

PZJA TORRES STRAIT FINFISH RESOURCE ASSESSMENT GROUP	Meeting 1 9-10 November 2017
MANAGEMENT ISSUES **Estimating catches taken outside of the commercial fishery**	**Agenda Item No. 5.2** **For NOTING and ADVICE**

RECOMMENDATIONS

That the RAG:

1. **NOTE** an update on current estimates of catches taken outside of the commercial fishery for Spanish mackerel and coral trout (recreational, charter-boat, subsistence);

2. **ADVISE** on the efficacy of the available estimates; and

3. **RECOMMEND** to any revised estimates of catches and/or work required to improve our estimates of catches **NOTING** AFMA is seeking advice on funding a small tactical research project to address this information need (considered under agenda item 3.2)

KEY ISSUES

1. Consistent with Australian Government policy (detailed in the *Commonwealth Fisheries Harvest Strategy Policy and Guidelines 2007*), all sources of mortality (catch) must be taken into account when setting a TAC. This generally means the TAC equates to the Recommended Biological Catch (RBC) (previously referred to as 'total kill' by the FWG) for the species minus expected catches to be taken outside of the fishery.
2. Catches taken outside of the commercial fishery include those taken by the recreational sector (non-indigenous), charter boat sector and catch taken by traditional inhabitants for non-commercial purposes such as subsistence (feeding family and friends).
3. Estimates of other sources of mortality were used to revise the Spanish mackerel notional TAC for 2017/18. However for coral trout an adjustment was not recommended.
4. Based on coral trout catches being significantly below the TAC (reported catches remaining around 20-40t) the FWG did not deem it necessary to reconsider the 2017/18 TAC to discount estimates of other fishing mortality (e.g. subsistence take) at this time. The FWG however agreed that this should be undertaken when new information becomes available to review the status of the stock and subsequent TACs.
5. As tabled under Agenda Item 3.1, AFMA is seeking RAG advice on improving estimates of catches in all sectors for both Spanish mackerel and coral trout as priority. RAG advice is requested on work required to improve our estimates of mortality.
6. Finfish RAG are tasked with reviewing the available estimates of catches taken outside the fishery and advise on the efficacy of available estimates, potential revisions and/or future work required to improve available estimates.

7. To address any recommendations to improve these estimates, there may be opportunity to fund small tactical research projects with AFMA's projected unspent research funds in 2018/19 (refer to Agenda Item 3.2).

8. A project is currently underway: "*Monitoring the traditional take of finfish in the Torres Strait Protected Zone*" led by Nicole Murphy at CSIRO. The project aims to improve estimates of traditional fishing catches for finfish the research project titled "*The subsistence coral reef fish fishery in the Torres Strait: monitoring protocols and assessment"* was funded (considered under agenda item 4.1).

BACKGROUND

Charter and recreational catches

9. The FWG QDAF Member reported at the FWG meeting on 16-17 March 2017 that there was limited data available for the charter and recreational sectors:

    a. ***Charter catch logbook records*** - between 1995 and 2014 using line gear, 10 charter licences have recorded activity in Torres Strait waters with a total of 360 days fishing recorded and 19.58 tonnes of product retained.

    b. ***2013/14 Queensland recreational survey*** – only three Torres Strait households participated. The standard error of the returned data mean they are unusable.

10. No estimates for recreational or charter catches were recommended by the FWG for Spanish mackerel. The FWG agreed that the QLD recreational data for the Torres Strait region is too limited to derive a catch estimate. Total recreational and charter catches are expected to be low

11. The FWG agreed for it to be a priority in future years to explore possible cost-effective options to develop a reliable estimate for recreational catches.

Subsistence catches by traditional inhabitants

12. At its 12-13 July 2016 meeting the FWG noted the past estimates of traditional catches of finfish reported from the research project titled "*The subsistence coral reef fish fishery in the Torres Strait: monitoring protocols and assessment* (Busilacchi PhD thesis 2008)", including:

    a. the traditional catch of finfish by Erub, Masig and Mer in 2005/06 was estimated as 169 tonnes and included 62 different species. This was a notable increase from catch estimated by CSIRO in the 1990s.

    b. only a small proportion of the 2005-06 catch was Spanish mackerel or coral trout (CT), although this is still a significant quantity (approx. 20 tonnes).

    c. for the commercial species (including Spanish mackerel and coral trout) about 15% were taken for subsistence.

    d. the largest components of other species taken were siganids (rabbitfish, spinefoot) mullet and trevally.

13. The FWG agreed that the figures from Busilacchi (2008) are the current best estimate of traditional take of finfish and resolved for more work to be carried out to clarify the proportion of subsistence take that was Spanish mackerel.

14. At the last Scientific Working Group meeting (6 April 2017) it was agreed for AFMA and TSRA to confirm out of session the estimate of Spanish mackerel subsistence take (kai kai) from the Dr Sara Busilacchi study. The reason why clarification was sought is because TSRA had reviewed the Busilacchi thesis and calculated that the subsistence take was 7.86 t rather than 12 t as reported at the FWG meeting on 16-17 March 2017 (**Table 1, below**).

15. Accordingly AFMA sought advice from Dr Busilacchi on the most accurate estimate and provided Dr Busilacchi with the calculations underpinning both estimates (12 t and 7.86 t). AFMA also sought confirmation from CSIRO on the calculations used to underpin the 12 t estimate.

16. Dr Busilacchi advises the most accurate Spanish mackerel subsistence estimate from her research is **5.155 t** (**Appendix A**) which is attributable to the previous 12 t figure being an overestimate stemming from combining data from the original research and the more recent journal articles and also being based on the entire family of Scomberidae, rather than for the individual Spanish mackerel (*Scomberomorus commerson*) species.

17. While this represents the most accurate estimate of subsistence catches the limitation of this study is that is provides an estimate only for Mer, Masig and Erub, rather than the whole Torres Strait.

18. Another consideration is that the number of commercial TIB operators has increased since the Busilacchi study. It is understood that a large proportion of the commercial finfish catch (22 per cent in Busilacchi 2008) from the TIB sector is taken for subsistence purposes – most of which consists of undersized individuals of target species. With the increase in TIB licence numbers there may also have been an increase in take for subsistence purposes associated with these TIB commercial catches.

Table 1. Agreed Spanish mackerel catch estimates outside of the fishery for the 2017/18 as presented at the FWG meeting 16-17 March 2017.

Source of catches	Expected catch (t)	Comments
Subsistence catch (kai kai) by traditional inhabitants	12	Based on data from *Busilacchi 2013*. Note this includes total of catch estimates for Mer, Masig and Erub Islands. The FWG agreed in July 2016 that the catch figures from the *Busilacchi 2008* research are the best estimates of traditional take of finfish. While some members considered this figure to be an overestimate, the FWG had no further empirical information available to recommend a different estimate.
Recreational	No estimates available	The FWG agreed that the QLD recreational data for the Torres Strait region is too limited to derive a catch estimate. Total catches are expected to be low. The FWG agreed for it to be a priority in future years to explore possible cost-effective options to develop a reliable estimate for recreational catches.
Charter	Negligible catches recorded	Available QLD logbook records show Charter boat line catches are low. Logbook records for the period between 1995 and 2014 report a total of 19.58 tonnes of mixed species taken from Torres Strait waters. The FWG agreed that catches are likely to be negligible.
PNG catch sharing	0	PNG_NFA have declined to enter into catch sharing arrangements for 2017/18.
Total discounts	**- 12**	
RBC (125t) – total for other catches (12t)	**113t**	
TAC with step-down applied	**125t**	

APPENDIX A

TORRES STRAIT FINFISH WORKING GROUP and **TORRES STRAIT SCIENTIFIC TECHNICAL WORKING GROUP**	**31 May 2017**
OUT OF SESSION UPDATE **Spanish mackerel subsistence take update**	**Out of session** **FOR NOTING**

RECOMMENDATIONS

That the Torres Strait Finfish Working Group/ Scientific Technical Working Group:

1. **NOTE** the provided out-of-session update on the subsistence estimate for Spanish mackerel catches.

UPDATE

1. At the last Scientific Working Group meeting (6 April 2017) it was agreed for AFMA and TSRA to confirm out of session the estimate of Spanish mackerel subsistence take (kai kai) from the Dr Sara Busilacchi study. The reason why clarification was sought is because TSRA had reviewed the Busilacchi thesis and calculated that the subsistence take was 7.86 t rather than 12 t as reported at the Finfish Working Group meeting on 16-17 March 2017.

2. Accordingly AFMA sought advice from Dr Busilacchi on the most accurate estimate and provided Dr Busilacchi with the calculations underpinning both estimates (12 t and 7.86 t). AFMA also sought confirmation from CSIRO on the calculations used to underpin the 12 t estimate.

3. Dr Busilacchi advises the most accurate Spanish mackerel subsistence estimate from her research is **5.155 tonnes** (**Table 1**, see page 2).

4. This has reduced our current estimate of 12 t (first presented at FWG July 2016) by 6.8 t and is attributed to our previous figure being an overestimate, stemming from combining data from the original research and the more recent journal articles and also being based on the entire family of Scomberidae, rather than for the individual Spanish mackerel (*Scomberomorus commerson*) species.

5. Note that the commercially associated subsistence catch represents data from both cray-fishing and reef-line fishers and is an average of 2004 and 2005 data as reported on pp. 138-139. The purely subsistence based catches are reported on pp. 136 and are an average of 2005 and 2006 surveys.

   Reference: http://researchonline.jcu.edu.au/11041/2/02Thesis_whole.pdf

Table 1. Outline of subsistence catch calculations

Subsistence catch (from purely subsistence fishers)

	Total subsistence catch all species (t) (pp. 136)	Spanish mackerel (*S. commerson*) % of catch composition (pp. 286)	Estimated subsistence catch of Spanish mackerel (t)
Erub	71	1.25	0.887
Masig	55	3.24	1.782
Mer	43	0.31	1.333
			Total 4.005

Commercially associated subsistence catch

	Average subsistence catch all species retained by commercial fishers (t) (pp. 138-139)	Spanish mackerel (*S. commerson*)% of catch composition (pp. 291)	Estimated Spanish mackerel subsistence catch retained by TIB fishers (t)
Erub	1.72	19.07	0.328
Masig	0.885	32.09	0.284
Mer	6.18	8.72	0.538
			Total 1.150

Total subsistence estimate	**5.155**

PZJA TORRES STRAIT FINFISH RESOURCE ASSESSMENT GROUP	Meeting 1 9-10 November 2017
MANAGEMENT ISSUES Estimating Traditional Inhabitant Boat Sector Catches	Agenda Item No. 5.3 For ADVICE

RECOMMENDATIONS

1. That the Finfish RAG **DISCUSS** and **PROVIDE ADVICE** on best estimates and/or methodology for deriving a best estimate of catches by Traditional Inhabitant Boat (TIB) licenced fishers for Spanish mackerel and coral trout.

KEY ISSUES

1. An estimate of TIB sector catches is required to minimise the risk of catches exceeding agreed catch levels for the Fishery. Having an estimate of TIB catches has been necessary for the Finfish Fishery where catch reporting is voluntary for TIB licence holders.
2. While a mandatory fish receiver system is due to be implemented on 1 December 2017, an estimate of expected catches for the 2018/19 season will still be required. For seasons beyond 2018/19 the fish receiver system and applying the TAC across all commercial licences should offer greater capacity to ensure catches do not exceed recommended levels.
3. RAG advice is sought on the best available estimate and/or methodology for deriving a best estimate of Spanish mackerel and coral trout catches by the traditional inhabitant commercial sector.

BACKGROUND

4. Since 2004, the TIB sector has been monitored through the voluntary Torres Strait Seafood Buyers and Processors Docket Book (TDB01) via buyers at the community and commercial freezer level.
5. In recent years, the reported catch in TDB01 docket books has become infrequent for the finfish fishery (**Figure 1**) with less than 1 tonne of catch being reported in both the 2014-15 and 2015-16 fishing seasons (**Figure 2**).
6. An increasing number of Traditional Inhabitant Boats are endorsed to fish in the Spanish mackerel or reef-line fisheries (**Table 2**).
7. There are a range of estimates of TIB commercial catch available from previous studies (**Table 1**) and industry advice is expected on likely trends in fishing effort noting a variety of factors that may have impacted TIB fishing effort overtime (e.g. management decisions (10nm closures), changes in market demand for product, the closure of island freezers, fishers leaving the fishery etc).
8. Existing catch estimates are detailed below together with licencing information (**Table 2** below) and number of fishers reporting sales of product (Figure to provide some indication of the level of effort (latent or otherwise) in the fishery.

Previous consideration by Finfish Working Group

9. At its 16-17 March 2017 meeting the FWG noted catch estimates of TIB commercial sector reported from reports and journals ranging from 9t to 22 t for Spanish mackerel as detailed in the agenda paper. The FWG also noted the FQMC agreed a reasonable estimate for TIB

catches for the 2017/18 season to be 15t or less (based on maximum reported catch of 10t since the 2008 buyout and adding 5t).

10. The FWG discussed the accuracy and relevance of these estimates for predicting future TIB catches. One of the TIB representatives noted that 10 tonnes was the likely current catch level, although future improvements to infrastructure would likely increase annual catches to above 15 tonnes beyond the 2017/18 season. It was noted that changes have occurred in the fishery overtime (e.g. participation levels, buyout,10 nm closures) which may influence total TIB catch. It was further noted however that in the absence of accurate catch estimates a precautionary approach should be taken.
11. The FWG noted that underestimating the total take either by adopting less precautionary estimates and/or under reporting, increases the risk that the RBC (or recommended total kill) will be exceeded. This can negatively impact the status of the stock and should be avoided.
12. The FWG encouraged all fishers to fill out logbooks to provide accurate information and reiterated its support for improving data collection systems, in particular implementing a mandatory fish receiver system.
13. In agreeing to a maximum estimated Spanish mackerel commercial catch for the 2017/18 season the PZJA Standing Committee used an estimate of 22 t for TIB sector catches. The PZJA Standing Committee noted that providing advice on catch estimates for all sector will be priorities for the RAG.
14. TIB catch estimates for coral trout have been specifically estimated having regard for the overall level of reported commercial catches by the sunset sector compared to the TAC.

Table 1. Summary of estimates of TIB commercial take

Study	Method	Time period	Estimate of TIB commercial take
O'Neill & Tobin (2016)	Spanish mackerel stock assessment	2003-2010	**22 t** Spanish mackerel
Bussilachi, Williams, Russ and Begg (2012)	Creel surveys - island based	2004-2006	**9 t** Spanish mackerel **25 t** coral trout **20 t** other species.
Begg & Murchie (2004)	Review of catch records and island freezer data	1988-2003	**29 t** peak reef-line catch of all spp.(2002) **15 t** peak coral trout catch (Mer + Erub, 2002) **7.5 t** peak Spanish mackerel catch (Masig, 1999)

REPORTED TIB COMMERCIAL CATCH

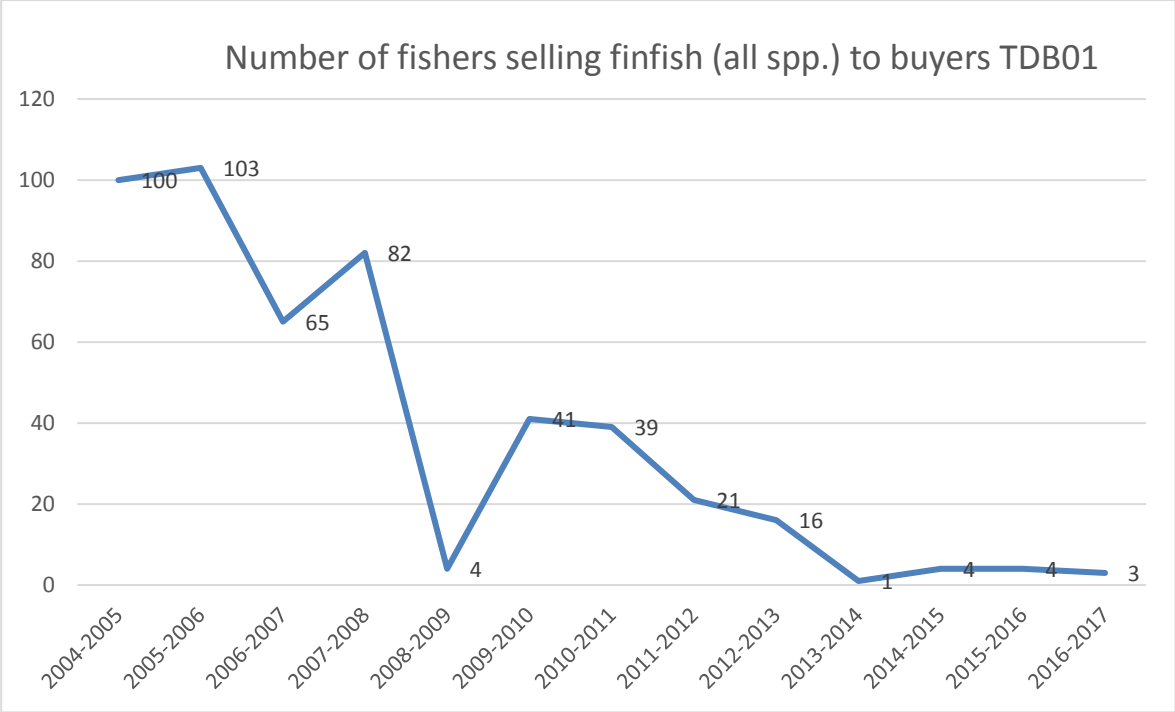

Figure 1. Reported catch in TDB01 docket-books from TIB fishers selling finfish (all species combined) to buyers by financial year.

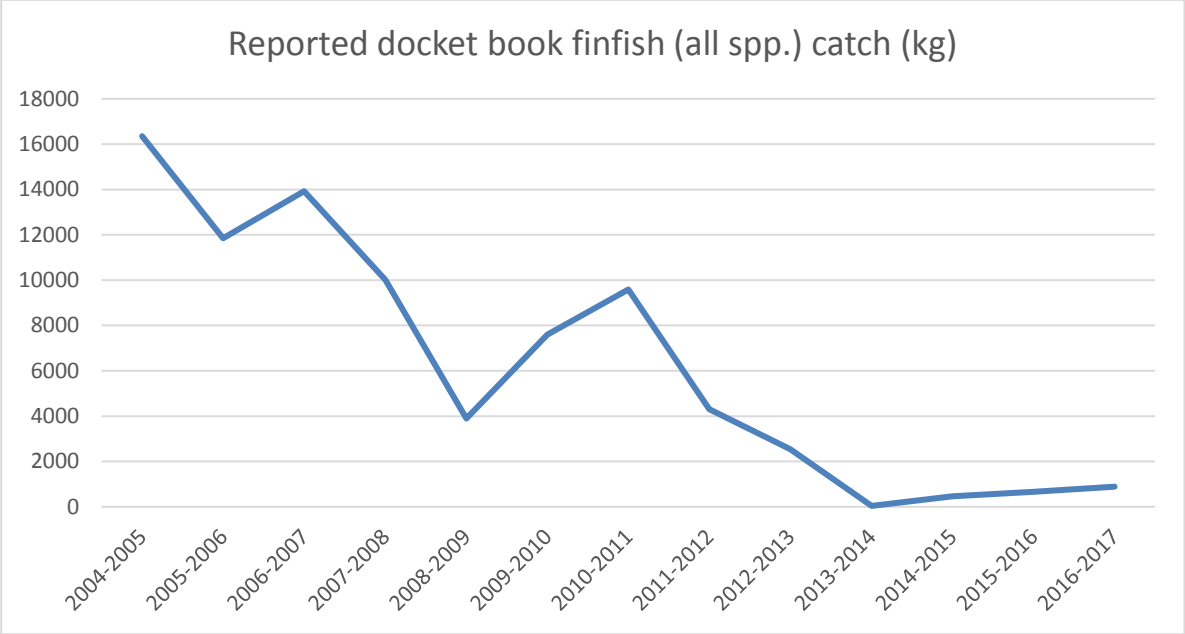

Figure 2. Reported docket book catches (fishers selling to buyers) from TDB01 by financial year.

STUDIES THAT PROVIDE ESTIMATES OF TIB COMMERICAL CATCH

O'Neill & Tobin (November 2016)

15. The most recent assessment for Spanish mackerel (O'Neill & Tobin – November 2016) reports that for the years 2003-2010 the docket (TIB) database corresponds to about **18.5 % (**SD =4.6%) on average **of the Spanish mackerel logbook** (TVH) tonnages per season.

16. The percentage was based on comparing the amount of catch recorded in TIB docket-books and compared what proportion this was of the TVH sector reported in logbooks.

17. This equates to an average of **22 t of Spanish mackerel per season** taken by the TIB sector.

18. This same assumed amount (18.5 %) is extrapolated for two other time periods in the assessment for which full docket data is not-available 1989-2002 and 2011-2014.

Busilacchi, Williams, Russ and Begg (2012)

19. This creel study estimated that from 2004 to 2006 the TIB sector commercial catch for three islands (Mer, Erub, Masig) studied was 53.5 tonnes in total, **Figure 3**.

    a. **9 tonnes - Spanish mackerel**
    b. **25 tonnes - coral trout**
    c. **20 tonnes - other species**.

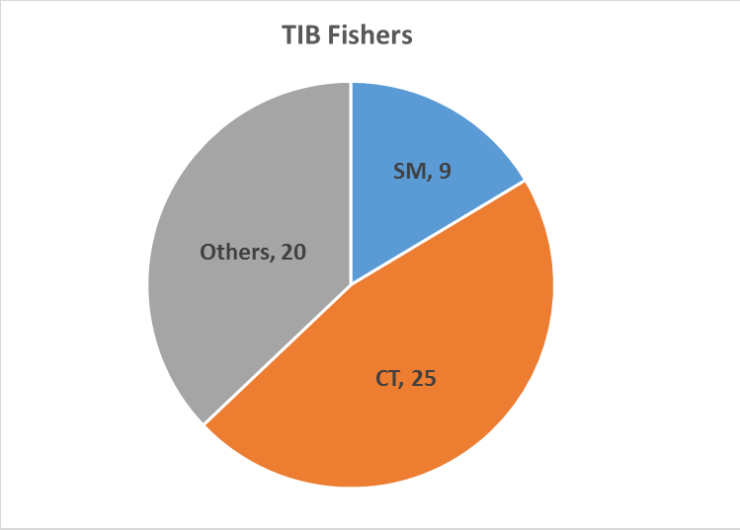

Figure 3. Chart of estimated TIB commercial catch for Mer, Masig and Erub from *Busilacchi et. al* (2012)

Begg & Murchie (2004)

20. The CRC report "*Collation and review of islander commercial catch history (1988-2003) in the Eastern Torres Strait reef line fishery*, Begg & Murchie 2004" provides a summary of traditional catch records from community freezer and commercial catch records (**Figure 4**).

21. The peak reef-line catch of all species combined was 29 tonnes in 2002 from 111 individual fishers and 1064 days of effort.

22. Coral trout was the main species harvested from Mer and Erub Islands and peaked at around 15 tonnes during the studied data.

23. Spanish mackerel was the main species harvested from Masig Island and peaked at around 7.5 tonnes in 1999.

24. **Figure 4** (below) provides an overview of reported catches (total and broken down by island)

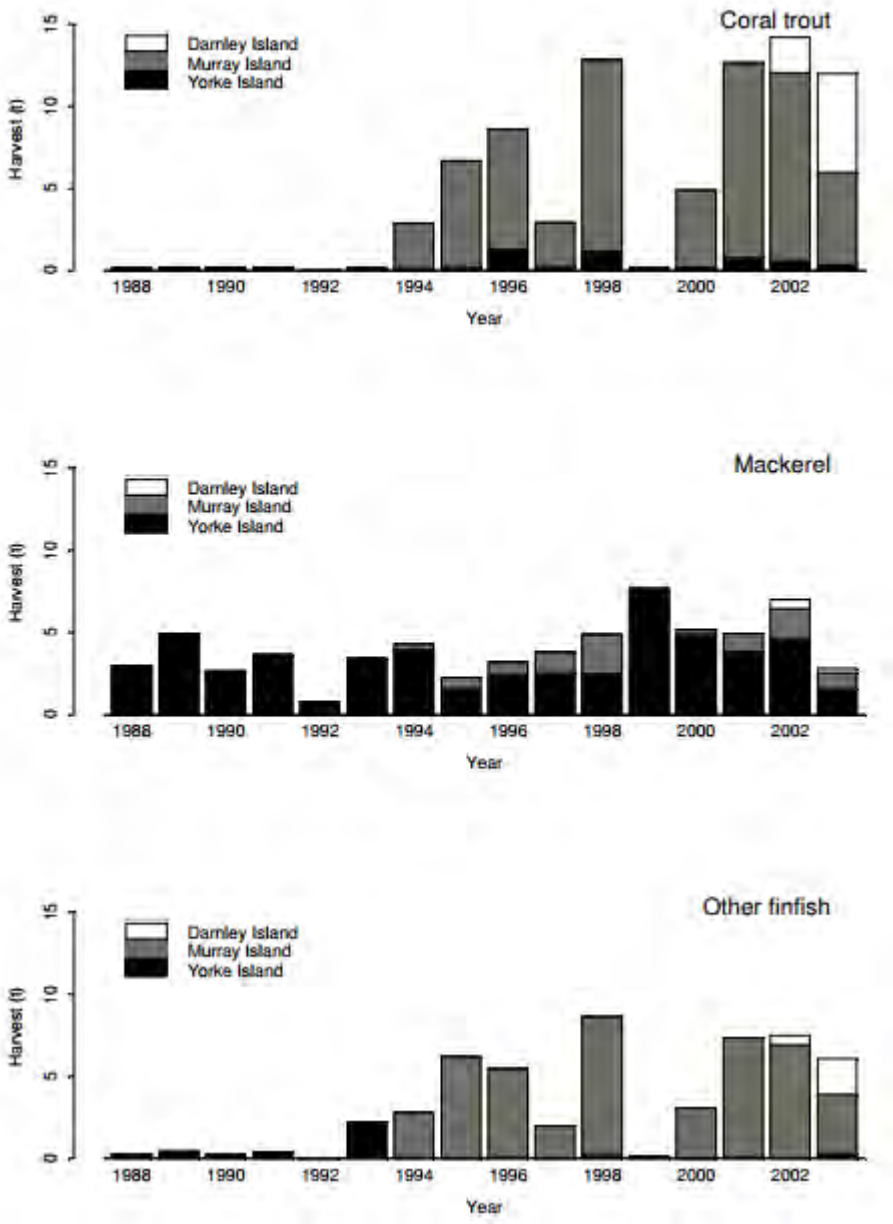

Figure 4. Total annual harvest (t) of Coral trout, Mackerel and Other finfish for Darnley (Erub), Murray (Mer) and Yorke (Masig) Islands. Overall heights of bars indicate the total annual reported harvest for the eastern Torres Strait (all three islands combined).

Table 1. Number of TIB license endorsements by fishing season (Source: ABARES Fishery Status Reports, *AFMA PISCES Database and PZJA Public Licensing Register.

Season	# TIB licenses (endorsements)
2009-10	161 SM, 145 RL
2010-11	148 SM, 129 RL
2011-12	150 SM, 134 RL
2012-13	135 SM, 122 RL
2013-14	136 SM, 132 RL
2014-15	210 SM, 194 RL
2015-16	270 SM, 227 RL
2017-18	277 SM, 177 RL

REFERENCES

Begg G.A., Murchie C.D. (2004). *Collation and review of Islander commercial catch history (1988-2003) in the eastern Torres Strait reef line fishery*. CRC Reef Research Centre Technical Report No. 57, CRC Reef Research Centre, Townsville.

Busilacchi, S., Williams, A.J., Russ, G.R., and Begg, G.A. (2012) *Complexity of applying minimum legal sizes (MLS) of retention in an indigenous coral reef fishery*. Fisheries Management and Ecology 19, 233–244.

O'Neill M. and Tobin A. – *Torres Strait Spanish Mackerel Stock Assessment II, 2015 (Update of stock assessment I published in 2006)*. Torres Strait AFMA Project Number RR2014/0823 as accepted by the Finfish Scientific Technical Working Group 10 November 2016.

PZJA TORRES STRAIT FINFISH RESOURCE ASSESSMENT GROUP	Meeting 1 9-10 November 2017
MANAGEMENT ISSUES **Supporting expansion of take of other reef-line species**	**Agenda Item No. 5.3** **For NOTING**

RECOMMENDATIONS

That the RAG:

1. **NOTE** an update on the considerations to date on managing catches of other-species in the reef-line sector; and

2. **NOTE** RAG advice may be sought in the future on the conditions for any expansion in terms of species, location, catch levels, data collection requirements and any other matters required to mitigate risks to the stocks.

KEY ISSUES

1. Most fishers in the reef-line sector of the Torres Strait Finfish Fishery target coral trout. Some operators have expressed interest in targeting other-reef line species such as barramundi-cod and emperors.
2. At its meeting on 12-13 July 2016, the FWG considered the proposal for 28.5 tonnes of unspecified mixed reef species to be leased-out to sunset licence holders in the 2016-17 fishing season. The FWG's advice focused on potential sustainability risk associated with targeting of new species and increasing effort on other species (see Background for more detail).
3. The FWG recommended that subject to further consideration by the Technical Scientific Working Group (TSWG) of coral trout to by-product catch ratios when targeting coral trout and total take of 'other species' by other sectors –

   > *there should be no further increase above 30 tonnes until systems are in place to independently verify catches, a species-specific risk assessment has been undertaken and where applicable catch triggers and control rules have been agreed.*

4. Although scheduled for discussion at the 10 November 2016 TSWG meeting, the development of a work plan to assess risk and manage expansion on other reef line species was deferred until a subsequent meeting.

5. At the16-17 March 2017 meeting the Finfish Working Group reaffirmed its advice that future expansion in effort for 'other' species requires effective risk assessment and management measures. The FWG agreed that taking into account the risks identified by the FWG at its last meeting there is also a need to review the 30t limit in light of the species composition of catches taken this season.

6. The FWG noted advice that targeted fishing for other species by sunset sector boats had not yet occurred in the 2016/17 season. Instead operators had focused on fishing for live coral trout. TSRA advised that there is less interest from sunset licence applicants to target other species in 2017/18 fishing season.

7. The FWG noted that the scope of the harvest strategy project does not include other reef-line species though there may be capacity to commission work in parallel to this project should the need arise.

8. Future expansion in effort for 'other' species requires effective risk assessment and management measures. Taking into account the risks identified by the FWG at its last meeting there is also a need to review the 30 t limit in light of the species composition of catches taken in recent seasons.

9. It is proposed that further work to assess the potential to expand effort on 'other' species should depend on:

    a) a detailed fishing proposal from industry for expansion;
    b) scientific advice on the conditions for any expansion in terms of species, location, catch levels, data collection requirements and any other matters required to mitigate risks to the stocks;
    c) where appropriate, management measures and policies be considered by the FWG; and
    d) available funding for the required scientific and technical advice.

BACKGROUND

10. Since the 2008-09 season the TSRA has leased-out fishing licences with individual catch entitlements for coral trout and Spanish mackerel on behalf of traditional inhabitants. TSRA for the first time leased catch entitlements for 'other' reef species in the 2016-17 season.

11. At its meeting on 12-13 July 2016, the Working Group noted the various fishing plans of operators seeking to take 28.5 tonnes in total of 'other' reef species i.e. not coral trout or Spanish mackerel**.** Three licences were granted a catch entitlement for 'other' reef fish species with catch entitlements of 1, 7.5 and 20 tonnes respectively. The proposed fishing plans reported at the FWG include:

    - the take of 'other' species as a byproduct (i.e. not targeted);
    - two operators plan to land live coral trout;
    - one operator plans to target deepwater 'other species' (20 tonnes) including:
        - emperor
        - job fish
        - flame snapper
        - nannygai
    - live fish to be unloaded in Cairns; and
    - one operator proposes to use two primary vessels (note same operation is required to have VMS under QDAF conditions).

12. Less interest exists among sunset operators to target other-species in the current 2017-18 season. AFMA understand this is mainly driven by good catch rates and market demand for coral trout which is preferentially fished for. A total of 7 tonnes of other-species have been leased to 3 operators for the current season (packages of 1, 2 and 4 tonnes). This drop in demand for access to take these species may be temporary and the issue of expanding catches over 30 tonnes may again become a priority for management in future.

13. The FWG has previously identified the following measures that may support further expansion in effort to other species:

    1) observer coverage – provides verification of logbooks and biological samples (length and age);
    2) port sampling – for biological samples;
    3) species triggers (possible vulnerable species) and/or area triggers (possible risk of localised depletion);
    4) consideration of iconic species, other values;
    5) VMS;
    6) Fish Receivers System; and

7) possible requirement for minimum ‘quota’ holdings for ‘other’ species.

14. The FWG identified the following the risks and benefits associated with the proposed leasing of 28.5 tonnes of other species:

Risks

- Uncertainty around catch composition (i.e. risks to specific species) arising from incomplete and/or inaccurate catch and effort reporting.
- Current logbooks – not optimal for reporting a wider range of ‘other’ species.
- Discards (post capture deaths).
- Deepwater species are generally longer lived at ~ 30-40 years. NT and Gulf area assessment found species have low natural mortality therefore the sustainable harvest rate is likely to be low (taking a low percentage of the stock). Six species in aggregate are included in the in the Gulf limit of 450t:
    - crimson snapper (age at maturity 4-7yrs)
    - large mouth nannygai (9-12yrs)
    - red emperor (10-13yrs)
    - goldband snapper (6-8yrs)
    - mangrove jack (8-11yrs)
    - golden snapper (10-13yr)

Benefits

- Sustainable fishing industry development for traditional inhabitants

CATCH DATA

15. Updated annual catch data for reef line species and the ratio of coral trout and ‘other’ reef fish species is provided in **Table 1.**

Pre-buyback data

16. Data for the period prior to the buyback for which accurate logbook data exists (2003 to 2008) indicates that annual catches of byproduct reef species varied from 1.4 tonnes to 43.5 tonnes with an average yearly value of 20.5 tonnes.

17. The number of fishers reduced during this period from 21 fishers in 2003 down to 3 fishers in 2007.

Post-buyback leasing data

18. Over the post-buyback period the average ratio of coral trout and ‘other’ reef-line species has varied between 5 to 18 per cent (**Table 2**).

Table 1. Seasonal catches of reef-line fishes 2008-09 season to 2016-17 season (source: AFMA TSF01 logbooks).

Species	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Barramundi cod	542	238	1086	745	429	756	646	1223	782
Red Emperor	223	70	398	202	125	160	207	256	457
Sea Bass	843	10	79				15	84	143
Spangled Emperor	197	68	244	29	35		8	45	56
Emperor	1968				18			4	
Rock cods	125	280	706	1017	480	932	575	1364	655
Trevally	1314					785	649	775	2377
Silver Trevally						172			
Venus Tuskfish		93	341	145	34	79			
Black Kingfish								11	
Jobfish			8					29	
Sea Bream Snapper								43	
Blue-toothed Tuskfish							1	30	
Australian Tusk								4	
Mangrove Jack								9	
Maori Sea Perch								6	
Parrotfishes								6	
Green Jobfish								5	
Total (other species)	**5212**	**759**	**2862**	**2138**	**1121**	**2884**	**2101**	**3894**	**4470**
Coral trout	**28873**	**10538**	**40264**	**34982**	**21731**	**30162**	**20529**	**38452**	**25700**
% of byproduct to coral trout	18	7	7	6	5	10	10	10	17

Table 2. Seasonal catches of reef-line fishes 2003-04 season to 2007-08 season. (Source TSF01 logbooks).

Species	2003-04	2004-05	2005-06	2006-07	2007-08	
Cod - unspecified	9669	5337	639			
Red Emperor	7694	5459	1608	705	163	
Shark other	3284	10602	2680			
Barramundi cod	4758	3659	1591	1177	580	
Mixed fish	4525	3795	200	2		
Sea Bass	4658	3435	656	325	50	
Spangled Emperor	3992	3033	831	364	248	
Emperor	3523	2378	64	214	21	
Rock cods	40	676	1141	1216	358	
Maori Wrasse	581	1861	135			
Grouper and Cod		2320	377			
Fork-tailed Catfish						
Trevally	428	464				
Silver Trevally		348		372		
Sea Perch	305					
Black Kingfish		123	100	94		
Jobfish		55			13	
Eastern Blue Groper	24					
Australian Tusk	3			12		
Bight Redfish	3					
Sweetlips	2					
Byproduct total	**43487**	**43543**	**10022**	**4481**	**1433**	Season av. 20.5 t
Coral trout	124772	102977	50379	50590	32467	Season av. 72.2 t
% of byproduct to coral trout	35	42	20	9	4	

PZJA TORRES STRAIT FINFISH RESOURCE ASSESSMENT GROUP	Meeting 1 9-10 November 2017
RESEARCH PROJECT UPDATES Torres Strait Finfish Fishery Harvest Strategy	Agenda Item No. 6 For ACTION

RECOMMENDATIONS

1. That the RAG **DISCUSS** and provide **ADVICE** on work completed to date under the harvest strategy project: "*Harvest Strategies for the Torres Strait Finfish Fishery";*

2. That the RAG **NOTE** Dr Trevor Hutton, Principal Investigator for the project will be attending the RAG to provide a progress report and seek RAG input; and

3. That the RAG **NOTE** Dr Michael O'Neill is a co-investigator on the project.

KEY ISSUES

1. The development of a harvest strategy has been identified by the FWG as a key management and research priority.
2. In line with a Torres Strait Scientific Advisory Committee call for research and advice on proposals submitted AFMA funded the CSIRO to deliver the current project: "*Harvest Strategies for the Torres Strait Finfish Fishery"* (**Attachment A**).
3. Dr Trevor Hutton, CSIRO Research Scientist, is the Principal Investigator for the project and will be attending the meeting provide progress report and seek RAG input.
4. Dr Micheal O'Neill, Principal Fisheries Scientist, Agri-Science Queensland, Department of Agriculture and Fisheries, is a co-investigator of the project.
5. The FWG and RAG will play a key role in developing advice for the PZJA on final draft harvest strategy for the Finfish Fishery. Broader stakeholder comment will also be sought.

Australian Fisheries Management Authority
FUNDING APPLICATION

The Australian Fisheries Management Authority provides funding for strategic research projects in Torres Strait Fisheries guided by advice from the Torres Strait Scientific Advisory Committee.

ADMINISTRATIVE SUMMARY

Project Details

Project Title: Harvest Strategies for the Torres Strait FinFish Fishery

Planned Start Date: 01/02/2017
Planned End Date: 31/08/2018

Project Applicant
Organisation: CSIRO Oceans and Atmosphere
Large Organisation (more than 20 people) – Yes.

Address: CSIRO Oceans and Atmosphere. CSIRO Head Office, GPO Box 1700, Canberra, Australian Capital Territory, 2600.

Project Budget Summary[1]

BUDGET[2]	TOTAL PROJECT COSTS					CONTRIBUTIONS			
Year	Salary	Travel	Operating	Capital	TOTAL	AFMA Contribution	Applicant Contribution	Applicant In kind	Other In kind
2016/2017	7540	1000	30073		38613	32580	6033		61500
2017/2018	27956	8000	110606		146562	123662	22900		218940
2018/2019	8754	3000	41246		53000	44719	8281		82570
	44250	12000	181925		238175	200961	37214		363010

External Review

Do you agree to any information being sent to external reviewers – Yes.

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[1] Please list budget exclusive of GST
[2] Please list budget exclusive of GST

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PROJECT DESCRIPTION

Project Challenge

From: 2015 TSSAC operational plan
C. Finfish
1) Efficacy of management arrangements
1a) Investigating improvement of efficient, long term monitoring for all sectors of the fishery
1b) Developing efficient harvest strategies for the fishery

Project Species

Species Group	FinFish (Spanish mackerel and Coral trout)
Species	*Scomberomorus commerson* & *Plectropomus leopardus*

Background

Research is required to deliver harvest strategy (HS) options as described in the project outline established by the PZJA consultative forums, TSSAC 2016 research call and the TSSAC operational plan. Since 2008 the Torres Strait Finfish Fishery has been reserved for Traditional Inhabitants, on whose behalf the Torres Strait Regional Authority (TSRA) leases out fishing licences to non-Traditional Inhabitants. The leasing process is based on consideration of estimates of sustainable total allowable catches (TAC) for coral trout and Spanish mackerel, with the aim to generate revenue for the benefit of Torres Strait (TS) communities.

A HS framework for the finfish fishery is sought to guide future TAC decisions, support leasing arrangements and expansion of the fishery using new stock status indicators; and to achieve ecological, economic and social management objectives consistent with the Torres Strait Fisheries Act 1984, TSFFF management plan 2013, the Commonwealth Fisheries Harvest Strategy Policy and Guidelines and Torres Strait FinFish Action Plan. HS options will also assist and guide future investment on finfish research and data collection to ensure the shared interests of Torres Strait Islanders, AFMA, TSRA and DAF are balanced in developing sustainable and economic fishing opportunities.

Current management of the fishery involves TACs based on historical catch which have remained unchanged since 2008. A clear contrast between under-utilisation of coral trout and over-subscription to Spanish mackerel exists. Lack of data and rules to set effective allowable harvests may impede the returns to islanders and put the fishery at risk, unless there is a clear set of harvest control rules (within a harvest strategy framework) agreed to by the custodians of the resource. This has been the subject of some discussion at management forums (e.g. FFWG) and community meetings for some time. A new harvest strategy process will provide the platform for an agreed and transparent strategy for managing, monitoring and information gathering into the foreseeable future.

Consultation

The need for the project has been highlighted through management forums such as the Finfish Working Group (FFWG) which includes TS Islander representatives. The proposed project has a significant consultation component that will take place during FFWG meetings that will include key stakeholders and experts. At these future FFWG meetings, stakeholder feedback will be recorded by the project team as part of the work-plan to merge any new additional considerations with those documented within the Torres Strait FinFish Action Plan (FRDC project 2014-240; Bodsworth et al 2016).

This level of engagement was inferred re: TSSAC letter 1st September 2016 and phone conversation with AFMA, stating clear focus be given to the development of harvest strategy information and procedures (i.e. two stages). Significant community consultation will also take place subsequent to this project, by AFMA, and this project will also be able to use significant islander consultation opportunities during the current Torres Strait Finfish Monitoring project [CSIRO].

For this project, the lead researches have already sort support from key staff in AFMA and the TSRA. Furthermore they have sought the approval of Traditional owners (Kenny Bedford).

The TSSAC supported the pre-proposal from each of the groups that submitted (DAF, CSIRO and Tobin Fish Tales Ltd). This resulted in a combine full proposal ‘version 1’ being reviewed by TSSAC in July–August 2016. The TSSAC response questioned the proposed stakeholder need analysis and workshop. All parties have consulted to revise the proposal appropriate.

Need

The Torres Strait finfish fishery consists of a mix of commercial, traditional and recreational sectors. The commercial allocation is held by Torres Strait Islanders and is fished by islander owner-operators and non-islander lease-fishing operators. The leased allocation provides income and market certainty to communities; the islander operators provides important local employment and income opportunities, and local food security and health benefits. The strategy for overseeing each sector and their joint fishing impact is relatively ad hoc, with a Total Allowable Catch (a separate TAC for Spanish mackerel and coral trout) the primary point of reference for capping fishing pressure at a level which meets sustainability targets,. Under the current management approach there is considerable risk of under or overfishing in some situations and no process of formalising harvest control rules to control fishing pressure.

A major impediment to defensible and robust management decisions is the development of a clear understanding of management arrangements including the potential mechanisms for fishery expansion and potential co-management, the knowledge underpinning current management strategies and fishery risk. Much of the rationale for current management arrangements are immersed in consultative meeting minutes, scientific reports or in various stages of ratification through a complex administrative framework. The development of a HS document that is ratified by management agencies and Islanders will guide and demonstrate sustainable fishing, in a clear consultative fashion for future development of the fishery. Adding some additional urgency is the fact that the current strategic assessment for the fishery includes a commitment for the development of "*harvest strategies to include meaningful performance indicators, performance measures and responses*".

Planned Outcomes

This research will provide a sound basis for the development of the Harvest Strategy (HS) for this locally important fishery for Torres Strait Islanders. This fishery has the potential to provide significant long-term livelihood benefits for local communities in the Torres Strait. The HS design, stock status indicators and assessment tools will provide the framework to improve monitoring, management and sustainable use of Torres Strait finfish resources. For the PZJA, AFMA, TSRA, DAF and community stakeholders, these outputs will contribute to stock status reporting (ABARES, Fishery status reports) and the evaluation of TAC. These will help identify revenue potential for Islanders through marketing of sustainably fished resources and understanding of the sustainable number of licences and TAC to lease. The project will also help sustain profitable levels of harvests for lessees, including taking into account need for more certainty as per lease agreements. The resulting outcomes will be measured through a) uptake and management use of a HS procedure, b) simple cost effective reporting on stock status, and c) feedback from the PZJA, managers, stakeholders and project extensions to inform government leaders, Islanders and fishers.

Objectives

1. Collate and analyse available coral trout and Spanish mackerel fishery data to estimate variability and assess whether there is sufficient information to develop time-series indicators of stock status (Task 1, Figure 1). This includes linkage to the Finfish Monitoring Project (Task 4, Figure 1) (data links and sampling methodology).
2. Summarise and assess utility of updated stock assessments and reference points for coral trout and Spanish mackerel (Task 2, Figure 1).
3. Present results and HS guidelines (including Harvest Control Rules – Task 3) to the Finfish working group, with fishery managers and representative stakeholders to develop and evaluate key elements of the draft HS. It is the responsibility of the FFWG to take the recommended draft HS and formally adopt it as the HS.

The project will develop and ratify a clear and concise draft harvest strategy for the Torres Strait finfish fishery. It will include clear guidance for sustainable fishing, the data requirements that underpins management strategies, options for flexibility to suit market and community needs, targets and limits and guidance for situations where these targets and/or limits are reached, and data requirements for potential fishery expansion.

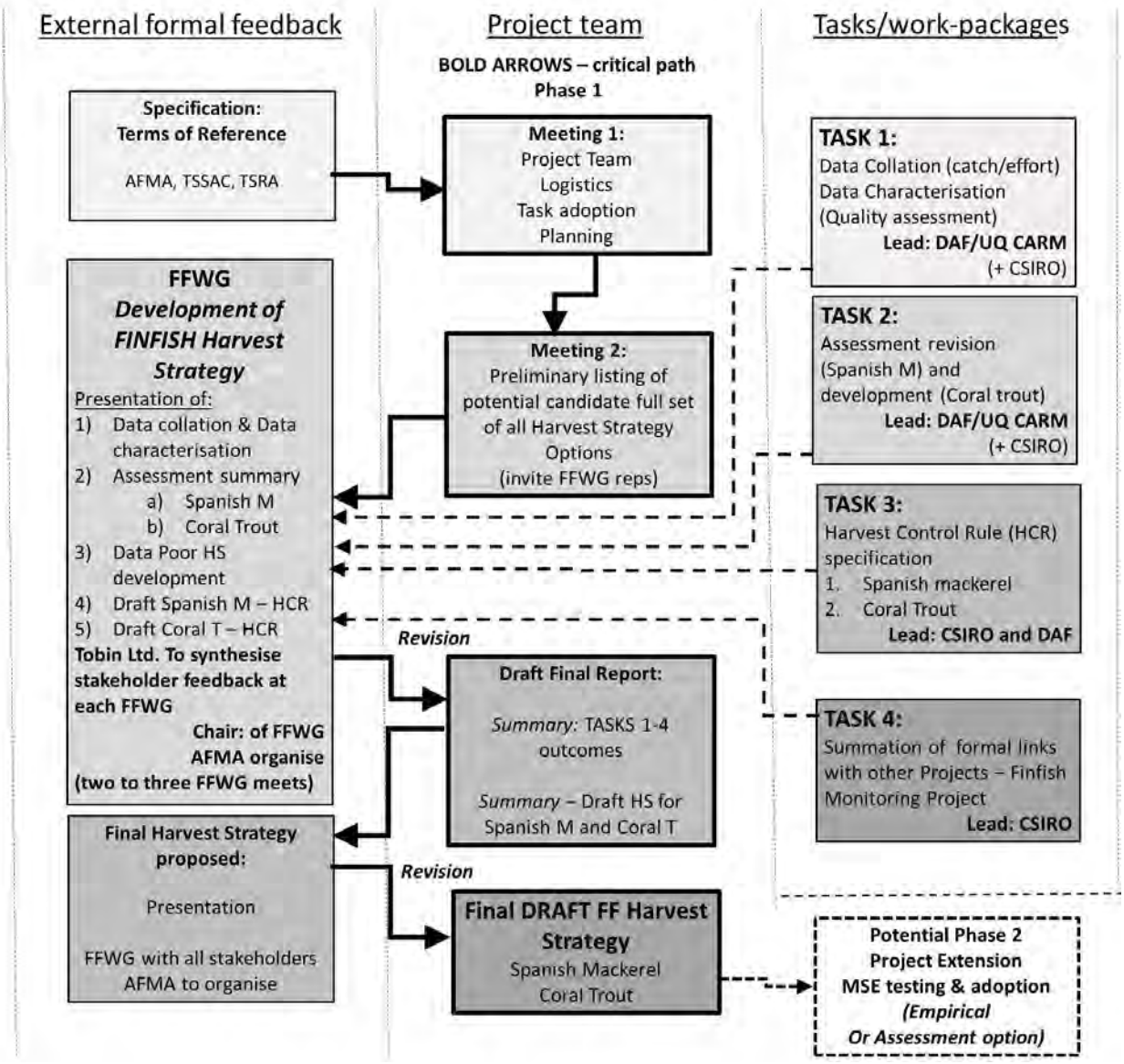


Figure 1. Proposed Process for project team meetings and deliverables, and tasks for the project (HCR – harvest control rule).

Methods

Phase 1

Tasks 1 will assess fish abundance indicators and empirical reference points (e.g. target and limit catch rates) that are achievable and are not based on unusually benign times in the past history of the fisheries. Task 1 aims to ensure a solid foundation for AFMA, TSRA, Fisheries Queensland, Torres Strait Islanders, fishery stakeholders and TSSAC to benefit from harvest strategies outcomes. Engagement processes on task outputs and their meaning will be determined through project meetings and presentations with the FFWG (see plan diagram, Figure 1).

Task 1 – Data collation and quality assessment:

This task collates data and provides early consideration of harvest strategy options.

Collate and review existing raw data for coral trout and Spanish mackerel and identify useful data (taking into account confidentiality constraints, following the guide for fisheries researchers working in the Torres Strait). Identify critical data gaps and indicate how they might be addressed. Analyse past research and logbook data sets to establish whether these data have sufficient information to develop critical indicators of fishery

performance and status. This will build on current Spanish mackerel analyses (O'Neill and Tobin, report draft with AFMA, email dated 21/11/2016) and coral trout analyses (Leigh et al 2014). Statistical analyses to be employed will be generalised linear models, generalised linear mixed models and GIS mapping.

For Spanish mackerel, the existing data and standardised catch rates from the updated assessment in 2015 (O'Neill and Tobin) will be used. This will be built on to calculate statistical powers of detection (e.g. confidence in detecting a 10%, 20% etc. significant change in catch rates) for quantifying HS precision at different spatial levels of fishing. In addition, the results will inform on HS control rule triggers and/or appropriate transformations to mitigate variances. Monitoring sample sizes for fish age frequencies will be calculated to demonstrate effective samples sizes and precision. This will provide options on increasing the tiered level of analyses and on the monitoring of fish ages frequencies. These analyses are in line with those conducted for HS for tropical snappers across northern Australia (FRDC Project No. 2009/037, O'Neill et al 2011).

For Torres Strait coral trout, no analyses or results are available. Therefore, the catch rate and stock analyses need to be developed to establish indicators and reference points for the HS. This will utilise existing methods applied to the Queensland fishery. Data variances and statistical powers will be reported, with reference points scaled as appropriate based on analysis trends and signals. Alignment with stock model predictions will be explored. Application of this data source will depend on the amount of information.

Data synthesis will also include historical information relevant to weather conditions, legislative and policy arrangements, fishery characteristics, stakeholders, their life histories, stock status, key threats and relevant available data. This will provide the context for the development of appropriate abundance indicators and reference points.

Recently AFMA have highlighted the management need to review data for other important quota fish species (e.g. Lethrinidae, Lutjanidae and Serranidae). For these "other species", no harvest strategy design will be conducted in this project; see project phase 2 options.

Task 2 - Assessment minor revision (Spanish M) and assessment development (Coral trout)

The recent Spanish mackerel assessment for TS was presented at the FFWG in 2016 (Brisbane 10th November). This model is adequate given the limitations in data in terms of providing a baseline assessment for Spanish mackerel. Review of the assessment during the FFWG meeting (10th Nov 2016) provided a series of recommendations for future consideration (e.g. run sensitivity test assuming catchability on older age classes decreases). Given the current progress made with the Spanish mackerel assessment, no new assessment work will be conducted for Spanish mackerel, except to adjust model settings (analyses) to estimate (target and limit) reference points as required for judging empirical indicators in the HS.

The Queensland coral trout model will be expanded for Torres Strait data in order to calculate reference points. Modification of the current assessment for Qld coral trout (spatial coral trout model - Leigh et al 2014) will be considered and adapted to Torres Strait reefs and data as appropriate. Catch rates are subject to significant effects of social learning (fish quickly learn not to take the bait when they are fished, which reduces catchability), environment (tropical cyclones and other low pressure systems) and fisher skill. The environmental effects of cyclones may be less of a problem in Torres Strait than in the Great Barrier Reef, as cyclones are less common, but analyses will need to confirm the significance of such effects and the implications for abundance indicators. The variances and extent that abundance indicators are affected by environmental variables rather than fishing will be assessed before being used as input into a harvest strategy.

Both models are annual age-structured population models which can define management reference points (target and limit) for fish harvest, catch rates, age-length and mortality in order to guide empirical or model-based harvest-strategy options. Furthermore, this task will review past research and assessments for the species to complete the knowledge base for the Torres Strait.

Performance indicator: identify empirical fish abundance indicators and procedures to mitigate variance in harvest strategies; establish analysis tools for simple and cost effective operation; identify target and limit reference points.

Both task 1 and 2 will be conducted by Dr Michael O'Neill (DAF) and Dr George Leigh (DAF) (in collaboration with UQ (CARM)) and Dr Trevor Hutton (CSIRO) who have many years of direct experience with the stocks in this fishery in terms of data, empirical-based techniques for stock status reporting, standardisation of fisheries indicators, formal stock assessments and the provision of recommend fisheries management advice, in addition to extensive skills and experience in local stakeholder engagement.

Task 3 - Harvest Control Rule (HCR) specification

The completion of a Harvest Strategy Framework for a fishery/stock; in this case Spanish mackerel and coral

trout relies on a complete set of components of the framework being specified, these being:

I. Indicators (full set of chosen indicators outlined) (here included in Task 1)
II. Current Monitoring and future monitoring (here included in Task 1, but future monitoring relevant to all Tasks)
III. Reference Points (for both stocks: Spanish mackerel and coral trout – the target and limit reference points will be defined and agreed to as part of Task 2, and this task)
IV. Method of status evaluation (assessment and empirical). For each stock the actual method depends on data and is a cost/risk analysis that should be informed by resources available (AFMA to advise)
V. Decision rules (THIS TASK)

The specification of a set of Harvest Control Rules (HCRs) would form the core element of the HS for each stock and the fishery. These HCRs are very much predicated on the outcomes of the previous project tasks, especially the uncertainty associated with data, the uncertainty of the assessments in estimating stock status and/or empirical techniques for estimating stock status, and a cost/risk analysis that should be informed by resources available (AFMA to advise). Given the fact that at least three separate factors (one of which is clearly independent of the project) are going to inform the exact final specification of each HCR, these HCRs can only be developed with a process (this being driven within a series of FFWG meetings where all parties commit to informing the process). Overall, the project will draw upon the National Guidelines to Develop Fishery Harvest Strategies (Sloan et al. 2014) – define operational objectives, empirical indicators, reference points, risk levels, data collection, process for HS analyses and rules that control fishing harvest and intensity. It will have a close link to the proposed separate TRL HS project to ensure consistency of HS framework and terminology.

The presentations to the FFWG will be made by the lead researchers (Hutton, O'Neill and Tobin). Further additional presentations will be made at FFWG meetings by other members of the project team such as Dr Eva Plaganyi (CSIRO, example of empirical HS development in the TSRL fishery). Given that stakeholder involvement and buy-in is dependent on stakeholder engagement and inclusion at the FFWG (planning thereof is dependent on management agencies); the plan is to monitor (and summarise) on-going stakeholder feedback during the FFWG meetings to later inform agencies whether all stakeholder needs have been addressed during the FFWG meetings (or in Action Items)(to be led by Andrew Tobin Ltd).

This task will be led by Dr Trevor Hutton (CSIRO), Dr Michael O'Neill (DAF), Dr George Leigh (DAF), Dr Andrew Tobin and Eva Plaganyi (CSIRO). Trevor Hutton (CSIRO) is separately currently part of a national project to review the Commonwealth Harvest Strategy Guidelines.

Performance indicators: develop draft HS options and HCRs for Spanish mackerel and coral trout. Note: The project team (and project) cannot 'create' a FINAL HS (and set of HCRs for each stock); only a DRAFT of each. The FINAL HS and accompanying HCRs are "created" when the DRAFT of each are endorsed by the Working Group and RAG, and authorities which are responsible for managing the fishery; with stakeholder support. The project team with facilitate this process as much as possible by presenting options to the Working Group.

Task 4 - Summation of formal links with other Projects – Finfish Monitoring Project

The project will also utilise data and proposed indicators from the current Finfish Monitoring Project (CSIRO).Further detail can be provided as the project progresses as linkages are highly dependent on progress made in this separate project which is out of the scope of this project team's influence.

Method references:

O'Neill and Tobin, In press, Torres Strait Spanish mackerel, Stock assessment II, 2015.

O'Neill, M. F., and Leigh, G. M. 2016a. Stout Whiting Fishery. Queensland Total Allowable Catch for 2016. p. 68. https://www.daf.qld.gov.au/fisheries/monitoring-our-fisheries/data-reports/sustainability-reporting/stock-assessment-reports/stout-whiting-fishery-summary

O'Neill, M. F., Leigh, G. M., Martin, J. M., Newman, S. J., Chambers, M., Dichmont, C. M., and Buckworth, R. C. 2011. Sustaining productivity of tropical red snappers using new monitoring and reference points. The State of Queensland, Department of Employment, Economic Development and Innovation. FRDC Project No. 2009/037 106 pp.

Leigh, G. M., Campbell, A. B., Lunow, C. P., and O'Neill, M. F. 2014. Stock assessment of the Queensland east coast common coral trout (*Plectropomus leopardus*) fishery. Fisheries Resource Assessment Report, Department of Agriculture, Fisheries and Forestry, Queensland Government. https://www.daf.qld.gov.au/fisheries/monitoring-our-fisheries/data-reports/sustainability-reporting/stock-assessment-reports.

Sloan, S. R., Smith, A.D.M., Gardner, C., Crosthwaite, K., Triantafillos, L., Jeffries, B. and Kimber, N. 2014. National Guidelines to Develop Fishery Harvest Strategies. FRDC Report – Project 2010/061. Primary Industries and Regions, South Australia, Adelaide.

Phase 2

The Phase 2 project component (Figure 1) is noted here for management strategy evaluation (simulation testing), adoption of a harvest strategy (HS) design, and assessing potential for any extra fishery monitoring. Phase 2 has not been costed in this proposal and represents an optional project extension. Costings and work details for Phase 2 will be provided separately if requested by AFMA and TSSAC, and are dependent on the successful outputs from Phase 1.

Phase 2 will:

- Undertake simulation modelling of the Torres Strait coral trout and Spanish mackerel fishery sectors to test candidate HS's (e.g. rules to set annual TAC's) to gauge their effectiveness prior to implementing procedures in real-world management.
- Test a risk-based range of assessment options reflecting increases in stock assessment information (i.e., a 'tiered' harvest strategy).
- Build simulations onto the fish stock models from task 1 and consider data components from the recent CSIRO-DAF ELFSim model (Little et al 2015).
- Produce statistics measuring the HS's biological, fishery and management performance.

Performance indicators: identify a robust HS for uptake into fishery management.

Risk Analysis

Threat: Key staff (M.O., A.T., G.L., K.B., T.H.) not being available to complete the project. It is highly unlikely that more than one of the listed would not be available. There are opportunities for substitution of tasks.
Contingency: This is a short term (1.5 year) project that should mitigate this risk. Also, there are other staff within CSIRO with similar skills to the Key staff who will have an allocation within the project and who could complete the project (e.g. Eva Plaganyi).

Performance Indicators

1. In principal agreement from the FFWG and TSSAC on a draft harvest strategy for the Torres Strait finfish fishery; that protects it from overexploitation while promoting its appropriate development.
2. Input and agreement from the relevant Torres Strait communities at the FFWG.
3. Draft Harvest Strategy put forward to the PZJA; including proposed harvest control rules (HCRs) for Spanish mackerel and coral trout.

Related Projects

This research project will build on the outcomes and recommendations from previous and current research and management activities on the Torres Strait finfish, including: Spanish mackerel and coral trout assessments. The investigators on this project are senior scientists experienced in finfish research, statistics, harvest strategy design, management and stock assessment nationally. They have numerous years of fisheries research experience and involvement in achieving favourable outcomes from previous Torres Strait, FRDC and government funded projects. The project will link and draw knowledge from a number of past and present research studies, such as O'Neill and Tobin (current Spanish mackerel stock assessment); O'Neill and Leigh 2015; Little et al 2015; Sloan et al 2014; Leigh et al 2014; Campbell et al 2012; O'Neill et al 2011; O'Neill 2010; and Begg et al 2006. The project will also maintain in parallel a formal link with the Torres Strait Tropical Rock Lobster HS project.

Outputs and Extensions

This research will provide a sound basis for the development of this important fishery for Torres Strait Islanders. This fishery has the potential to provide significant livelihood benefits for local communities in Torres Strait. The project will produce a formal harvest strategy, suitable for consideration by the relevant management and islander stakeholders.

Intellectual Property

Code	Description
1	Published, widely disseminated and promoted, and/or training and extension provided. Relates mainly to outputs that will be available in the public domain.
2	Published, widely disseminated and promoted, and/or training and extension provided. Related products and/or services developed. Relates mainly to outputs that will largely be available in the public domain, but components may be commercialised or intellectual property protected.
3	Published, widely disseminated and promoted, and/or training and extension provided. Related products and/or services developed. Relates mainly to outputs that may have significant components that are commercialised or intellectual property protected.

Code 1 applies. Open disclosure will be encouraged as much as possible.
Some components of the project will contain intellectual property that may require protection e.g. individual inputs into the stakeholder consultation.

Flow Of Benefits

Fishery (including aquaculture) Managed by:	Commercial(%)	Recreational(%)	Traditional(%)
ACT			
AFMA			75%
NSW			
NT			
QLD			25%
SA			
TAS			
VIC			
WA			

The AFMA benefit also recognises the TSRA role in fishery management.

Data Management

I have searched for existing data. (Refer to guidelines on how to search the Australian Spatial Data Directory and Oceans Portal) [Yes / No]

Provide a brief description of the resulting data from the project and how this data will be stored for future protection and access.

Data management should include a description of the data to be produced by the research and show details on the following aspects:

Data security or privacy issues, applying to the data.
Nominated data custodian, clearly identifying the party responsible for this data and the database/repository system that .the data will be stored in. AFMA may require researchers to provide copies of data and or metadata to them.

All data supplied by AFMA or other organisations will be in a single secure MS Access database that will be stored in the 'Stock Assessment Security Group' directory on the DAF server behind a firewall. The AFMA form 'deed of confidentiality' will be signed to cover the authority/access for the PI and co-investigators to analyse the data. When the project is complete, a copy of the database will be made available to AFMA under the 'deed' agreement, to allow future updates and enable the HS assessment tools to be utilised. Description of project data will be stored on the Repository with clearly stated access and use conditions. Clear and accurate records will be kept to allow verification, replication and review of the research work.

This project will produce consolidated information from the Torres Strait Islander communities. This will be maintained in a secure location in CSIRO and DAF. Public record information will be reported to the FFWG for recording in meeting proceedings.

BUDGET

Milestone List

Identify the key milestones against which progress of the project will be measured. All tangible outputs for the project should be listed as milestones together with the dates by which their achievement is anticipated, and the criteria for verifying that the milestones have been achieved. All milestones must be costed.
To facilitate project management please base milestone dates on the completion of significant reportable activities rather than traditional calendar dates such as end of the month, financial or calendar year.

Due Date	Details	Justification	Salary	Travel	Operating	Capital	Total
30/09/2017	FinFish Working Group presentation •Outline of Data collation •Summary of assessments	Salary, travel and operating for draft harvest strategy and consultation with experts and stakeholders	13978	4000	44000		**61978**
30/03/2018	Progress report prepared to a standard reasonably agreed by AFMA and the PI •Outline of Data collation •Summary of assessments •Draft Harvest Control Rule for each stock	Salary, travel and operating for draft harvest strategy and consultation with FFWG (request stakeholder representatives attend)	13978	4000	44000		**61978**
31/08/2018	Final Report prepared to a standard reasonably agreed by AFMA and the PI	Salaries, travel and operating related to production of Final Draft Harvest Strategy. Presentation to AFMA.	8754	3000	34140		**45894**

Cash Contributions

Contributor Name	Contributor Contact Details	Amount

Schedule of Payments

The schedule of payments is automatically generated. If there is a cash contribution associated with the project please specify the breakdown between the milestones.

Due Date	Details	Milestone cost
01/03/2017	Initial payment for project staff time in conducting data collation and characterisation, initial project team planning meetings.	32580
30/09/2017	FinFish Working Group presentation • Outline of Data collation • Summary of assessments	61831

30/03/2018	Progress report prepared to a standard reasonably agreed by AFMA and the PI •Outline of Data collation •Summary of assessments •Draft Harvest Control Rule for each stock	61831
31/08/2018	Final report prepared to a standard reasonably agreed by AFMA and the PI	44719

Special Budget Considerations

Include information that may impact on the project budget. This could include revenue from the sale of publications or other items (e.g. fish sales or capital items) or details of potential co-funding arrangements.

Contribution by Applicant

Provide estimates of contributions (cash and in kind) made to the project to cover staff, facilities, vessels, and administrative support costs. Ensure any cash contributions from the applicant are captured here.

Year	Salaries	Travel	Operating	Capital	Total	Justification
2016/17					6033	Addresses strategic goals of CSIRO Oceans and Atmosphere Flagship
2017/18					22900	Addresses strategic goals of CSIRO Oceans and Atmosphere Flagship
2018/19					8281	Addresses strategic goals of CSIRO Oceans and Atmosphere Flagship

Contribution by Other

Provide estimates of contributions (cash and in kind) made to the project from other government and private investors to cover staff, facilities, vessels and administrative support costs. Ensure any cash contributions from other sources (not applicant or AFMA) are captured here.

Year	Name of Contributor	Salaries	Travel	Operating	Capital	Total	Justification
2016/17	DAF					22350	
	University of Queensland					39150	
2017/18	DAF					71030	
	University of Queensland					147910	
2018/19	DAF					39060	
	University of Queensland					43510	

TORRES STRAIT FINFISH RESOURCE ASSESSMENT GROUP	Meeting 1 9 – 10 November 2017
Other Business	Agenda Item No. 6 For ADVICE

RECOMMENDATIONS

That the RAG **NOMINATE** any further business for discussion.

TORRES STRAIT FINFISH RESOURCE ASSESSMENT GROUP	Meeting 1 9 – 10 November 2017
RAG work plan and planning for next meeting	Agenda Item No. 8 For ADVICE

RECOMMENDATIONS

1. That the RAG **DISCUSS** and provide **ADVICE** on priorities for the RAG together with a work plan for addressing recommended priorities; and
2. That the RAG **NOMINATE** a date and a venue for the next meeting.

KEY ISSUES

3. Having agreed priorities (RAG issues to focus on) and a corresponding work plan aims to achieve a more efficient RAG process.

4. As a matter of priority, AFMA proposes to seek advice from the RAG on:
    a. harvest strategy options,
    b. data needs,
    c. Spanish mackerel stock assessment refinements,
    d. research needs, and
    e. catch estimates for all sectors.

5. Having regard for outcomes of this meeting the RAG may recommend an alternate list of priorities.
6. As far as practical AFMA proposes that a work plan be developed in-session.

7. AFMA proposes the next meeting be held in conjunction with the next harvest strategy workshop tentatively scheduled for the first quarter of 2018.

Torres Strait Finfish Working Group 2016.01

Meeting Record

12-13 July 2016

Note all meeting papers and record available on the PZJA webpage:

www.pzja.gov.au

Australian Government

Australian Fisheries Management Authority

Box 7051, Canberra Business Centre, ACT 2610 / Ph. (02) 6225 5555 / Fax (02) 6225 5500 / AFMA Direct 1300 723 621 afma.gov.au

Contents

Meeting Participants

Members

Date	Name	Position	Declaration of interest
12-13 July 2016	Andy Bodsworth	Chair	Independent Consultant – Cobalt MRM (recently developed Torres Strait Finfish Action Plan report for TSRA/FRDC)
12-13 July 2016	Steve Hall	FWG Executive Officer	Nil
12-13 July 2016	Selina Stoute	AFMA Member	Nil
12-13 July 2016	Tom Roberts	QDAF Member	Nil
12-13 July 2016	Mariana Nahas	TSRA Member	Nil
12-13 July 2016	Michael O'Neill	Research Member	Principal Fisheries Scientists, QDAF. Principal scientist for TSSAC project to develop a harvest strategy for the Torres Strait Finfish Fishery.
12-13 July 2016	David Brewer	Research Member	Independent Consultant. Principal scientist for TSSAC project to develop a harvest strategy for the Torres Strait Finfish Fishery. Previous CSIRO researcher for TSSAC project investigating traditional take of finfish in Torres Strait.
12-13 July 2016	Maluwap Nona	Industry Member	TIB licence holder. Chairperson Malu Lamar.
12-13 July 2016	Tenny Elisala	Industry Member	TIB licence holder. Ranger, TSRA.
12-13 July 2016	Frank Fauid	Industry Member	TIB licence holder
12-13 July 2016	Tony Vass	*Industry (sunset licence holder representative)	No financial interest in Torres Strait Fisheries. Holds Queensland East Coast quota for coral trout and 'other' finfish species. Previous Torres Strait finfish operator.

Date	Name	Position	Declaration of interest
			Representative for sunset licence holders.

Observers

Date	Name	Position	Declaration of interest
12-13 July 2016	Kenny Bedford	*TSRA Board - Fisheries Portfolio	TIB licence holder. Member, FQMC President - Erub Fisheries Management Association
13 July 2016	Ian Liviko	*NFA (PNG)	Nil
12-13 July 2016	John Ramsay	TSRA Program Manager, Fisheries	Nil
12-13 July 2016	Nicole Murphy	Researcher, CSIRO	Principal scientist for TSSAC project investigating traditional take of finfish in Torres Strait.
12-13 July 2016	Andrew Tobin	Researcher, JCU	Principal scientist for TSSAC project to develop a harvest strategy for the Torres Strait Finfish Fishery.
12-13 July 2016	Pau Stephen	Fisher, Member of Kos & Abob	TIB licence holder.
12-13 July 2016	Yen N. Loban	TSRA Board	TIB licence holder. Member, TSFA.
12 July 2016	Harry Nona	Fisher	TIB licence holder.
13 July 2016	John Mathews	Project Officer, TSRA	Nil

* Permanent observer

Apologies

Name	Position
Eliziah Wasaga	Industry Member
Jerry Stephen	Industry Member
Ian Liviko (Day 1)	NFA (PNG)

Action items

Number	Action
1.	QDAF member to provide a presentation at the next FWG meeting on the Queensland Government's Recreational Fishing survey and its application to Torres Strait, including survey methods and design.
2.	QDAF member to provide a summary of charter boat logbook data relevant to the Torres Strait at the next Working Group meeting.
3.	QDAF provide an update on recreational fishing data and charter boat operations within the TSPZ as a standing agenda item for future FWG meetings.
4.	Dr Michael O'Neill to provided FWG members out-of-session the full report on the stock assessment for the East Coast coral trout fishery.
5.	AFMA to confirm the nature of logbook changes that occurred in 2003
6.	AFMA to provide advice on the date of when the investment warning for the fishery was issued.
7.	AFMA to report on the percentage of coral trout and Spanish mackerel fish caught within and outside the 10nm exclusion zones prior the introduction of those closures.
8.	Compliance updates be added as a standing agenda item for future meetings.

Recommendations

Number	Recommendation
1.	The FWG **recommended** for the 2017-18 Spanish mackerel fishing season that**:** ▪ TAC setting advice to be finalised subject to consideration of updated stock assessment and advice from the newly convened Technical Scientific Working Group; ▪ Technical scientific working group to review stock assessment update to allow for full consideration of inputs and outcomes. Technical scientific working group to report back to FWG; ▪ The technical scientific working group should comprise the follow members: ➢ Scientific members ➢ Two industry members: Tony Vass, Kenny Bedford ➢ Andrew Tobin ➢ Nicole Murphy ➢ Government ▪ The technical scientific working group should consider the following: ➢ Disproportionate effort in Bramble Cay

Number	Recommendation
	➢ Local factors – unexpected factors (eg environmental and/or climate change related effects) ➢ Changes in accessible area of the fishery (closures) ➢ Estimates of TIB, Traditional, Recreational catches ➢ Logbook data quality ➢ Stock structure ➢ Catch rate objectives (effort & catch) ▪ Recognising the importance of precautionary approach, as an interim approach (noting Harvest Strategy to be developed) TAC should not exceed best estimates of MSY after taking into account all other sources of fishing mortality;
2.	The FWG **recommended** that the Spanish mackerel TAC remain unchanged (187.7t tonnes) for the 2016-17 fishing season noting the following: • the current TAC (187t) is based on average catches 2001-05. A stable period of catch; • recent reported catches are > 100 tonnes; • proposed lease amount for 2016-17 is 99 tonnes (across four boats) (18% TIB to TVH catch ratio was used in updated stock assessment); • management risks include unreported catches and potential unknown impacts from coral bleaching; and • on balance management risks are acceptable this season however the next season TAC setting process should take into account updated stock assessment and agreed estimates of catch from other sectors. Catches and the TAC remain within estimates of maximum sustainable levels: • *Begg et al 2006* maximum sustainable levels 146-264t • *O'Neil & Tobin 2016/17*: *Defining the status of Torres Strait Spanish mackerel to inform future fisheries allocation and sustainable fishing* ▪ maximum sustainable levels 145-210t ▪ catch rates may erode if future average harvest exceeded 150t
3.	The FWG **recommended** that the coral trout TAC (134.9 tonnes) remain unchanged for the current fishing season (2016-17) and the 2017-18 fishing season noting the following: • the TAC (134.9t) is based on average catches 2001-05. A stable period of catch; • although there is no stock assessment for coral trout, the Management Strategy Evaluation conducted (Williams et al 2007) using four constant catch scenarios (80-170t) predicted biomass of at least 70% of unfished by biomass by 2025; • proposed lease amount for 2016-17 is 74 tonnes (across four boats); and

Number	Recommendation
	• industry feedback that catch rates on Islands are considered good.
4.	For the 2016-17 fishing season the FWG recommended that the leasing out of 28.5 tonnes of other species by TSRA be supported subject to following **ACTIONS**: 1. improved logbooks (that enable accurate reporting of all species. The FWG noted that the AFMA logbook would require reprinting creating a possible timing issue and use of the QDAF logbook may be constrained by administrative constraints); 2. Prior reporting (possible use of QDAF system?)
5.	The FWG **recommended** that subject to further consideration by the Technical Scientific Working Group of coral trout to byproduct catch ratios when targeting coral trout and total take of 'other species' by other sectors – there should be no further increase above 30 tonnes until systems are in place to independently verify catches, a species-specific risk assessment has been undertaken and where applicable catch triggers and control rules have been agreed.

Agenda Item 1 - Preliminaries

1.1. Opening Prayer / Acknowledgement of Traditional Owners / Welcome / Apologies

Mr Frank Fauid opened the meeting in prayer.

Apologies were received from Eliziah Wasaga and Jerry Stephen (industry members), and Ian Liviko (NFA, PNG) for the first day of the meeting. Mr Liviko attended the second day of the meeting.

1.2. Adoption of Agenda

The Finfish Working Group (FWG) adopted the agenda without change.

1.3. PZJA requirements of WG members

The Chair noted that all meeting participants are required to participate in accordance with PZJA Fisheries Management Paper No. 1; the Chair noted the roles and functions of the FWG and the responsibilities of members and observers in the FWG when providing recommendations and advice.

1.4. Declaration of Interests

The FWG generally noted that there could be potential conflicts of interest for members and observers when providing information and advice on some agenda items. The Chair

explained that members may be asked to leave the room for certain agenda items if specific conflicts arose.

1.5. Actions Arising Apologies

The FWG noted the status of the previous action items and the following key updates on the Queensland Government's Recreational Survey and charter boat arrangements:

- recreational surveys were conducted in 2010 and 2013. Completed through randomised phone survey. Data for Torres Strait is poor due to small sample size; and

- charter Boat operators must be licenced and complete logbooks. Currently there are nine charter boat licences with registered addresses in the Torres Strait. Since 2005 the total recorded catch of finfish from charter boat licences within the TSPZ is approximately 12 tonne.

The FWG noted industry advice that there has been an increase in multi-purpose charter boat operations working in the Torres Strait, and that there are several businesses based on the Cape.

The FWG agreed that it would be useful to gain a better understanding of the Queensland Government's recreational fishing survey including survey methods and design noting there may be potential to supplement the survey to improve data for the Torres Strait.

The FWG agreed to the following **ACTIONS**:

1. QDAF member to provide a presentation at the next FWG meeting on the Queensland Government's Recreational Fishing survey including survey methods and design;
2. QDAF member to provide a summary of charter boat logbook data relevant to the Torres Strait at the next Working Group meeting; and
3. QDAF member provide an update on recreational fishing data and charter boat operations within the TSPZ as a standing agenda item for future FWG meetings.

Agenda Item 2 – Fishery Update

2.1. AFMA management

The Working Group noted an update on historical catch reported for Spanish mackerel, coral trout and other reef line species as detailed in the Agenda paper.

The Working Group noted there is likely under-reporting of catch data for the TIB sector. Members noted the importance of good catch reporting to facilitate effective fisheries management. The FWG noted the outcome from other PZJA forums to support amending the *Torres Strait Fisheries Act 1995* to enable mandatory catch reporting for the TIB sector. The FWG **agreed** to support the proposal for the PZJA to implement mandatory catch reporting for the TIB sector.

2.2. TSRA update

The FWG noted the follow updates on current and planned activities for the TSRA Fisheries Program:

- Implementation of the TSRA Finfish Action Plan. The Finfish Action Plan provides a 10 year pathway for increasing catches within the TIB sector;
- In line with actions identified in the Finfish Action Plan, TSRA:
    - have partnered with FRDC (Fisheries Research Development Corporation) to fund projects investigating the feasibility of:
        - developing Jewfish, barramundi and crab fisheries;
        - exporting seafood product directly from the Torres Strait; and
        - developing a Torres Strait fisheries brand;
    - are undertaking an project internally to investigate the feasibility of a developing baitfish fishery (garfish and sardines) based around Warraber and Poruma;
    - Capacity building initiatives include the funding of:
        - two participants in the FRDC National Seafood Industry Leadership Course; and
        - two cadetships in marine science studies as part of a TSRA employment succession plan;
- The TSRA Investment Strategy will be released on 1 July and will initially have a focus on fisheries. Community consultation on the strategy will be undertaken; and
- Increased market interest in leasing opportunities noting outcomes of the proposed Finfish leasing for 2016-17 and Finfish Quota Management Committee (FQMC) outcomes will be discussed in more detail at agenda item 5.3.

The FWG noted that management advice, assessment and planning would be required to support the sustainable development and/or expansion of finfish fisheries and encouraged all related proposals to be tabled with the FWG for advice. Members also welcomed further updates on TSRA capacity building and investment strategy initiatives as they relate to fisheries.

2.3. Native Title

Mr Maluwap Nona requested that Malu Lamar be recognised as a formal member of the FWG, and that he was participating in the meeting in his capacity as an industry member and not Malu lamar. As a result, Mr Nona was not able to provide a native title update. The AFMA member advised that AFMA would work with Malu Lamar on possible representation options.

2.4. PNG

The FWG noted the following relevant updates for the PNG finfish fisheries (note: updates were provide by the AFMA member on meeting day 1 and the PNG-National Fisheries Authority representative on meeting day 2).

On day 2, Mr Ian Liviko (NFA) provided a further update on finfish developments in the PNG jurisdiction, including:

- PNG-NFA advised at the Fisheries Bilateral meeting in November 2015 that PNG would not be taking up their Spanish mackerel catch entitlements in the Australian jurisdiction of the TSPZ. It was noted at the meeting that PNG fishers are eager to enter the fishery in the future;
- an increase in the catch rate of barramundi has recently been observed. This is despite there being no increase in effort by fishers or the number of operators. Research to further investigate this trend is to be conducted in December 2016;
- a barramundi aquaculture facility in Daru recently ceased operation but still holds brood stock. There are plans for the facility to be handed over to NFA for it to determine the facility's future prospects;
- currently there is no compliance enforcement on (including mesh size limits of nets) on finfish catches in the fishery;
- most fishing activity for finfish occurs around Daru; and
- Juvenile Jewfish and mackerel (25-45 cm) have recently been caught by trawlers targeting other species, however, species identification and catch data are needed to verify whether these are the juveniles of commercially important species for the Torres Strait.

2.5. Strategic overview and update (including economic and market trends)

The FWG noted the following update by members and observers on recent fishery performance, trends, activities and issues occurring in the Torres Strait finfish and relevant fisheries:

- Queensland East Coast finfish fisheries (ECF):
    - fishers are experiencing good catches of coral trout and came close to reaching the TAC in the 2015-16 season (96% caught). As a result there is a high demand for coral trout quota which is now fully utilised;
    - in recent years species other than coral trout ('other species') have gone from being byproduct to now being specifically targeted by fishers as a result of high market demand. There is potential for similar trends to occur in the Torres Strait and it is important that good information (e.g. stock status and catch data) is available before further expansion occurs across these species and potential new areas. Some of these finfish species may be more vulnerable to overfishing;

- Spanish mackerel catches in the ECF were poor in 2015-16 (300t caught equating to 51% of the TAC. Average catch to TAC ratio is 73%. Lowest catch recorded was 226t in 2007/08), with catch rates declining in recent years to the point where frozen product is not available (i.e. not enough mackerel are being caught to warrant freezing of product as the small amount of catch is going straight to market as fresh product);

- with the interest in coral trout quota exceeding demand, more intense and targeted fishing for other species and a deteriorating Spanish mackerel fishery in the ECF, it is likely there will be increasing interest in Torres Strait finfish quota (Spanish mackerel, coral trout and other reef line species). The Torres Strait fishery (including Spanish mackerel at Bramble Cay) are considered to be in good condition.

- anecdotal evidence suggests that there has been a recent increase in the incidence of fin rot in live coral trout product. The cause is still to be determined, however it has been suggested it may be due to additional environmental stresses on the fish following the recent climatic conditions that resulted in the large-scale coral bleaching event off the far northern Queensland cost. QDAF are testing some samples.

- Torres Strait finfish update from industry;

  - there is renewed interest in targeting live trout in Torres Strait, as shown during the FQMC's recent assessment of expressions of interest to lease finfish quota in 2016-17. Two operators are planning to trial live;

  - there are signs that interest in the fishery from the TIB sector is growing;

  - Ugar fishers are currently focused on the Beche-de-mer Fishery as the local freezer is not operational. The freezer is required to support finfish operations;

  - noting possible resourcing constraints, community based strategies should be examined to improve the efficiency of compliance;

  - there is ongoing need to balance the benefits of leasing quota to non-indigenous operators while still providing fishing industry development and employment opportunities for locals (in line with the COAGs commitment to closing the gap in indigenous disadvantage). The TIB sector needs to be supported to participate directly in the fishery.

Agenda Item 3 – QLD Inshore Finfish and Spanish mackerel fisheries – overview of management and stock status

The FWG noted an update on the ECF including an overview of the East Coast Finfish Logbook and reporting parameters, harvest control rules and TAC setting process. A presentation on the ECF was requested to broaden members understanding of management approaches and issues in finfish fisheries within the region. The presentation provided is at **Attachment A**. Members noted key features of the ECF management framework including:

- mandatory catch reporting comprised of prior reporting, unload reports and catch disposal records; and
- a harvest strategy for coral trout comprising:
    - a target biomass of 68% of unfished biomass levels. A high biomass target was agreed based on the high costs of fishing and subsequent need to maintain high catch rates;
    - a target Catch Per Unit Effort (CPUE) of 25kg/dory day with a maximum TAC of 1 288 tonnes (recently CPUE has been around 19kg/dory day);
    - a limit CPUE of 7.25kg/dory day; and
    - a target fishery catch of 1150t which is equivalent to the average recorded catch between 2006 and 2008.

The FWG noted advice from some industry members and observers that Torres Strait fishers want to report catches but first to need to understand why and how. Members noted advice that TSRA have commissioned the development and delivery of a Fisheries Management Training course for PZJA consultative forum representatives through the University of Wollongong. Pilot courses have been run with more to follow.

The FWG agreed for the following **ACTION**:

- Dr Michael O'Neill to provided FWG members out-of-session the full report on the stock assessment for the East Coast coral trout fishery.

Agenda Item 4 – Research

4.1. Traditional take catch estimates: past estimates (Dr Busilacchi) and future research (CSIRO)

Past estimates of traditional take catches (Busilacchi, 2008)

The FWG noted the past estimates of traditional catches of finfish reported from the research project titled "*The subsistence coral reef fish fishery in the Torres Strait: monitoring protocols and assessment"*, including:

- the traditional catch of finfish by Erub, Masig and Mer in 2005/06 was estimated as 169 tonnes and included 62 different species. This was a notable increase from catch estimated by CSIRO in the 1990s.
- only a small proportion of the 2005/06 catch was Spanish mackerel or coral trout (CT), although this is still a significant quantity (approx. 20 tonnes).
- for the commercial species (including Spanish mackerel and coral trout) about 15% were taken for subsistence.

- the largest components of other species taken were Siganids (rabbitfish, spinefoot, parasa), mullet (thurud, wap) and trevally (whitefish).

The FWG **agreed** that the figures from *Busilacchi (2008)* are the current best estimate of traditional take of finfish.

Future research: *'Monitoring the traditional take of finfish species in the TSPZ'*

The FWG noted the presentation by the Research member on the research project titled: "*Monitoring the traditional take of finfish species in the TSPZ".* Members noted the overview of the study and that data collection was yet to commence. The project team advised that:

- the first field trip is planned for August followed by another in February. The focus of the first trip will be to train monitors; and
- the aim is for monitors to visit all households weekly for 12 months. The project is attempting a 'census' of households rather than surveying a sample of households.

Advice from the FWG was sought on the project methodology, preferred process for consultation and identification of traditionally important species. FWG members advised the following:

- communication will be critical and island specific approaches may be necessary;
- the project should aim to build peoples capacity to independently complete catch forms and where possible, the project should trial the collection of fish length data. Both of these initiatives may have long lasting benefits for future cost-effective data collection programs;
- "Other" species to be prioritised in the project should be determined using the following criteria:
    - vulnerability to overfishing;
    - importance for traditional fishing (high value / target species);
    - commonly caught based on previous catch surveys; and
    - overlap with commercial fishery (are they taken by commercial fishers)

- the Poruma fishers association is best suited to do the data collection for the Poruma community;
- names for each finfish species vary across communities and the best way for community members to identify individual species and correct names will be for the researchers to supply pictures of finfish species endemic to the Torres Strait; and
- results from a previous Tagai College fish naming project for the central islands should be taken into account.

4.2. Spanish mackerel stock assessment update

Dr O'Neil (Research member) presented the draft findings of the revised Spanish mackerel stock assessment, completed as part of the research project "*Defining the status of Torres Strait Spanish mackerel to inform future fisheries allocation and sustainable fishing"*. Dr O'Neil noted that comments on the draft report were pending from the Torres Strait Scientific Advisory Committee.

The FWG noted that four stock analysis were conducted resulting among other outputs, four estimates of harvest levels to achieve Maximum Sustainable Yield (MSY). The estimates ranged from 145t to over 210t. Higher estimates were more uncertain.

Members also noted advice that the data contained less than expected year classes which may reflect the restricted length frequency sampling undertaken (Bramble Cay only for a few months). Maximum age of east coast Spanish mackerel is 26 years.

It was noted that further discussion of the revised stock assessment outcomes would be considered in relation to research priorities and recommendations for future TACs under agenda items 4.4 and 5.2 respectively.

The FWG agreed for the following **ACTIONS**:

1. AFMA to confirm the nature of logbook changes that occurred in 2003;
2. AFMA to provide advice on the date of when the investment warning for the fishery was issued.

4.3. Smart phone project

The FWG noted an update by the Executive Officer the project *Smart phone technology for remote data collection in Torres Strait traditional inhabitant fisheries*. Key updates and observations from other members included:

- the final draft report is pending (due April 2016);
- the project demonstrated that fishers were able to report catches through a smart phone catch reporting system however there were challenges around the logistics in engaging operators and maintaining user uptake of a voluntary catch reporting system;
- Erub fishers and the community freezer business found the smart phone application (the App) very useful. The additional information provided through the App was popular and used to assist fishers to determine the best time to go fishing (for example taking into account prevailing tides);
- TSRA strongly supports the continued development of an App system noting the potential benefit to fishers in having ready access to broader fishing related information and business tools; and
- the AFMA member advised that AFMA would continue to investigate AFMA's capacity to support catch reporting through an App noting back-end infrastructure is required to receive the information. AFMA is assessing and supporting a number of e-reporting initiatives, including e-logbooks across Commonwealth managed fisheries. Initiatives in the Torres Strait need to be considered within the context of AFMA's broader e-reporting program.

4.4. Research priorities

The FWG identified the following data and research needs:

Data needs

- Review logbook structure;

- Monitoring of non-commercial take (note partly being addressed through current research project on the traditional take of finfish);
- Improved rate of returns of freezer records for the TIB Sector; and
- Age and length structure data (medium term – relates to Harvest Strategy work, phase 2).

Research needs

- Genetic studies on Spanish mackerel to test single stock theory – particularly if PNG and NE QLD catches increase. This potentially could be achieved by using fishery data, fisher participation and/or a PhD study;
- Management Strategy Evaluation on harvest strategy options; and
- In the event that the western closure line is removed, investigate the potential impact on TAC.

The FWG also agreed on the following **ACTION**:

1. AFMA to report on the percentage of coral trout and Spanish mackerel fish caught within and outside the 10nm exclusion zones prior the introduction of those closures.

Agenda Item 5 – Management

5.1. Finfish Harvest Strategy

The FWG noted the project proposal to develop a harvest strategy for the fishery and that the funding proposal was still under consideration by the TSSAC.

Members and observers supported the development of a harvest strategy and provided the following observations and advice:

- a harvest strategy provides a clear management procedure for recommended TACs and in doing so, can provide greater certainty for industry;

- one benefit of harvest strategies is that they generally have a strong consultation process where key stakeholders have opportunity to provide their view on how the fishery should be structured. Furthermore, harvest strategies can include guiding principles;

- a harvest strategy for the finfish fishery should set out agreed set of decision rules for key species (i.e. Spanish mackerel and coral trout) and also include other species for which there is growing interest by fishers to target;

- the FWG should be proactive in managing what might become a valuable fishery in the future and that even with a lack of data the simplest form of control rules should be developed and can be built up as more data is available;

- it will be important to engage existing sunset licence holders in the development of the harvest strategy as these are the operators who have long-term experience and knowledge of the fishery and operational factors impacting the fishery;

- it will also be important to communicate well with fishers on the importance of data with all sectors in the development of the harvest strategy;

- catch per unit effort (CPUE) is a pivotal metric used to guide decisions in many fisheries. As an example, CPUE is the sole indicator in for place for the ECF coral trout fishery. A simple rule based on CPUE may be appropriate for the Torres Strait. A suite of other parameters used in the TVH fishery could also be considered and added through time to make sure the desires and aspirations for the fishery are maintained, noting that the primary objective is for sustainable stock and healthy economic return but other needs may to be considered in the Torres Strait context;

- the business decisions made by sunset licence operators is very dependent on the decisions and rules put in place to manage the fishery, and although they are an important sector for generating income for communities, they are at times in the dark about their future in the fishery (e.g. unsure if they'll be successful in accessing the fishery until a month or only weeks before season opening); and

- holding a pre-season briefing to hear from all sectors of the industry on what they want for the fishery is an option, particularly during the harvest strategy development. Pre-season briefings would be a good opportunity to build networks and provide a forum for the medium to long term aspirations for the fishery to be well communicated. Operators could then make informed decisions on how they structure their businesses.

5.2. Spanish mackerel and coral trout TACs

Spanish mackerel

The FWG **recommended** for the 2017-18 Spanish mackerel fishing season that**:**

- TAC advice to be finalised subject to consideration of updated stock assessment;

- a Technical scientific working group be convened to review the stock assessment update to allow for full consideration of inputs and outcomes. Technical scientific working group to report back to FWG;

- the technical scientific working group should comprise the follow members:
    - Scientific members
    - Two industry members: Tony Vass, Kenny Bedford
    - Andrew Tobin
    - Nicole Murphy
    - Government

- the technical scientific working group should consider the following:
    - disproportionate effort in Bramble Cay;

- local factors – unexpected factors (eg environmental);
- changes in accessible area of the fishery (closures);
- estimates of TIB, Traditional, Recreational catches;
- logbook data quality;
- stock structure; and
- catch rate objectives (effort & catch);

- recognising the importance of precautionary approach as an interim approach (noting Harvest Strategy to be developed) TAC should not exceed best estimates of MSY after taking into account all other sources of fishing mortality.

The FWG **recommended** that the Spanish mackerel TAC remain unchanged (187.7t tonnes) for the 2016-17 fishing season noting the following:

- the current TAC (187t) is based on average catches 2001-05. A stable period of catch;
- recent reported catches are > 100 tonnes;
- proposed lease amount for 2016-17 is 99 tonnes (across four boats) (18% TIB to TVH catch ratio was used in updated stock assessment);
- management risks include unreported catches and potential unknown impacts from coral bleaching on stocks; and
- on balance management risks are acceptable this season however the next season TAC setting process should take into account updated stock assessment and agreed estimates of catch from other sectors. Catches and the TAC remain within estimates of maximum sustainable levels:
  - Begg et al 2006 maximum sustainable levels 146-264t
  - O'Neil 2016:
    - maximum sustainable levels 145-210t
    - catch rates may erode if future average harvest exceeded 150t

<u>Coral trout</u>

The FWG **recommended** that the coral trout TAC (134.9 tonnes) remain unchanged for the current fishing season (2016-17) and the 2017-18 fishing season noting the following:

- the TAC (134.9t) is based on average catches 2001-05. A stable period of catch;
- although there is no stock assessment for coral trout, the Management Strategy Evaluation conducted (Williams et al 2007) using four constant catch scenarios (80-170t) predicted biomass of at least 70% of unfished by biomass by 2025;
- proposed lease amount for 2016-17 is 74 tonnes (across four boats); and
- industry feedback that catch rates on Islands are considered good.

The FWG identified the following issues for further consideration:

- significant decline in effort following buyout. What are the drivers?
  - historically, significant catches were taken within 10nm closure areas
  - possible localised depletion?
  - lack of effort - only one sunset licenced boat operating

- local factors – unexpected factors (eg environmental)
- moving to live coral trout - possible driver for changes in catch composition?
- QLD east coast data – take into account trends.
- estimates of TIB, Traditional and Recreational catches.

5.3. The Proposed leasing arrangements for 2016/17

The FWG considered the proposal for 28.5 tonnes of unspecified mixed reef species to be leased-out to sunset licence holders in the 2016-17 fishing season. The FWG's advice focused on potential sustainability risk associated with targeting of new species and increasing effort on other species. The FWG focused on more immediate risks, also addressing medium term risks in the event there was continued industry interest in these other species.

Proposed fishing plans

The FWG noted advice on the various fishing plans of operators seeking to take 28.5 tonnes in total of other species**.** The proposed fishing plans include:

- the take of 'other' species as a byproduct (ie not targeted);
- two operators plan to land live coral trout;
- one operator plans to target deepwater 'other species' (20 tonnes) including:
    - Emperor
    - Job fish
    - Flame snapper
    - Nannygai
- live fish to be unloaded in Cairns (via SeaSwift?); and
- one operator proposes to use two 'primary' vessels (note same operation is required to have VMS under QDAF conditions).

Relevant catch information and other considerations

The FWG noted relevant Information regarding past catch trends and catch ratios between coral trout/Spanish mackerel and other species include:

- Williams *et al* 2008 – *Population biology of coral trout species in eastern Torres Strait: Implications for fishery management*
- AFMA Logbooks
- Busilacchi 2008 – *The subsistence coral reef fish fishery in the Torres Strait: monitoring protocols and assessment.*

The FWG noted that regard should be given to management approaches within Queensland and appropriate native title consultation depending on the nature of these proposed fishing operations.

Risks and benefits

The FWG identified the following the risks and benefits associated with the proposed leasing of 28.5 tonnes of other species:

Risks

1. Uncertainty around catch composition (ie risks to specific species) arising from incomplete and/or inaccurate catch and effort reporting.
2. Current logbooks – not optimal for reporting a wider range of 'other' species.
3. Discards (survivorship? (i.e. targeting a wider range of species may change the composition of unwanted species that are caught and discarded (and the survivorship of those is largely unknown). Ultimately, there may be a wider range of species that are subject to higher mortality rates than previously and the consequences of that are unknown).
4. Deepwater species generally long lived 30-40 years. NT and Gulf area assessment found species have low natural mortality = sustainable harvest rate is low (take a low percent of the stock). 6 spp in aggregate in the Gulf limit = 450t.
    - Crimson snapper age at maturity 4-7yrs
    - Large mouth nannygai 9-12yrs
    - Red emperor 10-13yrs
    - Goldband snapper 6-8yrs
    - Mangrove jack 8-11yrs
    - Golden snapper 10-13yr

Benefits

1. Sustainable fishing industry development for traditional inhabitants

Recommended management options (managing the risks) immediate and medium term

Immediate

For the 2016-17 fishing season the FWG **recommended** that the leasing out of 28.5 tonnes of other species be supported subject to following **ACTIONS**:

1. improved logbooks (that enable accurate reporting of all species. The FWG noted that the AFMA logbook would require reprinting creating a possible timing issue and use of the QDAF logbook may be constrained by administrative constraints);

2. additional reporting conditions (ie in addition to daily logbook); and

3. Prior reporting (possible use of QDAF system?)

The FWG agreed the **priority outcome** from reporting measures is to have reliable catch data*, catch composition, location, timely reporting (by trip), effort and length (Dr O'Neil to advise on sample sizes, length classes).

*Not verified

Medium term

The FWG **recommended** that subject to further consideration by the Technical Scientific Working Group of coral trout to byproduct catch ratios when targeting coral trout and total take of 'other species' by other sectors -

> there should be no further increase above 30 tonnes until systems are in place to independently verify catches, a species-specific risk assessment has been undertaken and where applicable catch triggers and control rules have been agreed.

The FWG identified the following measures that may support further expansion in effort to other species:

1. observer coverage – provides verification of logbooks and biological samples (length and age);
2. port sampling – for biological samples;
3. species triggers (possible vulnerable species) and/or area triggers (possible risk of localised depletion);
4. consideration of iconic species, other values;
5. VMS (Agenda 5.7);
6. Fish Receivers System (Agenda 5.6); and
7. possible requirement for minimum 'quota' holdings for 'other' species.

The FWG identified the following for further consideration:

1. preliminary assessment of catches and catch ratio Coral trout and byproduct.

5.4. Removal of the western closure of the reef line fishery

The FWG noted that:

- the removal of the western closure of the reef line fishery was a long standing item and had broad support amongst Torres Strait communities;
- there is no management basis for the closure. Instead the closure reflects a historical jurisdictional boundary;
- there are potential economic benefits for the TIB sector in removing the closure;
- in the event that the closure was removed, TSRA would retain the closure within sunset licence lease agreements for the TVH sector. This approach could be reviewed subject to the direction of the community; and
- members had varying views on whether or not sufficient consultation on removing the closure had occurred. A key development since the last FWG meeting (2012) has been the Native Title Determination on the Regional Sea Claim, and it was noted that notification to the relevant Registered Native Title Bodies Corporate groups would be undertaken prior the PZJA making a decision.

Noting the need to undertake appropriate Native Notification, the FWG supported in-principle the removal of the western closure of the reef line fishery.

5.5. Finfish legislative instrument – consideration of measures

The FWG noted the proposed remaking of the Torres Strait Spanish Mackerel Fishery legislative Instrument.

In relation to the 50cm minimum size limit for grey mackerel (*Scomberomorous semifasciatus*) the FWG noted:

- that the minimum size limit for grey mackerel was well below the size at maturity and below the size limit for the ECF;
- a more appropriate size limit for grey mackerel would be 75cm;
- grey mackerel are not a common catch in the Torres Strait fishery and there are no logbook records of this species being caught in the Torres Strait; and
- that any changes on the limit for grey mackerel should be deferred as the priority is to have the instrument remade at the earliest opportunity.

5.6. Fish Receiver System

The FWG supported the proposal to replace the current Torres Strait Seafood Buyers and Processors Docket Book system with a mandatory Fish Receiver System for the all Torres Strait Fisheries, excluding Torres Strait Prawn Fishery by 1 December 2017 noting that the system will require:

a) all licence holders (including Traditional Inhabitants) to only dispose of commercially caught fish in those fisheries (not including fish caught during the course of traditional fishing) to a holder of a Fish Receiver licence; and

b) it will be mandatory for holders of Fish Receiver licences to comprehensively report details of all fish received (landed) for each fisher.

The FWG noted that AFMA would work with stakeholders to finalise the operational details of the Fish Receiver System

5.7. Vessel Monitoring System

The FWG supported the proposal to implement mandatory Vessel Monitoring System (VMS) for all commercially licenced primary and carrier vessels operating under the *Torres Strait Fisheries Act 1984* by 1 July 2017 where;

a) a primary boat is the boat nominated to the licence as the primary commercial fishing boat for the licence from which tender boats are authorised to operate;
b) freight shipping vessels are exempt; and
c) exemptions may be provided for carrier vessels that are 6 meters or less in length.

The FWG noted that industry would responsible for the installation and maintenance cost for VMS units whilst AFMA would be responsible for monitoring costs. AFMA's costs would be covered within AFMA's existing budget.

5.8. Future Management Priorities

The FWG agreed on the following future management priorities:

- development of a harvest strategy;
- progressing issues identified under agenda items 5.2 and 5.3 through the Technical Scientific Working Group; and
- improving fishery data (freezer data, possible length frequency and otolith data collection).

The FWG agreed to the following **ACTION**:

1. Compliance updates be added as a standing agenda item for future meetings.

Agenda Item 6 – AFMA Finfish Fishery Budget 2016/17

The FWG noted AFMA's 2016/17 Finfish Fishery Budget.

Agenda Item 7 – Other Business

There was no other business.

Torres Strait Scientific Technical Finfish Working Group

Meeting Record

10 November 2016 – Brisbane

Note all meeting papers and record available on the PZJA webpage:

www.pzja.gov.au

Australian Government

Australian Fisheries Management Authority

Box 7051, Canberra Business Centre, ACT 2610 / Ph. (02) 6225 5555 / Fax (02) 6225 5500 / AFMA Direct 1300 723 621 afma.gov.au

Contents

Meeting Participants

Attendance

Name	Organisation	Declaration of interest
Eva Plaganyi	CSIRO	Research funding. Principal scientist for TSSAC project to develop a harvest strategy for the Torres Strait Beche-de-mer Fishery.
Steve Hall	AFMA	Nil
Selina Stoute	AFMA	Nil
Tom Roberts	DAF QLD	Nil
Mariana Nahas	TSRA	Nil
Michael O'Neill	DAF QLD	Research funding. Principal scientist for TSSAC project to develop a harvest strategy for the Torres Strait Finfish Fishery.
David Brewer	Upwelling PL	Research funding. Principal scientist for TSSAC project to develop a harvest strategy for the Torres Strait Finfish Fishery. Previous CSIRO researcher for TSSAC project investigating traditional take of finfish in Torres Strait.
Kenny Bedford	Erub	TIB licence holder. President - Erub Fisheries Management Association
John Ramsay	TSRA	Nil
Andrew Tobin	JCU	Research funding. Principal scientist for TSSAC project to develop a harvest strategy for the Torres Strait Finfish Fishery.
Tony Vass	Industry	Nil. Does not own or operate a licence in Torres Strait. Holds Queensland East Coast quota for coral trout and 'other' finfish species.
Trevor Hutton	CSIRO	Research funding. Principal scientist for TSSAC project to develop a harvest strategy for the Torres Strait Finfish Fishery.

Name	Organisation	Declaration of interest
Andrew Trappett	AFMA, Meeting EO	Nil

Action items

Number	Action
1.	Next meeting of the working group to work towards developing a work plan for assessing risk and managing potential expansion of effort on 'other' reef line species.

Recommendations

Number	Recommendation
1.	The Torres Strait Finfish Scientific Technical Working Group **recommended** that the Torres Strait Finfish Working Group consider a Recommended Biological Catch (RBC) of **125 tonnes** for the 2017-18 Spanish mackerel fishing season noting the following: ▪ RBC of 125 tonnes was based on the updated stock assessment and was an estimated median total harvest of the preferred base case analyses 1 and 2, and an MEY reference point accepted by the working group. ▪ Using an assumed fishery management reference point of B_{MEY} (stock level at 60 per cent of virgin biomass) the assessment predicts annual harvests below 150 tonnes will maintain healthy biomass and catch rates.
2.	The working group **recommended** priorities for additional work on Spanish mackerel stocks in Torres Strait to further improve data collection and the stock assessment model.
3.	AFMA and TSRA, in consultation with temporary licence holders, to work on characterising fishing gear selectivity and different fishing practices and identify options for improving the accuracy and level of information collected through logbooks (a workshop with temporary licence holders was recommended as a starting point).

Agenda Item 1 - Preliminaries

1.1. Opening Prayer / Acknowledgement of Traditional Owners / Welcome / Apologies

Mr Kenny Bedford opened the meeting in prayer. Meeting chairperson Selina Stoute acknowledged the traditional owners, past and present, of the land where the meeting was held.

The working group noted that the meeting had been convened as an outcome of the Finfish Working Group meeting of 12-13 July 2016 (**Attachment A**). The group noted that the meeting had been formed with a scientific focus and was tasked with recommending a Spanish mackerel

Recommended Biological Catch (RBC) for the 2017-18 fishing season while the Torres Strait Finfish Working Group would focus on the management implications of this recommendation.

1.2. Adoption of Agenda

The Torres Strait Finfish Scientific Technical Working Group (the Working Group) adopted the agenda (**Attachment B**) without change.

Agenda Item 2 – Spanish Mackerel Stock Assessment

The working group noted the updated draft Spanish mackerel stock assessment detailed in the report titled: '*Torres Strait Spanish Mackerel Stock Assessment II, 2015, Torres Strait AFMA Project Number RR2014/0823*' and presented by Dr Michael O'Neill. The stock assessment updates the last assessment performed by Dr Gavin Begg in 2006. The last assessment suggested that harvests taken prior to 2007 were near or likely to be exceeding maximum sustainable levels. It was noted that the new assessment examines 11 further years of logbook data where harvest levels and fishing effort have declined since 2006 (average 64 to 105 t compared to an average of 98-233 t from 1989 to 2006).

The stock assessment

The working group accepted the new assessment as the best available stock assessment for Spanish mackerel whilst also noting sources of uncertainty in the assessment. The working group recognised that a level of uncertainty is expected in fishery stock assessments and that the current assessment should serve to guide future research and data priorities for the fishery.

The Working Group identified the following key uncertainties**:**

1. Catch data: Two potential sources of uncertainty in the catch estimates for the fishery include:
    a. deliberately inflated catch reports ('paper' fish) immediately following the 2002 investment warning. Total catches increased significantly in this period; and
    b. unaccounted changes in the traditional inhabitant (TIB) catch associated with some long term fishers exiting the fishery and some island freezer operations closing down. The working group supported the approach taken for the assessment to impute TIB catch for periods where data are missing based on 18.5% of logbook reported TVH catches.

2. Fish vulnerability (availability, selectivity and catchability): Industry members advised that operators can target certain sized fish. A better understanding of these behaviours may improve the CPUE standardisation and utility of length frequency samples. By way of example, industry members advised that at times:
    a. some fishers take different size classes of fish due to their gear setup;
    b. fishers limit effort and catches according to onboard / shore based freezer capacity;
    c. fishers may need to halt fishing and wait 3-4 days to unload catch to barges.

3. Spatial data: Spatial data was not used in the assessment due to missing data prior to the introduction of the TSF01 Logbook and a number of other periods where spatial information has not been reported in logbooks. Catch rate analyses were performed for individual vessels rather than over various spatial areas.

4. Stock structure: Biologically there is some uncertainty in stock connectivity between the Torres Strait and adjacent waters, where spatial-temporal patterns of fish movement may affect fish vulnerability and data.

5. Hyperstability: Hyperstability can occur in fisheries that target aggregations. Hyperstability is yet to be explored in the assessment (hyper-stability: where catch rates continue at a set rate over time but the stock abundance is actually declining); and

6. Restricted length frequency samples (by area and time) and the absence of larger size classes in the samples.

The Working Group **recommended** additional analyses be undertaken to improve the stock assessment including*:*

- sensitivity analyses to examine how the model might perform with 'domed vulnerability' where large fish are assumed to be less available to capture; and
- examination of CPUE data using 'indicator' vessels with known fishing histories as a means to further validate the CPUE time series.

To improve the stock assessment in the longer-term the Working Group **recommended** the following research and data collection/analysis priorities:

- appropriate spatial genetic sampling to clarify the current single Torres Strait stock/population structure assumption (noting the single stock assumption is the most precautionary approach);
- additional length frequency sampling to improve the spatial representativeness of biological data used in the model. This will assist in: a) assessing the fishing mortality and selectivity of the catch i.e. whether the catch size structure is representative of the underlying population age structure and b) validate fecundity at age assumptions;
- further data analysis and consultation with stakeholders to investigate options for improving the accuracy of the TIB catch data series; and
- AFMA and TSRA, in consultation with temporary licence holders, to work on characterising fishing gear selectivity and different fishing practices and identify options for improving the accuracy and level of information collected through logbooks (a pre-season workshop with temporary licence holders was recommended as a starting point).

Preferred model

Four stock analyses (model runs) were conducted (parameters described on report pp. 36) which generated estimates of harvest levels for either Maximum Sustainable Yield (MSY[1]) or Maximum Economic Yield (MEY[2]) reference points calculated to be $B_{0.4}$ and $B_{0.6}$ respectively. These correspond to the principles of the *Commonwealth Harvest Strategy Policy and Guidelines 2007,* noting no formal reference points have been set for Torres Strait finfish stocks at present.

[1] MSY **maximum sustainable yield:** the maximum average annual catch that can be removed from a stock over an indefinite period under prevailing average environmental conditions

[2] MEY **maximum economic yield:** the sustainable catch level for a commercial fishery that allows net economic returns to be maximised; generally more conservative (i.e. less harvest and fishing effort) than maximum sustainable yield

The working group noted the harvest estimates for an MSY reference point ranged from 145 t to over 210 t. The estimates from MEY analyses ranged from 122 t to 185 t (**Figure 1**).

The Working Group did not support the use of analysis 3 and 4 noting:

- analysis 4 was based on inflated harvests (1.75 times the average 1989-2014 logbook harvest) which the working group considered too high. Analysis 4 was included in the report for the purpose of contrast to document uncertainty; for possible unaccounted harvest across the Torres Strait. The result was noted by the group and management staff but further data evidence is required to verify the scenario for use in RBC procedures.
- analysis 3 had a high level of uncertainty.

The Working Group agreed that analyses 1 and 2 were acceptable noting:

- some concerns were raised that the parameters of analysis 1 were conservative estimates; and
- the *M* value (natural mortality) was fixed lower in analysis 2 and as a result, the steepness estimate (*h*) was higher. Future work should revisit the sensitivities of these parameters and investigate possible higher steepness values; together with the vulnerability uncertainty noted above.

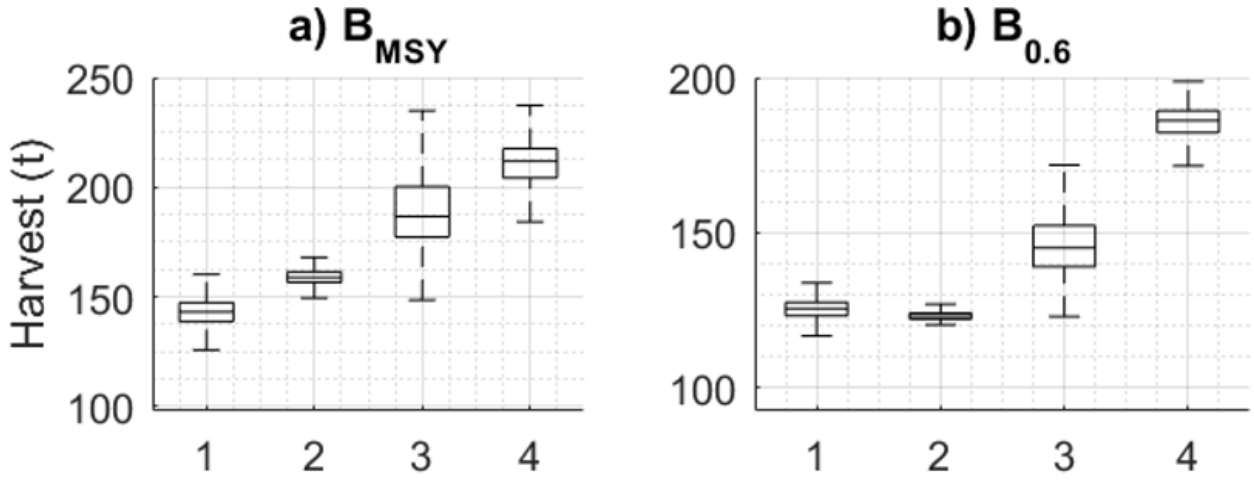


Figure 1. (Figure 20 of the report pp. 39) The estimated equilibrium harvest reference point (tonnes) for Spanish mackerel, where the first boxplots (a) is for the exploitable biomass at MSY ($B_{MSY} \approx B_{0.4}$) and the second boxplot (b) is for a higher exploitable biomass at 60% of virgin ($B_{MEY} \approx B_{0.6}$). Each boxplot illustrates the distribution around the median (line in the middle of each box). The bottom and top of each box were the 25th and 75th percentiles. The whisker lengths indicate about 99% coverage of the MCMC simulations. B_{MSY} median values (t) by scenario 1) 143.140, 2) 158.820, 3) 186.590, 4) 211.880 and $B_{0.6}$ median values (t) by scenario 1) 125.510, 2) 122.970, 3) 145.040, 4) 186.100

Target reference point

The working group noted that a harvest strategy is to be developed for the fishery which will establish formal reference points for the stock. In the interim RBC advice should be made on the best available science and be guided by existing Australian Government harvest strategy policy.

The working group **recommended** that the B_{60} target reference point (aim for a stock level at 60 per cent of unfished biomass, used here as a proxy for MEY) is preferred over a MSY target reference point (B_{40}) for Spanish mackerel, recognising that the stock is a shared resource of high importance to traditional inhabitants.

The working group **noted** that:

- similarly high target reference points have been recommended for the Torres Strait TRL fishery and in the '*Green paper on fisheries management reform in Queensland, July 2016'*; and
- the updated stock assessment report recommended a target reference point above B_{MSY} to ensure healthy population biomass and catch rates, in order to achieve and balance sustainability, economic, social and cultural objectives.

Recommended Biological Catch

The working group noted advice from the updated stock assessment report that if harvests increase above 150 t and/or fishing effort increases above 1000 operation days, then catch rates may erode long term.

The Working Group **recommended** an RBC of **125 tonnes** for the 2017-18 Spanish mackerel fishing season having regard for the following:

- the need for a precautionary approach to take into account the uncertainties in the assessment;
- the preferred interim target reference point of $B_{60;}$ and
- RBC is based on an estimated median total harvest (tonnes) of the preferred stock analyses 1 and 2 for the exploitable biomass at B_{60}.

Agenda Item 3 – Work plan for assessing risk and managing potential expansion in effort on 'other' reef line species

The working group agreed to defer discussion on this item to allow adequate time for a full discussion.

It was noted that assessing risk and managing potential expansion in effort on 'other' reef line species will likely be a lengthy process (e.g. more than one meeting) and would require substantial input from the working group members. It was also noted that the development of a harvest strategy will play a role in the formation of a work plan for 'other' reef line species.

Action: AFMA to explore options to convene a Technical Working Group Meeting alongside the Tropical Rock Lobster Resource Assessment Group meeting scheduled for 13 December 2016.

MEETING CLOSED 4:15 PM

Attachment A

Outcomes of the last Finfish Working Group – 12-13 July 2016

Number	Recommendation
1.	The FWG **recommended** for the 2017-18 Spanish mackerel fishing season that**:** ▪ TAC setting advice to be finalised subject to consideration of updated stock assessment and advice from the newly convened Technical Scientific Working Group; ▪ Technical scientific working group to review stock assessment update to allow for full consideration of inputs and outcomes. Technical scientific working group to report back to FWG; ▪ The technical scientific working group should comprise the follow members: ➢ Scientific members ➢ Two industry members: Tony Vass, Kenny Bedford ➢ Andrew Tobin ➢ Nicole Murphy ➢ Government ▪ The technical scientific working group should consider the following: ➢ Disproportionate effort in Bramble Cay ➢ Local factors – unexpected factors (e.g. environmental and/or climate change related effects) ➢ Changes in accessible area of the fishery (closures) ➢ Estimates of TIB, Traditional, Recreational catches ➢ Logbook data quality ➢ Stock structure ➢ Catch rate objectives (effort & catch) ▪ Recognising the importance of precautionary approach, as an interim approach (noting Harvest Strategy to be developed) TAC should not exceed best estimates of MSY after taking into account all other sources of fishing mortality;
2.	The FWG **recommended** that the Spanish mackerel TAC remain unchanged (187.7t tonnes) for the 2016-17 fishing season noting the following: • the current TAC (187t) is based on average catches 2001-05. A stable period of catch; • recent reported catches are > 100 tonnes; • proposed lease amount for 2016-17 is 99 tonnes (across four boats) (18% TIB to TVH catch ratio was used in updated stock assessment);

Number	Recommendation

	• management risks include unreported catches and potential unknown impacts from coral bleaching; and
	• on balance management risks are acceptable this season however the next season TAC setting process should take into account updated stock assessment and agreed estimates of catch from other sectors. Catches and the TAC remain within estimates of maximum sustainable levels:
	  • *Begg et al 2006* maximum sustainable levels 146-264t
	  • *O'Neil & Tobin 2016/17*: *Defining the status of Torres Strait Spanish mackerel to inform future fisheries allocation and sustainable fishing*
	  ▪ maximum sustainable levels 145-210t
	  ▪ catch rates may reduce if future average harvests exceed 150t

3.	The FWG **recommended** that the coral trout TAC (134.9 tonnes) remain unchanged for the current fishing season (2016-17) and the 2017-18 fishing season noting the following: • the TAC (134.9t) is based on average catches 2001-05. A stable period of catch; • although there is no stock assessment for coral trout, the Management Strategy Evaluation conducted (Williams et al 2007) using four constant catch scenarios (80-170t) predicted biomass of at least 70% of unfished by biomass by 2025; • proposed lease amount for 2016-17 is 74 tonnes (across four boats); and • industry feedback that catch rates on Islands are considered good.
4.	For the 2016-17 fishing season the FWG recommended that the leasing out of 28.5 tonnes of other species by TSRA be supported subject to following **ACTIONS**: 1. improved logbooks (that enable accurate reporting of all species. The FWG noted that the AFMA logbook would require reprinting creating a possible timing issue and use of the QDAF logbook may be constrained by administrative constraints); 2. Prior reporting (possible use of QDAF system?)
5.	The FWG **recommended** that subject to further consideration by the Technical Scientific Working Group of coral trout to byproduct catch ratios when targeting coral trout and total take of 'other species' by other sectors – there should be no further increase above 30 tonnes until systems are in place to independently verify catches, a species-specific risk assessment has been undertaken and where applicable catch triggers and control rules have been agreed.

Attachment B

TORRES STRAIT FINFISH TECHNICAL SCIENTIFIC WORKING GROUP MEETING

10 November 2016

The Space meeting room, Ground Floor
80 Anne Street, Brisbane

MEETING TIME:

9:00am – 3:00pm, Thursday, 10 November

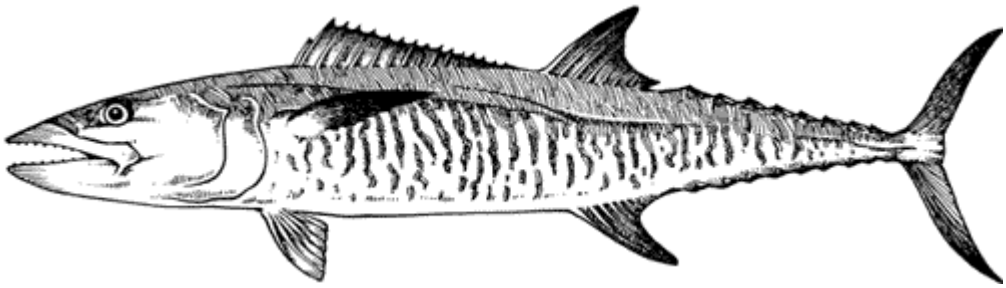
AGENDA

1. **Preliminaries**
   1.1. Opening Prayer / Acknowledgement of Traditional Owners / Welcome / Apologies
   1.2. Adoption of Agenda
   1.3. Declaration of Interests

2. **Updated Spanish mackerel stock assessment review**

3. **Work plan for assessing risk and managing potential expansion in effort on 'other' reef line species**

4. **Other Business**



Scomberomorus commerson

Torres Strait Spanish mackerel

Stock assessment II, 2015

Update of stock assessment I published in 2006. Results are for consideration for defining target goals for fishery management and community benefits.

Torres Strait AFMA Project Number: RR2014/0823

Queensland Government

This publication has been compiled by Dr M. F. O'Neill of Agri-Science Queensland, Department of Agriculture and Fisheries and Dr A. Tobin of James Cook University.

Acknowledgements

The authors gratefully thank past and present scientific staff, fishers and islander communities who generated and supplied data on the times series of Torres Strait Spanish mackerel. Special thanks go to Jo Langstreth (Fisheries Queensland, DAF) for collating, reviewing and verifying the fish age-length data; Leanne Curry (JCU) for collating initial logbook data, establishing base rules for using the logbook data and collating Torres Strait weather data from the BOM; Shane Fava, Selina Stoute, Alicia Sabatino, Dean Pearce and Dylan Maskey from AFMA for organising and supplying Torres Strait logbook and docket-book harvest data; and Gavin Begg (SARDI) for his time searching and providing the 2006 stock assessment data. The stock assessment and report were funded by the Australian Fisheries Management Authority (AFMA), James Cook University (JCU) and the Queensland Government, through the Torres Strait Scientific Advisory Committee – project number RR2014/0823.

Summary

Torres Strait Spanish mackerel are harvested by line and troll fishing from ocean waters between Cape York Peninsula (north-east Australia) and the western province of Papua New Guinea. Spanish mackerel are an important economic and traditional food source, with historical commercial harvests ranging in order of 200 tonnes (t) per year. The commercial fishery is highly seasonal between September and November and located in the eastern Torres Strait and Bramble Cay.

This report has been prepared to update the inaugural 2006 stock assessment with the latest data and inform management agencies on revised estimates of sustainable harvest for consideration in defining future management objectives and harvest strategies.

The Torres Strait commercial finfish logbook data was analysed for the fishing years 1989–2013. From the logbook data, the estimated Spanish mackerel annual harvests ranged from 98–233 t between 1989 and 2006. The estimated annual harvest of Spanish mackerel declined to 64–105 t between 2007 and 2014. The estimated catch rate indices of Spanish mackerel abundance showed a general decline between 1989 and 2002. After 2002 the logbook design was changed and improved. From 2003 onwards the catch rate index was estimated to be either increasing or stable around the 2002 level. The two results were dependent on the assumed fishing behaviour of recording Spanish mackerel harvests before and after the change in logbook design in 2003; i.e. different or similar. The two time series quantified uncertainty in the catch rate signal and identified significant variation in the harvest reported between fishing vessels.

The age-structured stock analyses of Torres Strait Spanish mackerel inputted and assessed the time series data on harvests, catch rates and fish age-length. The assessment results were uncertain and show a range of variation in estimated population size. In spite of this uncertainty, the recent harvests for 2007–2014 (64–105 t) and population estimates were all sustainable.

Management should adopt a precautionary approach to setting target levels of commercial harvest until further data on total catches (commercial + non-commercial) and fish age structures are available. If future average harvests increase above 150 t and/or fishing effort increases above 1000 operation days (of the main vessel, not dory days; Figure 20), then future catch rates of Spanish mackerel may erode.

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Introduction

Torres Strait Spanish mackerel, *Scomberomorus commerson*, are large pelagic fish that are harvested by line and troll fishing from ocean waters between Cape York Peninsula (north-east Australia) and the western province of Papua New Guinea. Management of fisheries in the Torres Strait is shared between Australia and Papua New Guinea (Figure 1). The Australian sector for Spanish mackerel is an important economic and traditional food source for all Torres Strait communities (Begg et al., 2006). Historically, the Australian commercial sector have harvested in order of 200 t of Spanish mackerel year^{-1}, with lesser harvests taken by Torres Strait and Papua New Guinea communities (Begg et al., 2006; Busilacchi et al., 2015).

Torres Strait waters connect to the Coral Sea in the east and Great Barrier Reef to the south, and the Arafura Sea and the Gulf of Carpentaria to the west. Separate stocks of Spanish mackerel reside in these surrounding waters, with the most recent stock structure research recommending that Torres Strait Spanish mackerel be regarded as a discrete meta-population for management (Buckworth et al., 2007). This recommendation formed the spatial boundary for stock assessment and harvest monitoring.

The inaugural stock assessment for Torres Strait Spanish mackerel was completed using data up to the 2003 fishing year (Begg et al., 2006). The assessment described the biological parameters, management and research histories and estimated the stock as being fully fished with annual harvests (mean = 173 t and standard deviation = 31 t) judged to be nearing or exceeding maximum sustainable levels (146–264 t) (Begg et al., 2006). The Australian Government fishery status reports have monitored nominal harvest trends since 2003 and in 2015 classified Torres Strait Spanish mackerel as not overfished and not subject to overfishing (Patterson et al., 2015).

In 2014 the Torres Strait Scientific Advisory Committee, on behalf of the Protected Zone Joint Authority (PZJA), funded the need to revisit and update the previous 2006 stock assessment (Begg et al., 2006) for consideration in defining future management objectives and harvest strategies. The report informs the PZJA and associated management agencies on updated estimates of sustainable harvest that will maintain the fishery long term. The outputs of the research will better inform management decision processes and catch leasing arrangements.

Figure 1. Area of the Torres Strait Fisheries. The management area for the Australian (Torres Strait) component is shaded blue. The map was sourced from the ABARES Fishery status report 2015.

Methods

Harvest and catch rate data

The Spanish mackerel harvest data were supplied by the Australian Fisheries Management Authority (AFMA) on 3rd September 2015 (job # 65833). The data were updated from the previous request dated 3rd August 2014 (job # 65368). The AFMA 'deed of confidentiality' was signed by the project Principal Investigator at James Cook University (JCU) on the 27th August 2015. This included the authority for the project co-investigator (Queensland Department of Agriculture and Fisheries – DAF) to analyse the data for stock assessment under project objective I.

The raw data tables were imported and stored in the MS Access database 'spanish_ts_catch_afma'. The database was filed in the computer directory for 'spanish_mackerel_ts'. The directory was a part of the 'Stock Assessment Security Group' on the Queensland Government DAF server. The security group ensured access only by approved staff and confidentiality, integrity and backup of the data. The data were only authorised for use in AFMA project # RR2014/0833. A copy of the 'spanish_ts_catch_afma' database is available to AFMA under the 'deed' agreement.

The data on Torres Strait Spanish mackerel harvest were collated from two sources: 1) AFMA compulsory logbook (Log) database and 2) AFMA docket (Doc) book records. The commercial licence and endorsement conditions for logbooks is compulsory for Spanish mackerel, as the Protected Zone Joint Authority (PZJA) has determined a logbook form for recording harvests (Australian Government, 2013). This is a condition of all commercial endorsement holders fishing for Spanish mackerel to ensure that the information required by the logbook about fish taken and effort expended in the fishery is accurately and fully recorded in accordance with the instruction (Australian Government, 2013). The docket (Doc) book records are important supplementary information for harvest validation. At the time of this report the Doc data was deemed non-compulsory and the database was not readily maintained or up-to-date (French et al., 2015).

The following data tables were created and linked in the MS Access database for the purpose of summarising total harvests and fishing efforts and modelling to standardise catch rates (* indicates non AFMA data sourced and created by JCU or DAF):

- LogOperation – logbook client, vessel, fishing date and location data.
- LogEffort – number of crew, tenders and the fishing method.
- LogCatch – tender number, species harvested, numbers and weights (kilograms: kg)

- LogBoat – grouping factors for different vessels and operators.
- LogSpp – defines species categories / families.
- LogWtConversions – for different product forms (e.g. kg of fillets to kg whole fish).
- Regions* – latitude and longitude borders for the six fishing regions; see Figure 5.
- DayYear* – daily sinusoidal data for modelling within year fishing seasons.
- LeapYear* – binary factor identifying leap years; links with DayYear.
- Winds* – daily mean wind speed, direction and components (NS and EW).
- LunarPhases* – continuous moon phase data.
- Setup_meanwt – mean fish weights by species (kg); calculated from AFMA data.
- DocOperation – Docket book records of processed harvest by island and fisher/seller.
- DocCatch – species weights (kg) and prices (AUD$).
- DocSpp – defines species categories / families.

The Torres Strait wind data were sourced by JCU on 27th September 2015 from the Bureau of Meteorology (BOM, Australian Government; www.bom.gov.au). The wind data encompassed the time series from the 1/1/1989 to 15/9/2015 for the Horn and Coconut Islands weather stations. The recorded measures of wind speed (km hour^{-1}) and direction (degrees from where the wind blew) was collated by JCU and converted to an average daily reading. From this data the north-south (NS) and east-west (EW) wind components were calculated (Figure 2):

$$NS = \text{km hr}^{-1} \times \cos(\text{radians}(\text{degrees})), \text{ and}$$

$$EW = \text{km hr}^{-1} \times \sin(\text{radians}(\text{degrees})).$$

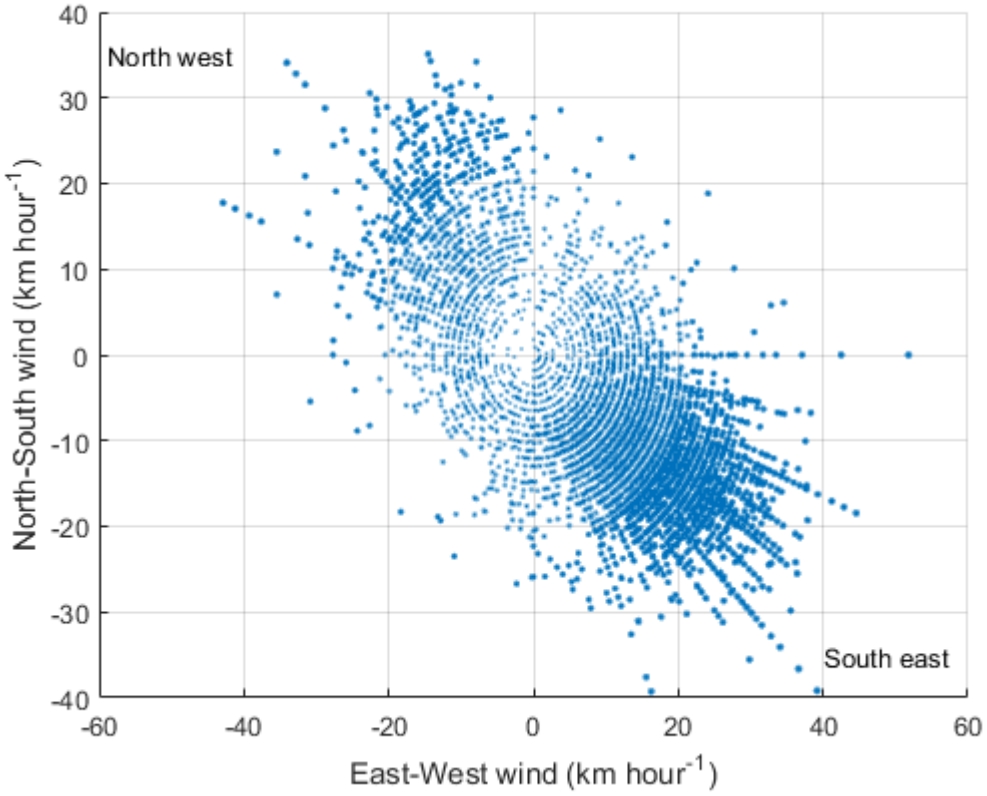

Figure 2. Plot of the Torres Strait average daily wind components 1989–2015, showing a predominant south-east wind pattern.

The component functions considered the BOM defined wind directions as degrees measured clockwise from true north (http://www.wmo.int/pages/prog/www/IMOP/publications/CIMO-Guide/Ed2008Up2010/Part-I/WMO8_Ed2008_PartI_Ch5_Up2010_en.pdf; http://www.wmo.int/pages/prog/www/IMOP/CIMO-Guide.html); 0 degrees = North, 90 degrees or π/2 radians = East, 180 degrees or π radians = South, and 270 degrees or 3π/2 radians = West.

In total 9% (850 out of 9341 records) of the wind data were not observed and recorded by the BOM. The missing wind components were assumed equal to the overall average values (NS = -10.4334 and EW = 9.9282). The wind components were used to standardise Spanish mackerel catch rates for different wind directions and strengths.

The lunar phase (luminance) data was a calculated measure of the moon cycle with values ranging between 0 = new moon and 1 = full moon for each day of the year (Courtney et al., 2002; Begg et al., 2006; O'Neill and Leigh, 2006). The data were sourced from the Department of Agriculture and Fisheries (DAF), Queensland Government. The luminance measure (lunar)

followed a sinusoidal pattern and was copied and advanced 7 days (≈ ¼ lunar cycle) into a new variable (lunar_adv) to quantify the cosine of the lunar data (O'Neill and Leigh, 2006); Figure 3. The two variables were modelled together to estimate the variation of Spanish mackerel harvest according to the moon phase (i.e. contrasting waxing and waning patterns of the moon).

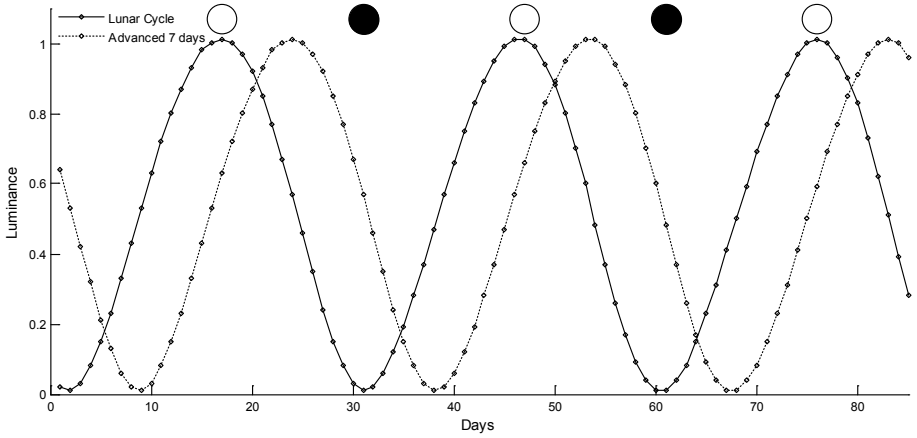

Figure 3. The lunar phase cycle (solid line) illustrated over 85 days. The dashed line illustrates the lunar cycle advanced by seven days. Together these lines were used to model catch rates allowing for new moon, waxing moon, full moon and waning moon effects.

The seasonality of Spanish mackerel catch rates was modelled using sinusoidal data (DayYear) to identify the time of year. The data was calculated and used to minimise the number of model parameters with the purpose to reduce temporal confounding with the regional and/or vessel parameters. For Torres Strait Spanish mackerel, parameter confounding was a concern given the limited temporal and spatial patterns of fishing by some vessels; particularly if more parameters were used to model the explicit monthly or weekly factorisations of the data. In total four trigonometric covariates were used, which together modelled an average monthly pattern of catch (Marriott et al., 2013): $s_1 = \cos\left(2\pi d_y / T_y\right)$, $s_2 = \sin\left(2\pi d_y / T_y\right)$, $s_3 = \cos\left(4\pi d_y / T_y\right)$, $s_4 = \sin\left(4\pi d_y / T_y\right)$, where d_y was the cumulative day of the year and T_y was the total number of days in the year (365 or 366); Figure 4. The reason for using both sine and cosine functions together was similar to modelling lunar phases, where the functions together identify the seasonal patterns of catch rates corresponding to autumn, winter, spring and summer periods.

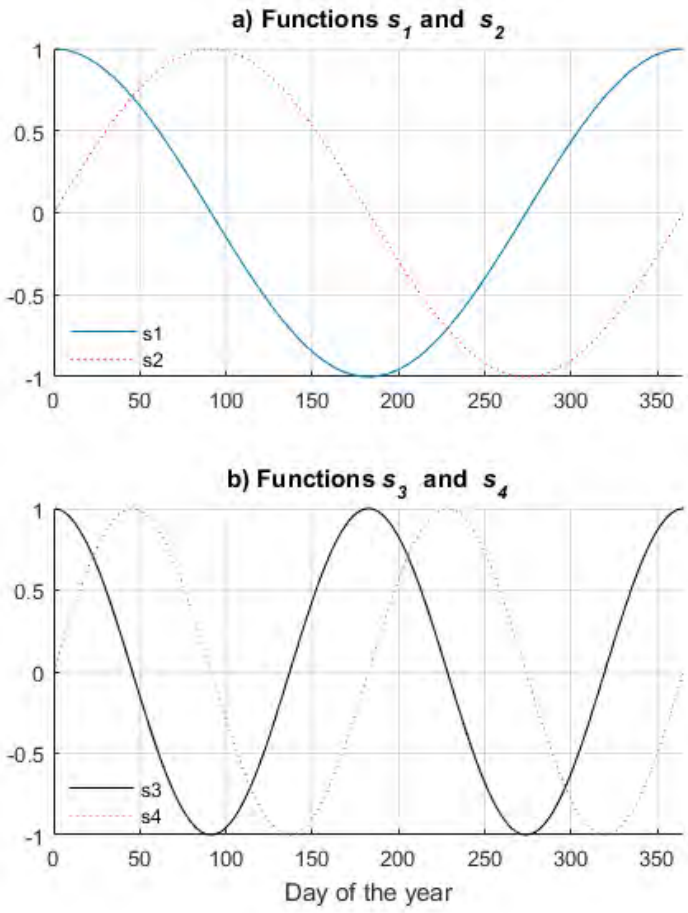

Figure 4. Illustration of the sinusoidal DayYear data for a) the annual cycle and b) the 6-monthly cycle. For the x-axis day of the year, 1 = 1st January and 365 = 31st December and the y-axis is the function value. For more information on the relationship between unit circles and the sine and cosine function, see https://en.wikipedia.org/wiki/Trigonometric_functions (webpage last accessed 16th November 2015).

The different data tables in MS Access were merged for analysis and to standardised catch rates of Spanish mackerel. The analysis data formed records of each vessel's daily harvest, together with the associated variables for the main vessel name, date, number of specified tenders, numbers and weight of Spanish mackerel harvested, lunar phase and wind components. Analysing harvests at the primary vessel unit aimed to match the daily recording format (Appendix 4), avoid correlation between tenders and to use appropriate sample sizes for estimating confidence intervals. The following aspects were noted for creating the daily catch rate data:

- The Log Boat and LogOperation data was grouped to each vessel, day and record number, and filtered for only Spanish mackerel vessels, gear code TR and logbook types SM02 and TSF01. This included the corresponding location data.

- The LogCatch and LogEffort data were merged with the selected LogOperation data based on the linked record number. The merged data was for the LogSpp codes for Spanish mackerel.
- In addition to the above data, the lunar phase, day-year and wind components data were merged based on the linking fishing dates.
- The region data was not merged or used in the catch rate analysis due to the amount of missing data prior to the introduction of the TSF01 logbook in 2003. It was also uncertain whether the locations recorded by fishers was consistent based on the fishing trip's start grid, start location name and start latitude/longitude (as labelled in the database; or port of departure in logbook) or the actual daily fishing location (GPS position of the primary vessel as defined in the logbook; Appendix 4). In total about 50% of the database fishing-location fields was blank and missing. Categorisation of the available location data into regions suggested 35% of the Spanish mackerel records were from Bramble Cay, 32% Eastern Islands, 19% Central Islands, 5% north/south/west and 9% missing. Plot of the latitude and longitude data showed less fishing around Bramble Cay compared to the central and eastern areas (Figure 5). Often the latitude and longitude data did not match the specified start location name in the database.
- The course spatial stratification of Begg et al. (2006) was not used, as many of the recorded fishing locations bordered on the Bramble, central, eastern and southern regions (Figure 5) and that vessels were easily capable of travelling between regions each day. The variation in daily harvests was assumed to primarily relate to the vessel stratification (vessel name).
- Some client/fisher names and their fishing regions were found to be inconsistent (Dr A. Tobin pers. comm.). The degree of this problem was unknown. Catch rates were therefore analysed by vessel name (also called a boat), which accurately grouped the clients, and no region codes were used as noted above.
- The harvests of Spanish mackerel were recorded in three different data fields: 1) number of fish n, 2) weight of whole fish in kilograms w_{old}, calculated based on different product forms and 3) number of cartons c. The data fields were 94%, 5% and 56% complete, respectively. The catch rate analysis was therefore based the numbers of fish as this data was the most complete. Also, numbers generally index abundance more accurately than weight, given the average size and weight of fish can vary between different areas, times and schools of fish. Records of zero harvest were not analysed as they may be inconsistent and under reported (Dr A. Tobin pers. comm.). The conversions used to fill in missing records are listed in Table 1.
- The harvest tonnages of Torres Strait Spanish mackerel were estimated based on an assumed mean fish weight of 6.909 kg (Table 1). In the 2006 stock assessment report, Begg et al. (2006) estimated a mean fish weight of 8.5 kg based on logbook data for whole fish only (n = 64). In Table 1 the same calculation method was used for consistency, but updated to include both whole and filleted fish; i.e. all available mean weight data was used. This resulted in a mean estimate of 6.909 kg that was more

consistent with the mean of 7.145 kg (median = 6.562, std = 2.2797) from the age-length monitoring data. The estimate of 6.909 kg was also near the mean values of 7.229 kg and 7.279 kg from northern Queensland and the Gulf of Carpentaria, respectively (Figure 6).

- The final catch rate analysis data grouped record numbers identifying different dories and fishing sessions to form records of each vessel's daily harvest. The data were also filtered to remove vessels that had fished less than 30 days in total between 1989 and 2014, fished in only one year between 1989 and 2014 and had recorded 'bulk' trip harvests. In total the filter removed 2% of the recorded harvests (from 23098 daily records down to 22545) and reduced the number of vessels analysed from 64 to 40.
- The number of dories/tenders/vessels used each day by each fishing operation was tallied by counting the listed 'tender number' from the LogCatch data table. The tallied vessel numbers ranged 1–5. The catch rate analysis compared the significance of this covariate data against the categorisation of the data into the groups of 1, 2, and ≥3 vessels. It was noticed that the number of tenders, ranging 1–9, in the LogOperation data table varied from the LogCatch table. The LogOperation tender data was not used as it as it did not match the expected number of 1–4 tenders per operation used to catch Spanish mackerel in the Torres Strait (Appendix 4).
- To group the seasonal biology and fishing patterns of Spanish mackerel, the fishing-year was defined for the months from July to June (Begg et al., 2006); i.e. fiscal year, where for example the time period from the 1st July 2014 to 30th June 2015 was labelled as fishing year 2014.
- In June 2003 a new Torres Strait finfish daily fishing logbook (TSF01) was formalised by AFMA (Appendix 4). Examination of the nominal data suggests that this may have improved reporting rates (Figure 13). To consider this possibility, a binary factor for pre and post 1st June 2003 was created to model the time series effect.

Table 1. Equations for converting numbers of fish and weights (kg).

Equation	Condition
$w_{new} = n \times 6.909$, where 6.909 kg was the mean weight of a whole fish calculated using whole and filleted fish data (n = 86, s.d. = 2.93).	$n > 0$
$w_{new} = (w_{old} / v_{old}) \times v_{new}$, where v_{old} was the original and v_{new} was the corrected product conversion weights (fillets, trunk, gilled and gutted or whole; Begg et al., 2006).	$n = 0, w_{old} > 0$
$w_{new} = c \times 13 \times 1.608$, where 13 kg was the mean carton weight for fillets (≈ 3 fish carton^{-1}; s.d = 1.47, n = 6828) and 1.608 kg was the mean conversion for fillets to whole fish.	$n = 0, w_{old} = 0, c > 0$
$n = w_{new} / 6.909$	$n = 0$

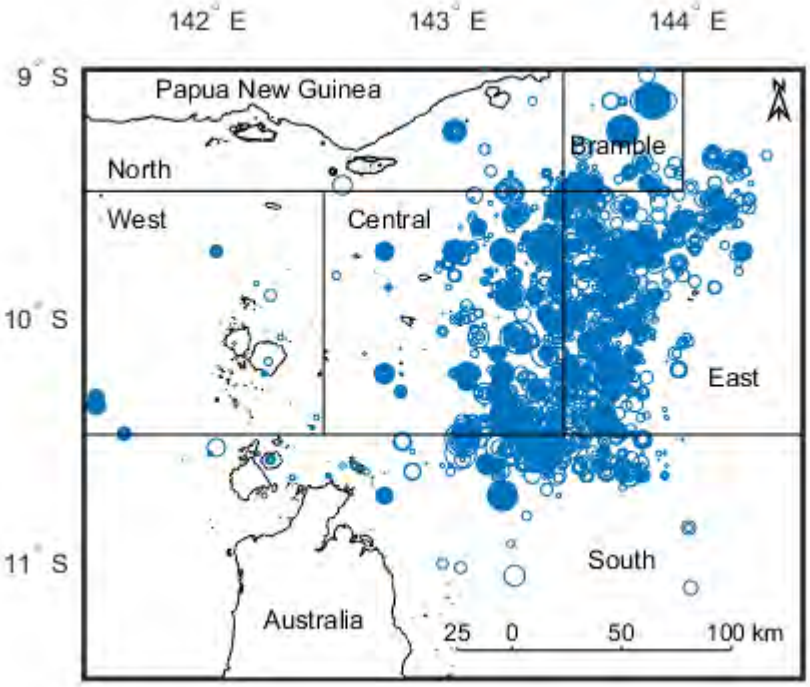

Figure 5. Map of the Torres Strait and regional stratifications (Bramble Cay, east, south, central, west and north island waters) used by Begg et al. (2006), with blue circles indicating the numbers of Spanish mackerel harvested per vessel day 1989–2015 by logbook recorded start-latitude and start-longitude. The circles are scaled proportionally, with larger circles showing larger daily harvests.

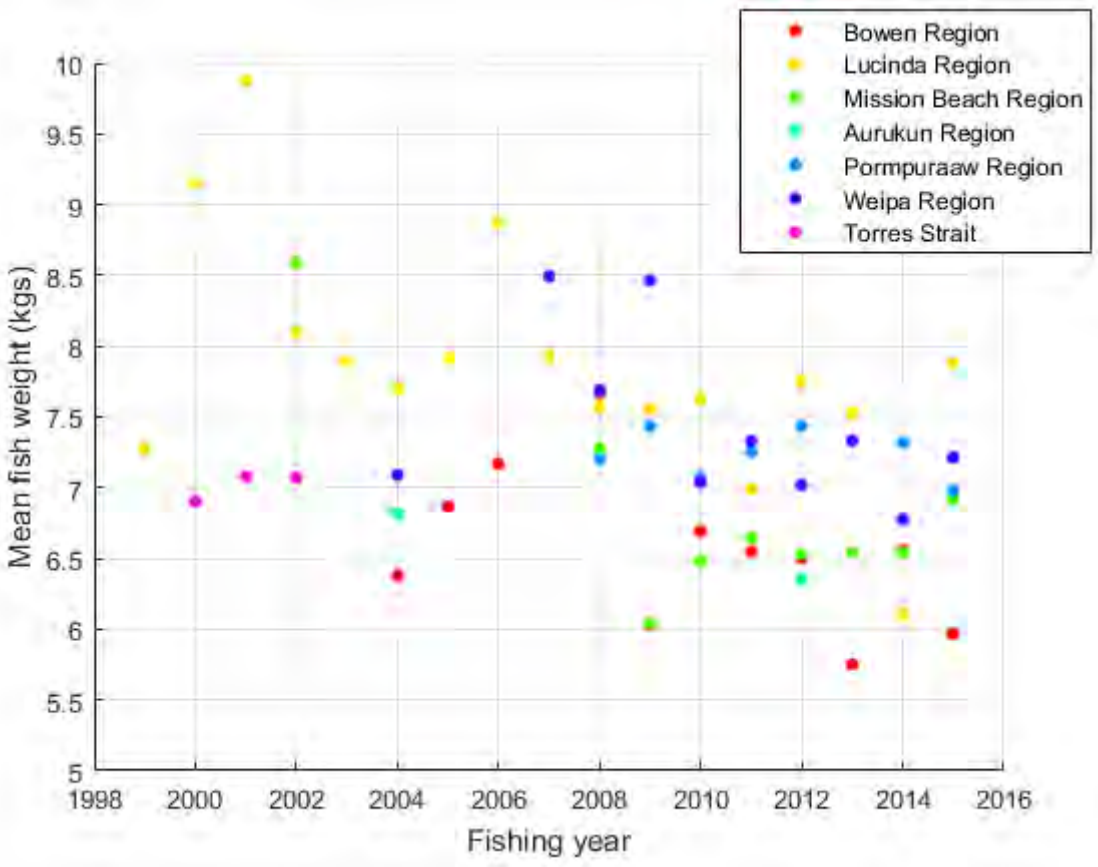

Figure 6. Comparison of the mean weight of Spanish mackerel by fishing years and regions nearby to the Torres Strait. Each mean point was calculated on a sample of between 100–2680 fish. The figure illustrates the variability between years and regions, with only a small number of means at or above 8.5 kg.

Fish age-length composition data

The Queensland Government (DAF) conducted monitoring of Torres Strait Spanish mackerel between 2000 and 2002 to obtain biological data and parameters on fish age and length (McPherson, unpublished). The monitoring was conducted through commercial fishing operations, which generally fished within 2 km of Bramble Cay. The sampled fishing locations and times was dependent on the commercial operation of vessels.

In each year an observer monitored the troll fish catches of as many vessels and days as possible (Table 2). The observer operated from a nominated vessel that provided sample processing and accommodation. Commercial operators were paid a stipend to provide and deliver filleted fish frames (McPherson, unpublished). The fish frames were processed for length, otoliths, gonads and genetic samples, with most fish sampled from morning catches. See Begg et al. (2006), Langstreth (2015) and McPherson (unpublished) for more detail.

Queensland Government monitoring ceased after 2002, but a CRC Torres Strait research project (T1.14) adopted the above protocols to sample fish in 2005 (Begg et al., 2006). The 2005 Spanish mackerel data were unable to be found on JCU computer servers or through the past stock assessment author Begg et al. (2006) (emails: A. Tobin 24th August 2015; G. Begg 17th August 2015).

The observed fish-otolith increment counts were assigned to an age (cohort) group based on the otolith edge types (Appendix 2). Fish sampled in October were assigned an age group as follows:

- New edge type (code 0): age group = increment count,
- Intermediate edge type (codes 1 and 2): age group = increment count, and
- Wide edge type (code 3): age group = increment count +1.

The fish aged in the year 2000 samples had no edge type data. To adjust to age groups, 23% of these fish were assumed to have a wide edge type (Appendix 2). Fish aged 0+ (13 fish) were allocated to the 1+ age group (Appendix 2).

As most fish (~90%) were both measured and aged, the age group classifications were used directly to form the age structure proportions for input into the stock model (no age-length key was applied).

Table 2. Number of Spanish mackerel sampled for length and age. The 12 fish sampled (9 were aged) in April 2007 were not used.

Year	Month	Days	Vessels	Number of fish	Number aged
2000	Oct-Nov	15	1	915	827
2001	Oct	11	5	942	860
2002	Oct	8	3	654	579

In addition to the above data, the records on Spanish mackerel total lengths (cm) from the 2004 AFMA voluntary fisher logbook was used in the stock model (data from Begg et al., 2006).

Catch rate analysis

The Spanish mackerel data consisted of counts of fish (>0) harvested per vessel-operation day (Figure 11). Count data of this form can be analysed as an over-dispersed Poisson-like process (McCullagh and Nelder, 1989; Lee et al., 2006). Analyses that deal with over-dispersion are essential to accurately assess the significance of model parameters and to calculate appropriate confidence intervals on mean predictions. For Spanish mackerel, the over-dispersion arises due to fish aggregating (schooling) with various levels of abundance through time and area.

Over the time-series of data, two different logbook data forms were used to report harvests of fish: SM02 for 1989–2003 and TSF01 for 2003–2014. There was a clear increase in the catch rates of Spanish mackerel reported in the TSF01 logbook over SM02 (Figure 13); more than could be explained only by an increase in stock abundance. Thus the change in logbook reporting from SM02 to TSF01 was considered in the analyses to standardise catch rates. In total four analyses were conducted to standardise catch rates and explore different vessel and logbook effects.

The analyses were completed using the statistical software GenStat (VSN International, 2013) and standard errors were calculated for all estimates. The analyses were defined based on different logbook effects (Table 3):

a) No logbook effect – the generalised linear model (GLMa) assumed the change in logbook to TSF01 had no influence on reported harvests between 1989–2014;

b) TSF01 logbook effect – the GLMb modelled different logbook effects pre and post 31st June 2003. The effects were assumed constant over vessels;

c) By vessel-logbook effect – the generalised linear mixed model (GLMM) assumed the change in logbook influenced vessels reporting differently pre and post 31st June 2003; and

d) Reduced time series – the GLMd analysed only TSF01 reported harvests since 1st July 2003; no logbook effect required.

The importance of individual model terms (Table 9 and Table 10) was assessed formally using F statistics by dropping individual terms from the full model.

The over-dispersed Poisson models were used as they conformed easily to the discrete nature of the count (numbers of fish) data. The Poisson models suitably weighted the data giving greater but no excessive emphasis to harvests with large fitted values, they were consistent with respect to different time scales and it should be noted that the residual plots do not have to appear to be normal (Leigh, 2016).

The calculation of standardised catch rates involved predicting mean catch rates from the different model terms; using GenStat's 'PREDICT' and 'VPREDICT' procedures for the GLM and GLMM respectively (VSN International, 2013). For example, annual standardised catch rates were predicted from the fishing-year model term, keeping all other model terms constant. For reasons to ensure comparability and confidentiality, the final predictions were normalised against their overall mean. Standard errors for all predictions were adjusted up according to the sqrt(residual mean deviance); where the residual mean deviance = over dispersion parameter.

Table 3. The GenStat statistical models used to analyse Spanish mackerel harvests. Models a–c analysed all time-series data 1989–2014, whereas model d analysed only 2003–2014 data.

a) GLMa: Main fixed effects model with no logbook effect.

```
MODEL [DISTRIBUTION=poisson; LINK=logarithm; DISPERSION=*] nfish
FITINDIVIDUALLY [PRINT=model,summary,estimates,accumulated; \
 CONSTANT=estimate; FPROB=yes; TPROB=yes; FACT=2;\
selection=%variance,%ss,adjustedr2,r2,seobservations,dispersion,%meandeviance,%deviance,aic,sic;]\
fishyear+boat+s1+s2+s3+s4+tenders+lunar+lunar_adv+windns+windnsQ+windew+windewQ
RWALD
```

The variables windnsQ = windns^2 and windewQ = windew^2 were quadratic model terms.

b) GLMb: Main fixed effects model with logbook effect.

```
MODEL [DISTRIBUTION=poisson; LINK=logarithm; DISPERSION=*] nfish
FITINDIVIDUALLY [PRINT=model,summary,estimates,accumulated; \
 CONSTANT=estimate; FPROB=yes; TPROB=yes; FACT=2;\
selection=%variance,%ss,adjustedr2,r2,seobservations,dispersion,%meandeviance,%deviance,aic,sic;]\
fishyear+boat+logbook+c12+cs12+c6+cs6+tenders+lunar+lunar_adv+windns+windnsQ+windew+windewQ
RWALD
```

c) GLMM: Main fixed effects model with a boat x logbook random effect term.

```
GLMM [PRINT=model,monitor,components,vcovariance,means,backmeans,effects,wald; DISTRIBUTION=poisson;\
 LINK=logarithm; DISPERSION=*;
FIXED=fishyear+c12+cs12+c6+cs6+tenders+lunar+lunar_adv+windns+windnsQ+windew+windewQ;\
 RANDOM=boat+boat.logbook; CONSTANT=estimate; FACT=9; PSE=differences,estimates; MAXCYCLE=20;\
 FMETHOD=all; MVINCLUDE=*; CADJUST=mean] nfish
```

d) GLM: Main fixed effects model with hours fished data included for the reduced time series 2003–2014.

```
MODEL [DISTRIBUTION=poisson; LINK=logarithm; DISPERSION=*] nfish
FITINDIVIDUALLY [PRINT=model,summary,estimates,accumulated; \
 CONSTANT=estimate; FPROB=yes; TPROB=yes; FACT=2;\
selection=%variance,%ss,adjustedr2,r2,seobservations,dispersion,%meandeviance,%deviance,aic,sic;]\
fishyear+boat+c12+cs12+c6+cs6+tenders+hours2+lunar+lunar_adv+windns+windnsQ+windew+windewQ
RWALD
```

Population dynamics model

The population dynamic model (Table 4) calculated numbers (N) of Spanish mackerel by the following categories:

- yearly (t) time categories from the fishing year 1989 to 2014,
- sex (s) with level 1 = female and 2 = male, and
- age-group (a) from 1+ to the maximum age.

The model accounted for the processes of fish births, growth, reproduction and mortality in every fishing year (time step t; Table 4). The model was run in two phases: (i) historical estimation of the Spanish mackerel stock from the fishing years 1989–2015 and (ii) simulations of model values and errors to evaluate reference points (Figure 7).

The Torres Strait commercial fishery for Spanish mackerel commenced in the 1940's (Begg et al., 2006) and it was unrealistic to start the model in 1989 from an unexploited state (virgin population). To initialise population conditions in 1989 the model assumed an estimated annual harvest from 1940 to 1988 with respect to the building trend in harvests reported by McPherson (1986) for the years 1957, 1959, 1960, 1962, 1975-77 and 1979 (Table 4.1 x 1.185, in Begg et al., 2006) up to the average annual harvest 1989–1993.

The method to initialise population conditions using 1940–1988 predicted harvests was similar to the model runs by Begg et al. (2006), however a logistic shaped increase was assumed rather than linear or exponential-like. The logistic increase was estimated from a binomial GLM assuming the 1989–1993 harvests were at 100% and the McPherson (1986) data a fraction of the 1989–1993 average annual harvests. The logistic-shape assumption aimed to create a realistic long term pattern of expansion of the fishery in order to initialise suitable model conditions. Begg et al. (2006) used the fishing year 1940 to represent the start time for modelling when fishing pressure was low.

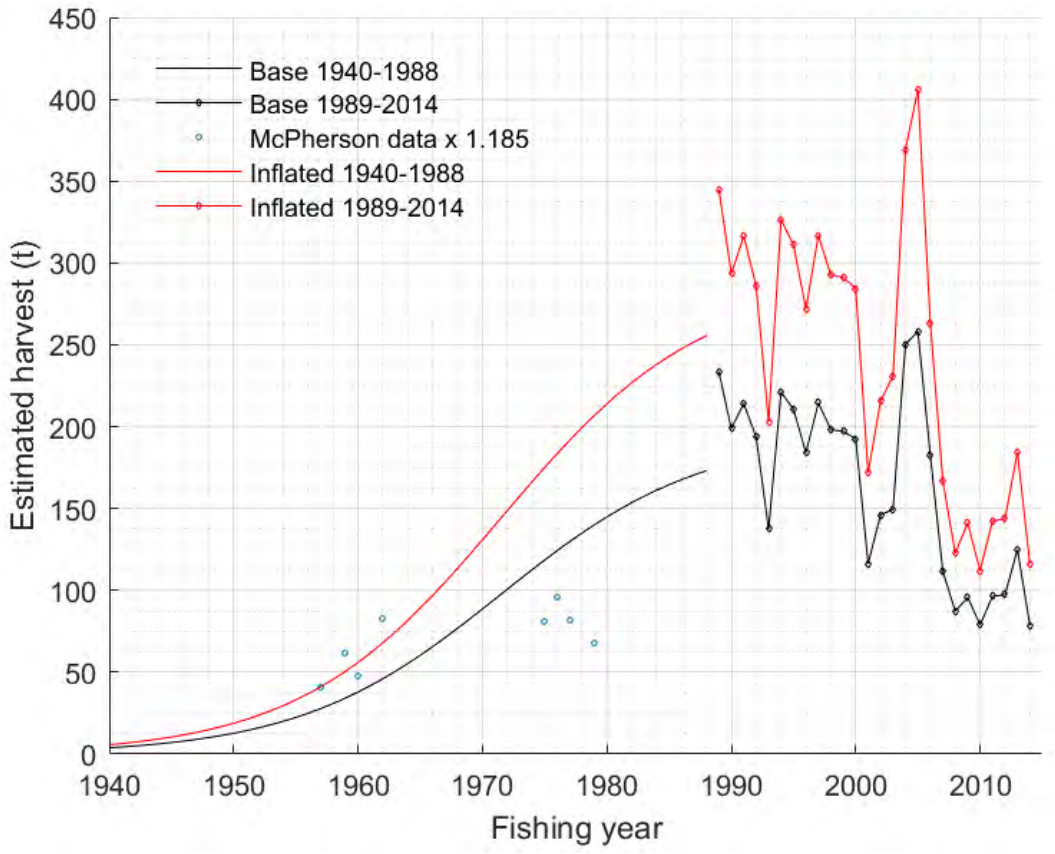

Figure 7. Comparison of pre 1989 estimated harvests used to initialise model dynamics in 1989.

For the Torres Strait, Spanish mackerel harvests are taken by commercial (islander and non-islander fishers), traditional subsistence fishers, recreational fishers and charter fishers. Estimates of harvests taken by all these sectors were not available. Harvests were assumed to be mostly taken by the commercial non-islander sector, with the other sectors harvests considered minor in comparison (Begg et al., 2006); see also the comment under the 'data inputs' section for harvests. Due to the limited availability of sectoral data the assessment was constrained to follow this assumption, including that fish vulnerabilities were the same between fishing sectors *f*. This assumption simplified the calculation of harvest rates (u_t) to be based on a single value for the total harvest C_t in each fishing year ($\sum_f C_{f,t}$). No iterative method for different sectoral harvests (Leigh et al., 2014; O'Neill and Leigh, 2014) or negative log-likelihood for predicting harvests was required.

The estimation of fish growth and modelling of discrete lengths were not attempted in the stock model given the short time series of observed fish age-length data. An externally estimated von Bertalanffy growth curve (Table 4, equation 6; described in Haddon (2001)) for each fish sex based on age-groups (defined on page 11) and 2001–2002 data was used; where l^{∞} is the average maximum fish total-length (cm), κ is the growth rate parameter that determines how quickly l^{∞} is attained and a^0 is the is the theoretical age at which the expected length is zero – the value is typically negative and needed so that the function best represents the growth of exploitable (legal) sized fish; data on small undersized fish are less vulnerable and under sampled in the Torres Strait.

From the growth curve, fish length at age was assumed to follow a normal distribution using the parameters from Table 7 for mean fish length and variance. For a given fish sex and age the normal distribution calculated the proportions of fish $p_{s,a}(l)$ at length *l*, such that $\sum_l p_{s,a}(l) = 1$.

The stock model length distributions of Spanish mackerel for each time and sex group was approximated using the theory of Gaussian finite mixture models (McLachlan and Peel, 2000). The normal probability densities can be combined over any of the groups to form a multivariate normal distribution of fish lengths. The multivariate normal distributions can be calculated, where the individual normal densities (with mean $\overline{l}_{s,a}$ and standard deviation $\sqrt{\sigma_s^2}$.) are summed based on the mixing proportions $\pi_{t,s,a}$ calculated from the exploitable population numbers of fish $N_{t,s,a}v_a$.

Model parameters (Table 5) were estimated by calibrating the model to standardised catch rates and age-length composition data (Table 6). Primary importance was placed on fitting the standardised catch rates (Francis, 2011). Effective sample sizes for scaling multinomial negative log-likelihoods were calculated within the model in order to give realistic weighting to the age-length composition data. Additional negative log-likelihood functions were also considered for predicting natural mortality (M) and annual recruitment variation (η_t) (Table 6).

The model estimation process was conducted in Matlab® (MathWorks, 2015) and consisted of a maximum likelihood (ML) step followed by Markov Chain Monte Carlo sampling (MCMC). The flow of the estimation process is summarised in Figure 7. The maximum likelihood step used Matlab global optimisation (Quasi-Newton method, MathWorks, 2015), followed by a customised simulated annealing program to find and check the parameter solutions and estimate the parameter covariance matrix. The maximum likelihood step was effective for searching and locating optimal estimates over the negative log-likelihood (combined NLL fitting functions) search space. The simulated annealing was started from a NLL scaling factor of 100 and then reduced to 10 and then 1. For each scaling factor, the annealing process was run for 5000 iterations of each parameter. The covariance matrix was built up by measuring the differences in the negative log-likelihood with each parameter jump.

The MCMC followed on from the simulated annealing using a NLL scaling factor of 1 with fixed covariance. The MCMC used parameter-by-parameter jumping following the Metropolis-Hastings algorithm described by Gelman et al. (2004). The final parameter distributions were based on 1000 posterior MCMC samples thinned from 1 solution stored per 100 samples. MCMC parameters traces and autocorrelations were assessed for convergence and independence (Plummer et al., 2006).

The calculation of the fishery equilibrium reference points were based on optimising the population model dynamics through an average harvest rate ($u = 1 - \exp(-F)$) for each MCMC posterior parameter sample. All parameter uncertainties were included except stochastic recruitment variation (error term $\exp(\eta_t)$ in equation 3, Table 4) was fixed equal to one.

The age-model biomass equilibrium reference points for maximum sustainable yield ($B_{MSY} \approx 0.4B_0$) and a proxy for maximum economic yield ($B_{MEY} \approx 0.6B_0$) were calculated. The Australian Government's current proxy for B_{MEY}/B_{MSY} is 1.2 (Australian Government, 2007). The origin of this proxy is not clear (Dr Sean Pascoe, CSIRO, personal communication at the Fisheries Queensland harvest strategy workshop 4-5th August 2015), but likely based on the symmetric surplus production theory of $B_{MSY} \approx 0.5B_0$ (Zhou et al., 2013; Pascoe et al., 2014). This corresponds to $B_{MEY}/B_{MSY} = 1.5$ for the non-symmetric age-model dynamics.

In model development and testing the estimation of annual recruitment variation was deemed inestimable due to the limited time series of age-length data. This was because the number of parameters would exceed the amount of data and saturate the model fit; given that an extra 25 annual recruitment parameters are needed to cover the model years 1989–2014. The calculation of annual fish recruitment was therefore assumed deterministic according to the Beverton-Holt function with no error.

In addition the model testing of fish length dependent vulnerability proved inadequate due to the growth curve and age-length data indicating that the sampled fish were fully size selected and that only the age 1+ group was not. Therefore the model was simplified for age dependent vulnerability to improve model fit and estimation. The initial method for fish length dependent vulnerability followed the Cabezon stock model conversion technique (Leigh, 2016) for sex-and-age dependent vulnerability, where:

$$v_{t,s,a} = \sum_{l} p_{s,a}(l) v_{t,l} \qquad (16), \text{ and}$$

$$v_{t,l} = \frac{1}{1+\exp\left(-\log(19)\dfrac{(l-l_{50})}{(l_{95}-l_{50})}\right)}\left[l \geq \text{mls}_t\right] \qquad (17).$$

The mls was the minimum legal size at time *t*. Before 1985 there was no mls, in 1985 an insignificant 45cm total length (TL) mls was introduced and then in 2004 a 75cm TL mls was enforced (Begg et al., 2006). These management measures appeared to have no influence on the data.

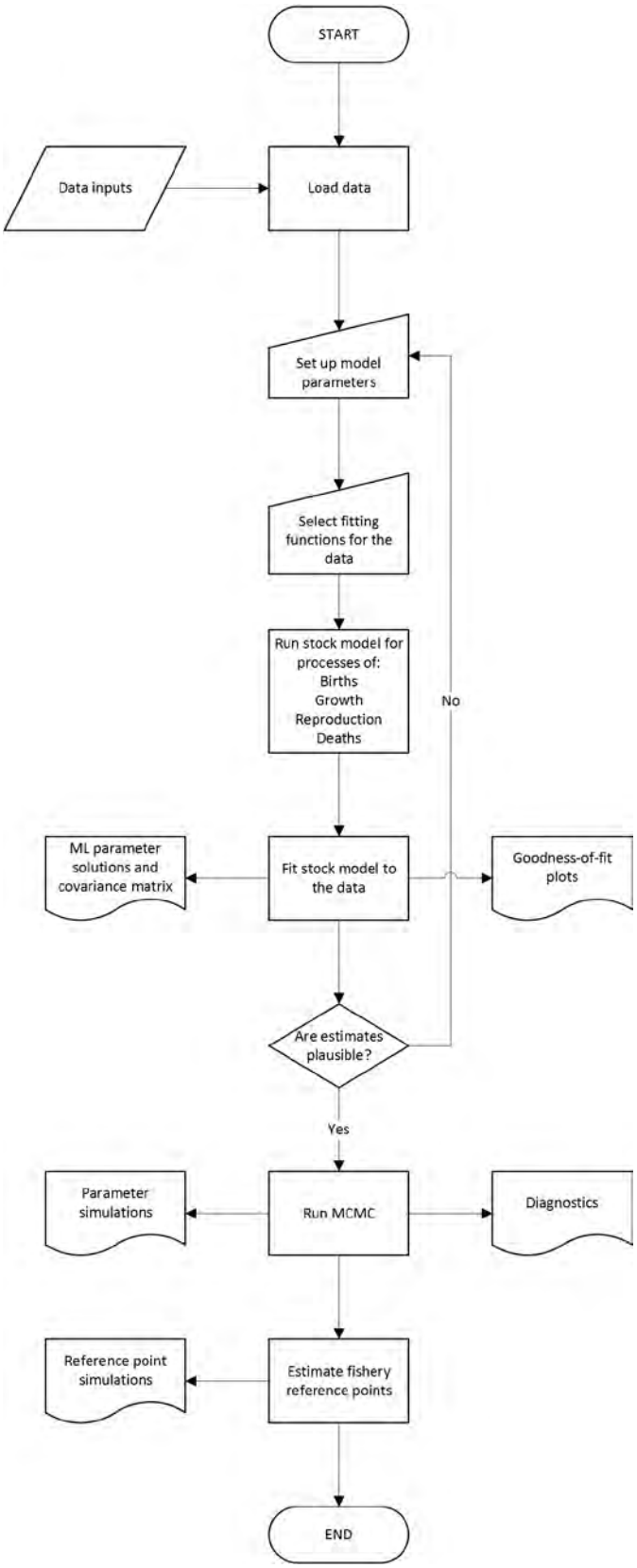

Figure 8. Flow of operations for the stock model from loading the data to evaluating model predictions.

Table 4. Equations for calculating the Spanish mackerel population dynamics.

Population dynamics	Equations
Numbers of fish in the 1st year 1940 (*t*=1): $N_{t,s,a} = 0.5R_t \exp\left(-M\left(a-1\right)\right)$	(1)
Numbers of fish after the 1st year 1940 (*t*>1): $N_{t,s,a} = \begin{cases} 0.5R_t & \text{for} \quad a = 0 \\ N_{t-1,s,a-1}\exp\left(-Z_{t-1,s,a-1}\right) & \text{for} \quad a = 1\ldots\max\left(a\right) \end{cases}$	(2)
Recruitment number of fish – Beverton-Holt formulation: $R_t = \frac{S_{t-1}}{\alpha + \beta S_{t-1}}\exp\left(\eta_t\right)$	(3)
Spawning index – annual egg production: $S_t = \sum_a N_{t,s,a} m_a \vartheta_a \quad \text{for} \quad s = 1$	(4)
Fish survival: $\exp\left(-Z_{t,s,a}\right) = \exp\left(-M\right)\left(1 - v_a u_t\right)$	(5)
Mean fish length in each cohort: $\bar{l}_{s,a} = l_s^{\infty}\left(1 - \exp\left(-\kappa_s\left(a - a_s^0\right)\right)\right)$	(6)
Fish vulnerability to fishing: $v_a = \frac{1}{1 + \exp\left(-\log\left(19\right)\frac{\left(a - a_{50}\right)}{\left(a_{95} - a_{50}\right)}\right)}$	(7)
Harvest rate: $u_t = C_t / B_t^1$	(8)
Midyear exploitable biomass – forms 1 and 2: $B_t^1 = \sum_s \sum_a N_{t,s,a}\bar{w}_{s,a} v_a \exp\left(-0.5M\right)$	(9)
$B_t^2 = \sum_s \sum_a N_{t,s,a}\bar{w}_{s,a} v_a \exp\left(-0.5M\right)\sqrt{1-u_t}$	(10)
Catch rate: $c_t = qB_t^2$	(11)

Table 5. Parameter definitions for the Spanish mackerel population dynamics model.

Parameter	Equations and values	Notes
Assumed		
$\mathrm{Max}(a)$	25	Based on considering the maximum fish age recorded from the Torres Strait (12 yrs), the Gulf of Carpentaria (15 yrs) and the Queensland East Coast (26 yrs). Larger values can be set in the model as no plus-group was programmed in the dynamics for combining very old fish.
l	$TL = 4.274 + 1.06 \times l$	Fish length conversion from fork length (l) to total length (TL) measured in cm (Begg et al., 2006).
	$l_s^{\infty}, \kappa_s, a_s^0$	The estimated von Bertalanffy growth curve parameters for each sex s (Table 7).
w	$w_s = x_s l^{y_s}$	Fish weight (kg) at total length for each sex s, based on the exponential curve parameters x_s and y_s. Females: x = 2.960e-6 and y = 3.148; Males: x = 4.224e-6 and y = 3.068 (Begg et al., 2006).
m	$m_{s,l} = \dfrac{\exp(\varsigma)}{1+\exp(\varsigma)}$	Logistic maturity schedule $p(\text{mature}\vert l_{s,a})$ by fork length (cm) for female fish (s = 1). The schedule was estimated using binomial regression and logit link (Mackie et al., 2005; Begg et al., 2006). The length-dependent maturity was converted to sex-and-age dependent maturity following the process for length vulnerability (Equation 16).
	$\varsigma = -10.349 + 0.0128 \times l$	
ϑ	$\vartheta_l = xl + yl^2$	Mature gonad weight (kg as an index of fecundity) at total length for female fish. The relationship was estimated from only mature ripe stage 7 fish using Begg et al. (2006) data. The quadratic curve parameters were: x = -0.008858 and y = 0.000124; R^2 = 0.4906 and n = 83. The length-dependent fecundity was converted to sex-and-age dependent fecundity following the process for length vulnerability (Equation 16).
Estimated		
Υ and ξ	$\alpha = S_0(1-h)/(4hR_0)$	Two parameters for the Beverton-Holt spawner-recruitment function, equation 3 Table 4, that define α and β (Haddon, 2001). Virgin recruitment (R_0) was estimated on the log scale for the first model year. One estimated value of steepness (h) was assumed for the stock. S_0 was the calculated as the overall virgin egg production in the first model year from equation 4 Table 4. The r_{comp} parameter is the recruitment compensation ratio (Goodyear, 1977), based on the log scale coefficient ξ.
	$\beta = (5h-1)/(4hR_0)$	
	$R_0 = \exp(\Upsilon) \times 10^6$	
	$h = r_{comp}/(4 + r_{comp})$	
	$r_{comp} = 1 + \exp(\xi)$	
a_{50} and a_{95}		Two parameters for the logistic vulnerability, equation 7 Table 4 (Haddon, 2001). a_{50} was the fish age (years) at 50% vulnerability to fishing and a_{95} at 95%.
M		One parameter for instantaneous natural mortality year^{-1}, according to the log-likelihood equation 14 Table 6. The prior distribution allowed for a lifespan of about 20 years in the Torres Strait. Begg et al. (2006) considered empirical estimates of 0.37 based on the Hoenig (1983) equation assuming the maximum age of 12 years and 0.28 year^{-1} using the Pauly's (1983) schooling equation. Estimates from east-coast waters of Queensland ranged 0.26 to 0.34 year^{-1} using the same methodology (Campbell et al., 2012). Another estimate of using the age based estimator of Then et al. (2015) was 0.25 year^{-1} assuming a maximum age of 26 years from Queensland east coast waters.

ζ	$\boldsymbol{\eta} = \boldsymbol{\zeta}\mathbf{e}$
	e = zeros(nparRresid, nparRresid+1);
	for i = 1:nparRresid
	hh = sqrt(0.5 * i ./ (i + 1));
	e(i, 1:i) = -hh ./ i; e(i, i + 1) = hh;
	end; e= e ./ hh;
		Recruitment parameters to ensure log deviations sum to zero with standard deviation σ, equation 15 Table 6. ζ were the estimated parameters known as barycentric or simplex coordinates, distributed $NID(0, \sigma)$ with number nparRresid = number of recruitment years – 1 (Möbius, 1827; Sklyarenko, 2011). **e** was the coordinate basis matrix to scale the distance of residuals (vertices of the simplex) from zero (O'Neill et al., 2011).

q		Fish catchability parameter measuring the proportion of the exploitable stock taken by one unit of standardised fishing effort. The parameter was derived as a closed-form median estimate of standardised catch rates divided by the midyear biomass form 2 (Table 4) (Haddon, 2001).

Table 6. Negative log-likelihood functions for calibrating population dynamics.

***-LL* functions for:**	**Theory description**	**Equations**
Log standardized catch rates for each fishing sector ($c_{f,t}$): $\frac{n}{2}\left(\log\left(2\pi\right)+2\log\left(\hat{\sigma}\right)+1\right)$, or simplified as $n\log\left(\hat{\sigma}\right)$, where $\hat{\sigma}=\sqrt{\sum\left(\left(\log\left(c_t\right)-\log\left(\hat{c}_t\right)\right)^2\right)/n}$ and n was the number of annual catch rates *c*.	Normal distribution (Haddon, 2001)	(12)
Fish length (l) and age (a) composition data: $-\sum\left(\log\left(T^{(\tilde{n}-1)/2}\right)-\left(\frac{1}{2}\left(\tilde{n}-1\right)\frac{T}{\hat{T}}\right)\right)$, or simplified as $-\sum\frac{1}{2}\left(\tilde{n}-1\right)\left(\log T-T/\hat{T}\right)$, where $\tilde{n}$ was the total number of categories (l or a) with proportion-frequency > 0, $\hat{T}=\left(\tilde{n}-1\right)/2\sum\hat{p}\log\left(\hat{p}/p\right)$, $T=\max\left(2,\hat{T}\right)$ specified sample size bounds, $\hat{p}$ were the observed proportions > 0 and p were predicted.	Effective sample size (*T*) in multinomial likelihoods (Leigh, 2011; O'Neill et al., 2011; Leigh et al., 2014; Leigh, 2016)	(13)
Instantaneous natural mortality M year^{-1}: $0.5\left(\frac{M-0.3}{\sigma}\right)^2$, where $\sigma=0.06$ defined the prior distribution $\cong$ 20% CV.	O'Neill et al. (2014)	(14)
Annual log recruitment deviates η: $\frac{n}{2}\left(\log\left(2\pi\right)+2\log\left(\sigma\right)+\left(\hat{\sigma}/\sigma\right)^2\right)$, or simplified as $n\left(\log\sigma+\frac{1}{2}\left(\hat{\sigma}/\sigma\right)^2\right)$, where $\sigma=\min\left(\max\left(\hat{\sigma},\sigma_{\min}\right),\sigma_{\max}\right)$, $\sigma_{\min}=0.1$ and $\sigma_{\max}=0.4$ specified bounds, $\hat{\sigma}=\sqrt{\sum\eta^2/n}$ and n was the number of recruitment years modelled with variance.	O'Neill et al. (2014)	(15)

Results and discussion

The results and discussion section describes notable trends in Spanish mackerel data, predictions from analyses and general conclusions and recommendations. The key data and analyses results are structured under two sub-headings for the 'data inputs' into the model and the 'population dynamic model' estimates and diagnostics. The flow of stock model operations from data inputs to evaluating outputs are illustrated in Figure 7.

Data inputs

Harvests

The Torres Strait AFMA finfish logbook data was analysed for the fishing years 1989–2014. The data analyses were summarised to financial or fishing years (e.g. the 2014 fishing year grouped harvests between 1st July 2014 and 30th June 2015). The descriptive terms 'fishing year' or 'year' are synonymous.

From the logbook data, the estimated Spanish mackerel annual harvests ranged 98–233 t between 1989 and 2006 (Figure 8a). The estimated annual harvest of Spanish mackerel declined to 64-105 t between 2007 and 2014. The corresponding estimated numbers ranged 14–34 thousand fish harvested each year between 1989 and 2006, and 9–15 thousand fish each year between 2007 and 2014 (Figure 8b).

The number of vessels reporting Spanish mackerel harvest through logbooks ranged 10–28 between 1989 and 2006 (Figure 9a). These operations fished in order of 750–1400 days a year (Figure 9b). The numbers of operations reporting harvest dropped to 4–6 per fishing year between 2007 and 2013, with less than 500 boat days fished. The number of tender days were tallied, but are under estimated in some years (Figure 9c).

The docket database of Spanish mackerel harvests averaged about 22 t each fishing year from 2003–2010 (Figure 10). The harvest tallies from other years were very low (Figure 10). Begg et al. (2006) also documented low harvests from the docket database of 1–9 t each year 1989–2002. It was noted through the AFMA Torres Strait Smart Phone project that the Islander freezer and docket database was not up-to-date (French et al., 2015). This database is important to verify harvest trends and to tally commercial Islander harvest into stock assessment. From the AFMA database supplied, data for the fishing years 1989–2000 were missing (years 1989 to 2000 were present in Fig 3.11, in Begg et al., 2006). For the years 2003–2010, the docket

database corresponded to about 18.5% (standard deviation = 4.6%) of the Spanish mackerel logbook tonnages.

For data input into the population dynamic model, two scenarios of total Spanish mackerel harvest were considered to cover the range of uncertainty in unreported catches:

1. Base reported harvests: logbook harvest 1989–2014 + docket book harvest 2003–2010 + 18.5% of logbook harvest for the unaccounted years of docket book harvest (1989–2002, 2011–2014). This scenario is similar to Begg et al. (2006), except a larger docket book harvest was assumed.
2. Inflated harvests: logbook harvest 1989–2014 was multiplied by 1.75 to examine the inference of larger harvests on stock status predictions.

The base harvest schedule above included all reported Spanish mackerel catches from both Islander and Non-Islander commercial fishers. Additional unreported catches and fishing effort are likely (Patterson et al., 2015). This uncertainty is examined under the inflated harvest schedule.

As reported and assumed by Patterson et al. (2015) and Begg et al. (2006), the traditional Islander subsistence, recreational, historical foreign fishing and Papua New Guinea harvests were assumed small and not accounted in the base schedule. This uncertainty is examined under the inflated harvest schedule.

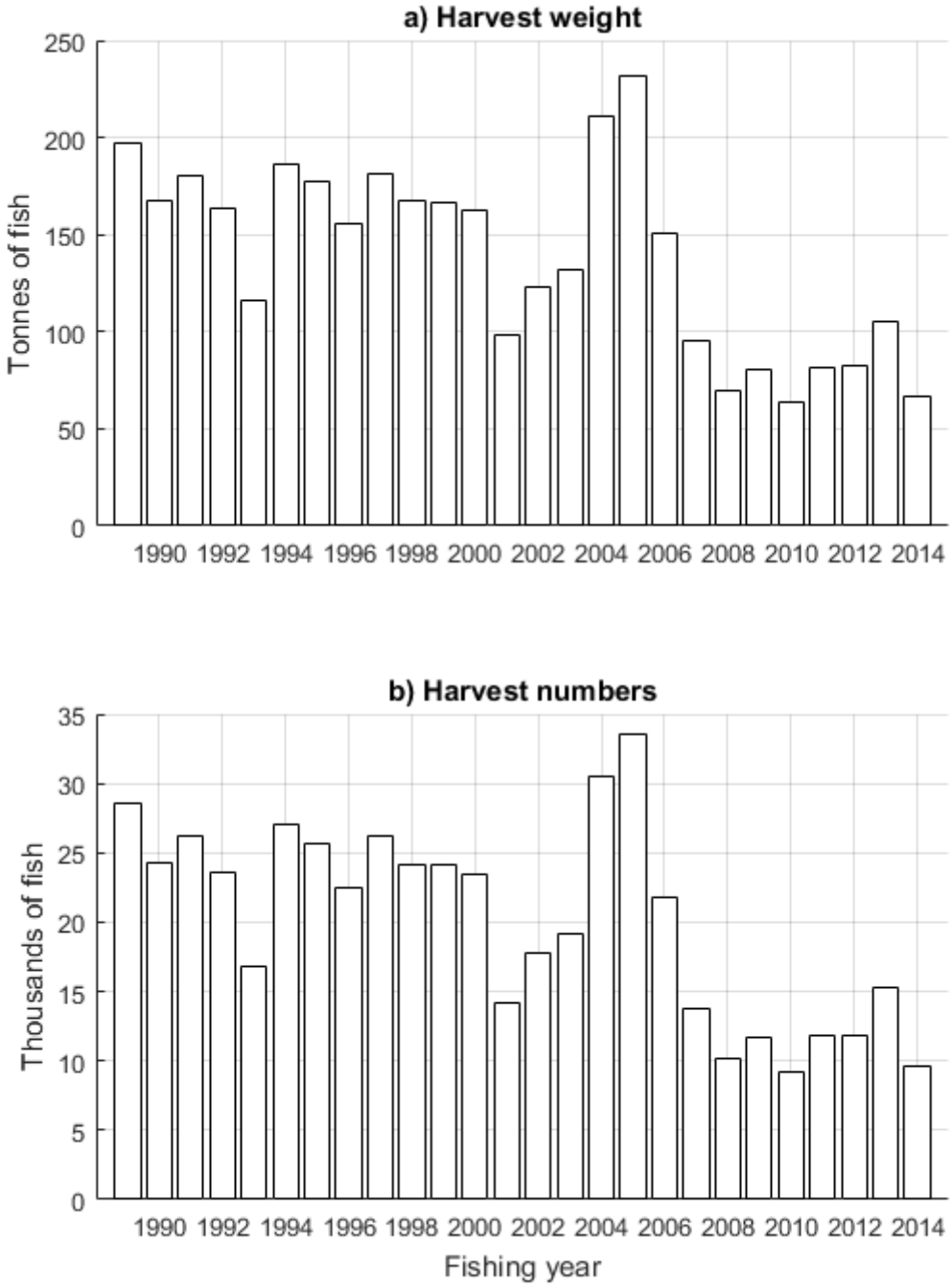

Figure 9. Estimated total harvests of Spanish mackerel by fishing year from the logbook data for a) fish weight measured in tonnes (t) and b) numbers measured in thousands of fish.

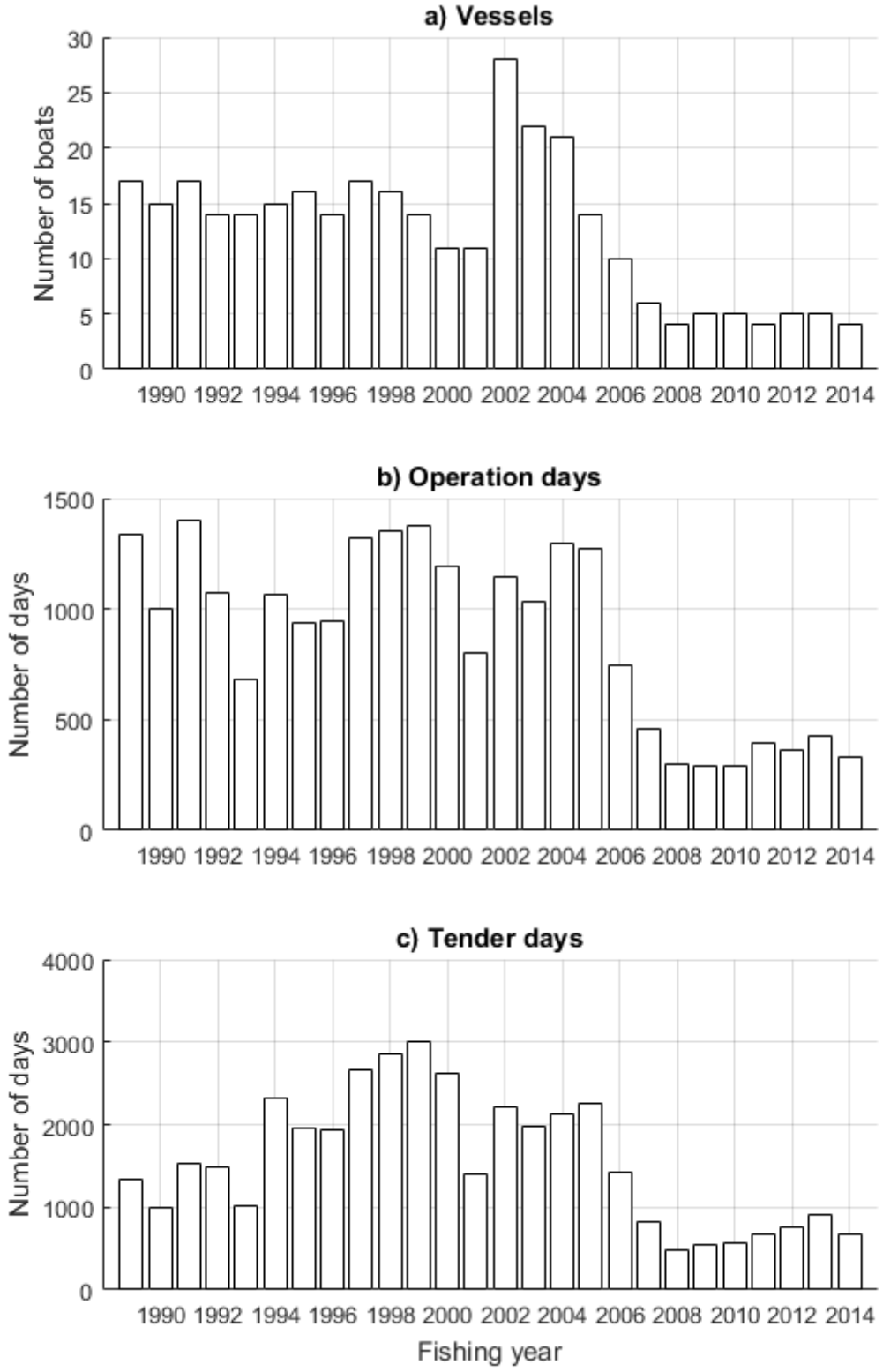

Figure 10. Estimated nominal measures of total fishing effort by year for a) number of fishing operations (vessels), b) number of days fished by the vessels and c) number of days fished by all vessel tenders. Note: early 1990's tender days may be underestimated due to logbook complexities.

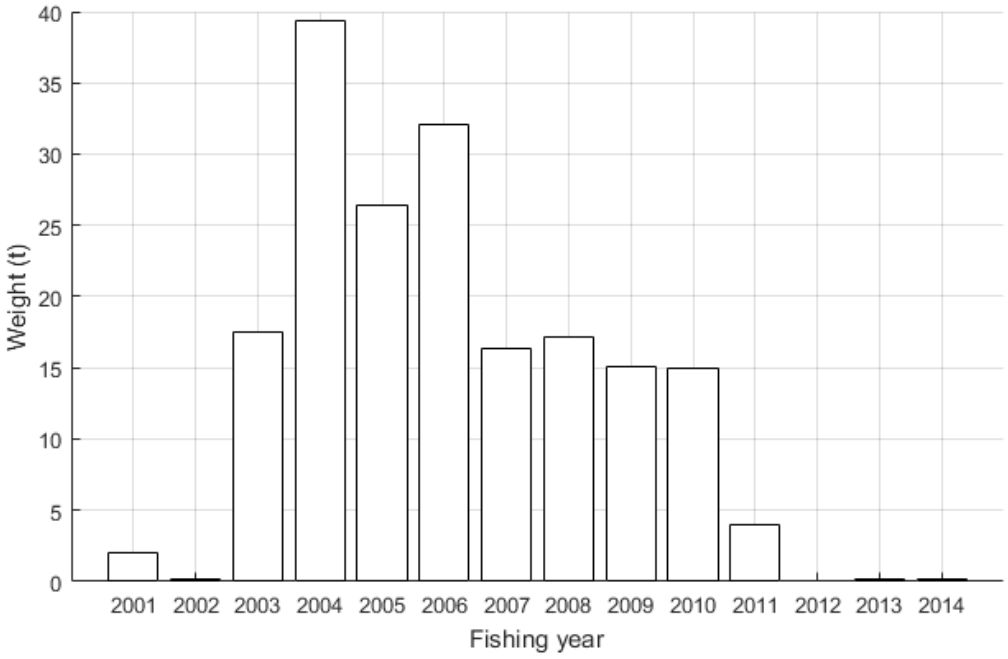

Figure 11. The Docket database tally of Spanish mackerel harvest (tonnes) by fishing year. The 2003–2010 mean = 22.3 t year^{-1}, corresponding to about 3238 fish, with standard deviation = 9.2 t.

Catch rates

At this time for Torres Strait Spanish mackerel, relative trends in fish abundance can only be inferred from a logbook standardised catch rate. This index is of great importance to the stock assessment model as it informs proportionally on the magnitude of change in the Spanish mackerel fished (exploitable) population; this was the primary assumptions for the stock model. It is also a limitation as the stock model has to place emphasis on the index as no recent monitoring of Spanish mackerel age-length or fishery-independent survey data was available.

The assumption of proportionality was made only after employing a regression model (Hilborn and Walters, 1992), in order to standardise the biases or variation in the data by accounting for factors affecting relative fish abundance and fishing efficiency. The result aims to generate a time series of standardised catch rates that is more representative of trends in the fished population. If a catch rate trend measure is calculated on only raw catch and effort data, then this could produce a false outcome unless sources of variability are identified and corrected as needed. This error can occur due to efficiency changes in fishing effort and locations fished through time and between fishing vessels.

The Spanish mackerel catch rate data (numbers of fish) between 1989 and 2014 was first summarised to understand the distributional properties. The catch rate data had high variance

and was highly skewed with a nominal median = 15 fish vessel-day^{-1}, mean = 23 fish and standard deviation = 25 fish (CV = 109%); most (94%) harvests were reported as numbers of fish and not weight. Significant variance in catch rates between primary vessels was evident (Figure 11), with some surprisingly large harvests (> 100 fish day^{-1}). The variance in catch rate data by fishing year is illustrated in Figure 12. Control chart analysis of the data further illustrates the skewness and magnitude of some harvests (Appendix 1, Figure 20).

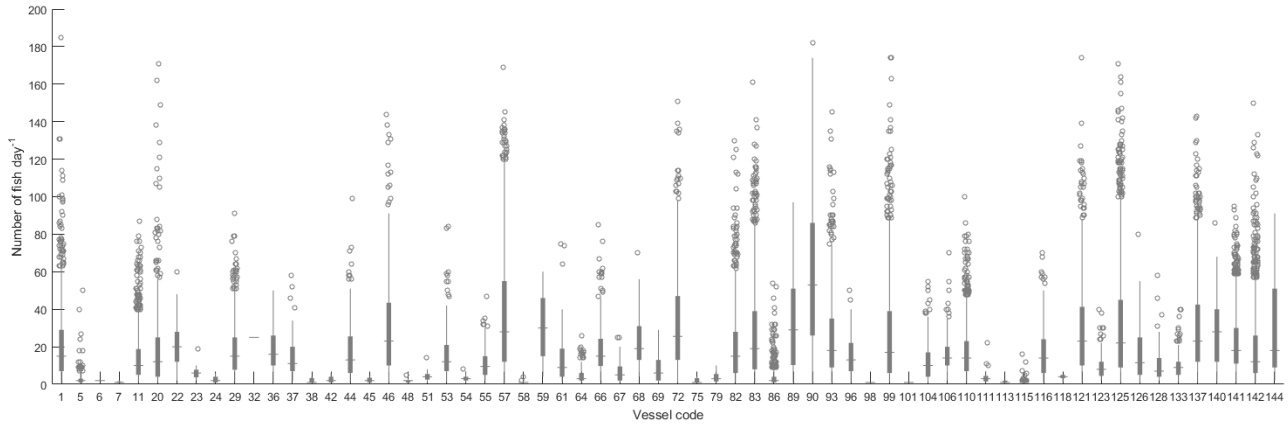

Figure 12. Box plot of each vessel's daily harvest of Spanish mackerel. The plot displays the skewed distributions of harvest around their medians (line in the middle of each box). The bottom and top of each box were the 25th and 75th percentiles. The whisker lengths indicate about 99% coverage of each vessel's harvest. Outlier points are drawn as circles. To improve the display the y-axis was limited to 200 fish, with 6 outlying harvests between 201 and 500 fish not shown. Overall, the upper skewness of the data was 2.096 (s.e. = 0.0163) and the calculated box-cox power transformation to normalised the data and analysis residuals was λ = 0.12. Total number of data points N = 23098 (unfiltered).

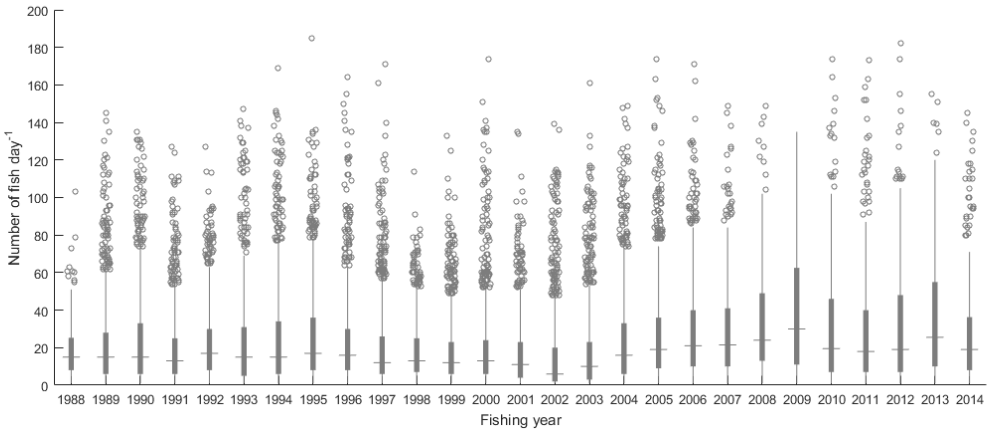

Figure 13. Box plot of daily harvests of Spanish mackerel by fishing year. The plot displays the skewed distributions of harvest around their medians (line in the middle of each box). The bottom and top of each box were the 25th and 75th percentiles. The whisker lengths indicate about 99% coverage of each vessel's harvest. Outlier points are drawn as circles. To improve the display the y-axis was limited to 200 fish, with 6 outlying harvests between 201 and 500 fish not shown.

Figure 13 compared three different catch rate indices of Spanish mackerel abundance between the fishing years 1989 and 2014. A fourth analysis was conducted to verify trends separately on the 2003–2014 data (Figure 22, Appendix 1). The indices from all analyses were scaled relative to their overall time series mean. The following results are noted:

- All indices illustrated a general decline between 1989 and 2002.
- The nominal (unstandardised) and GLMa indices increased strongly post 2002.
- The GLMb indices were adjusted for the change in logbook reporting and showed no increasing trend post 2002.
- The GLMM, which allowed for different logbook reporting effects between primary vessels, predicted increasing indices post 2002.
- All indices indicated a strong decline in 2014.
- Figure 14 illustrated separately the increasing confidence intervals for the GLMa, GLMb and GLMM predictions.
- The significance of the GLMa, GLMb and GLMM model terms used to standardise catch rates are listed in Table 9 (Appendix 1). Significance variance was identified between the primary fishing vessels and the number of tenders operated.
- Scatter plot of the standardised residuals against fitted values is displayed in Figure 21 (Appendix 1). The residual plot showed no lack of model fit for GLMb. The scatter plot was typical for Poisson models and was similar between models.
- The separate analysis of the 2003–2014 data produced indices that was most similar (ρ=0.96) to the GLMM (Figure 22, Appendix 1). The inclusion of the hour's fished data

was significant, but not as important as the number of fishing tenders (Table 10, Appendix 1).

- Figure 15 illustrates the GLMb predicted relationships of increasing catch rates using more tenders, fishing during the spring and autumn months, on the early waxing moon phase and timed with good weather of light SE winds.

The annual standardised catch rate trends from the GLMb and GLMM models were assessed in the stock model.

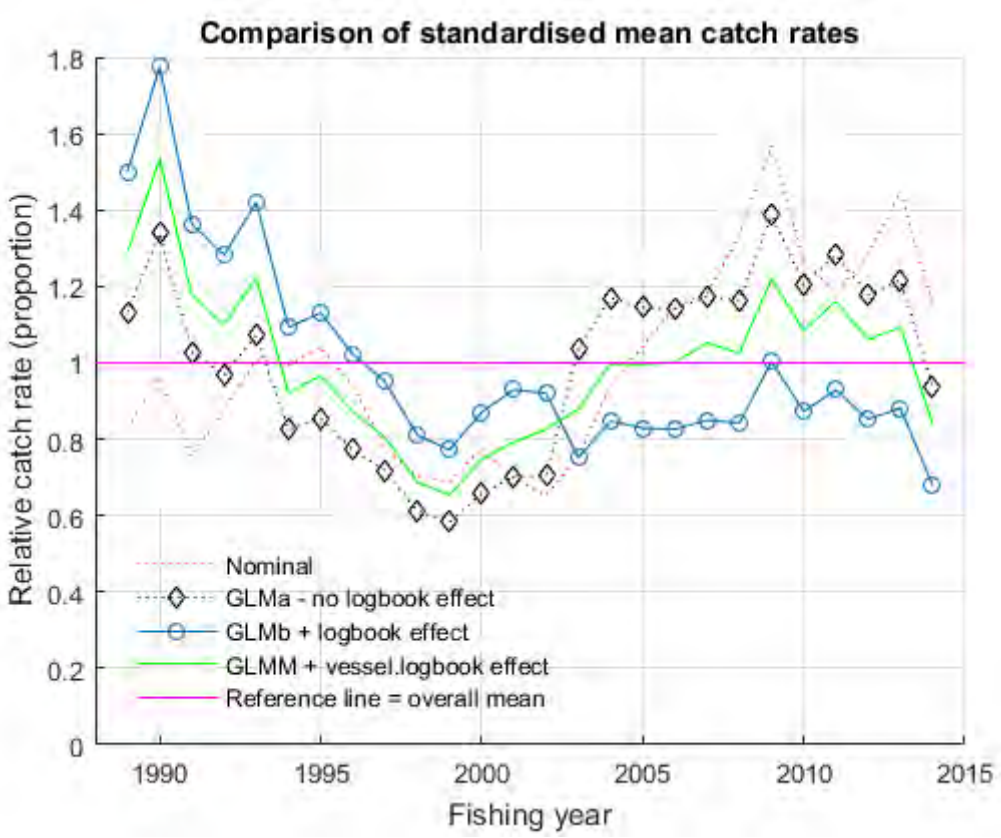

Figure 14. Comparison of Spanish mackerel average catch rates by fishing year 1989–2014. The plot compares nominal reported catch rates against three different standardised predictions. Each catch rate time series was scaled relative to its overall mean (y-axis = 1, reference point line for overall mean catch rate). Note the new TSF01 logbook was introduced in 2003 fishing year.

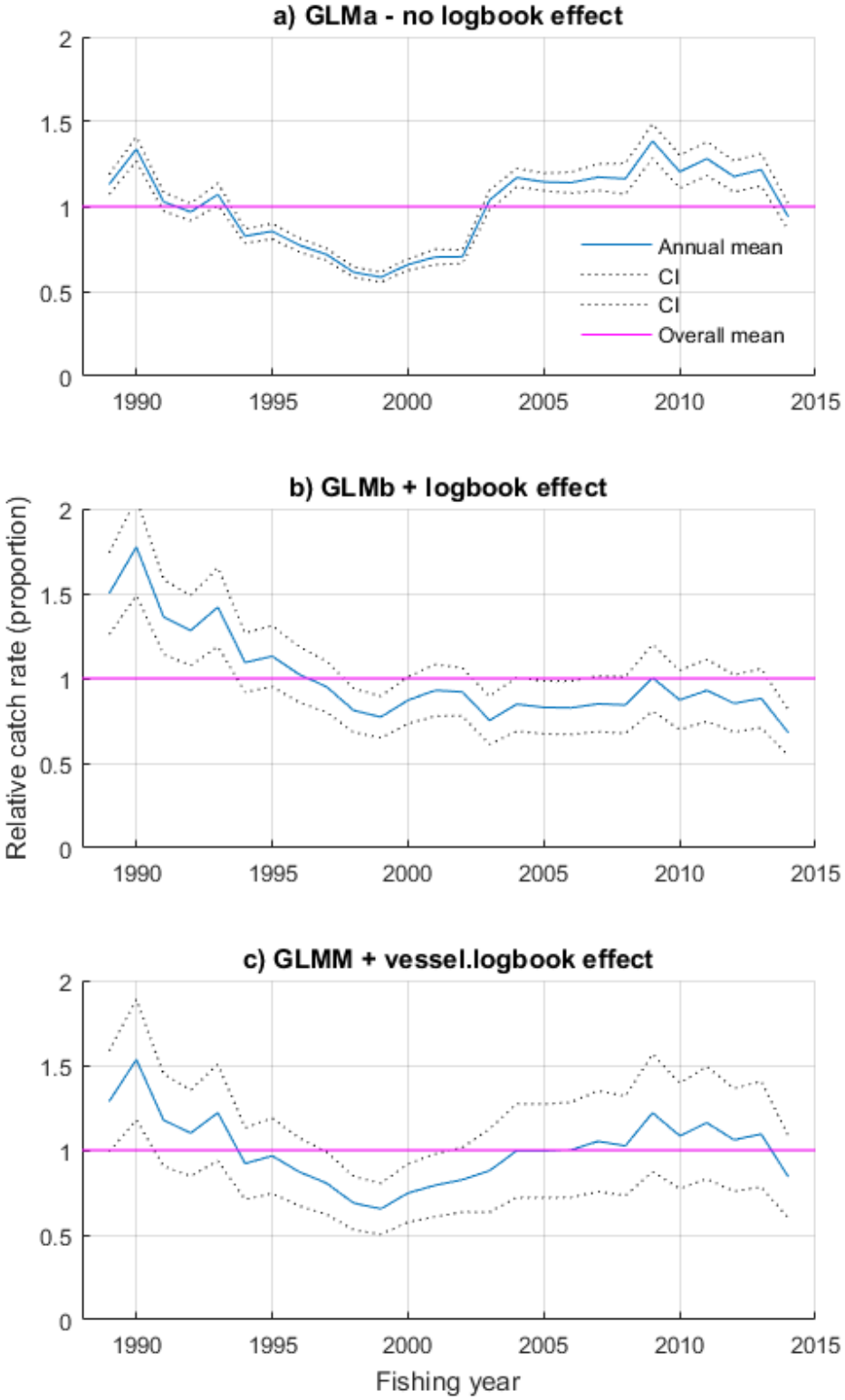

Figure 15. Spanish mackerel average catch rates by fishing year 1989–2014 for the a) Poisson GLMa without logbook effects, b) Poisson GLMb with logbook main effects, and c) Poisson GLMM with logbook effects by vessel. Each catch rate time series was scaled relative to its overall mean (y-axis = 1, reference point line for the overall mean catch rate). The error lines indicate the 95% confidence intervals (CI) on the yearly means.

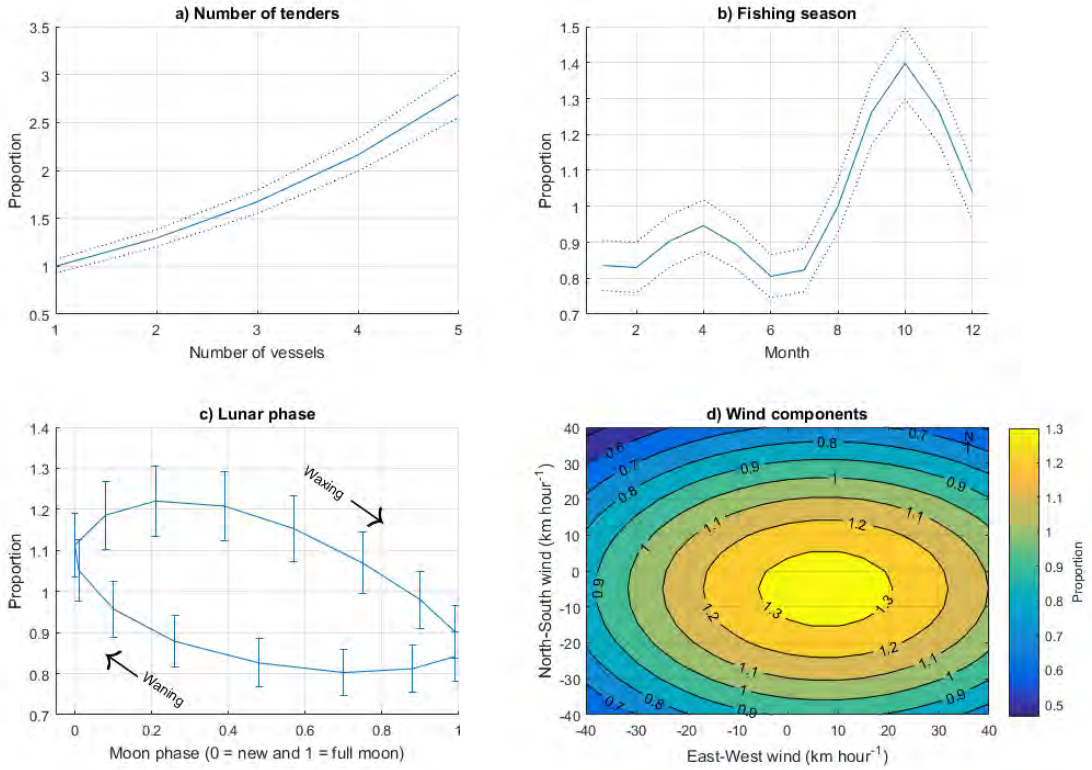

Figure 16. Predicted proportional change in Spanish mackerel catch rates for a) increasing the number of tender vessels per fishing operation, b) the fishing months, c) the lunar phase, and d) the wind speed and direction. The predictions were estimated from the Poisson GLMb with the logbook main effect. Subplot A was scaled relative to the catch rate of one vessel (=1) and subplots b–d were scaled proportional to the overall mean (=1). Subplots a–c outlines the 95% confidence intervals (CI) on the mean predictions.

Fish age-length composition data

The age-length structure of Torres Strait Spanish mackerel has not been monitored for many years. The available age frequencies show limited numbers of old fish from Bramble Cay waters 2000–2002 (Figure 16). Most of the sampled fish were aged in the 2+ to 4+ cohort age-groups. The maximum fish age determined was 10 years, much less than the maximum age found in waters on the Queensland east coast (26 years; Campbell et al., 2012; Langstreth et al., 2014). In recent years, more 4+ to 6+ year old fish have been reported in the Queensland east coast waters (Fisheries Queensland data). No recent data are available to verify if this trend has occurred in the Torres Strait.

For the 2000–2002 samples, female fish were on average slightly larger (Figure 17; females: overall mean = 109 cm TL and std = 10, males: mean = 102 cm TL and std = 8 cm). The average weight of Spanish mackerel from the Torres Strait was not too different to surrounding waters of the Queensland east coast and Gulf of Carpentaria (Figure 6, page 11).

The absence of older fish in the Torres Strait samples is of interest. Reason why are unknown, but may relate to movement patterns of fish and the lack of spatial samples collected across the Torres Strait. On face-value, the truncated age structures may indicate high fish mortality.

The length and age frequencies (Figure 16 and Figure 17) were input into the population dynamic model. High values of natural mortality were explored to explain the lack of old fish.

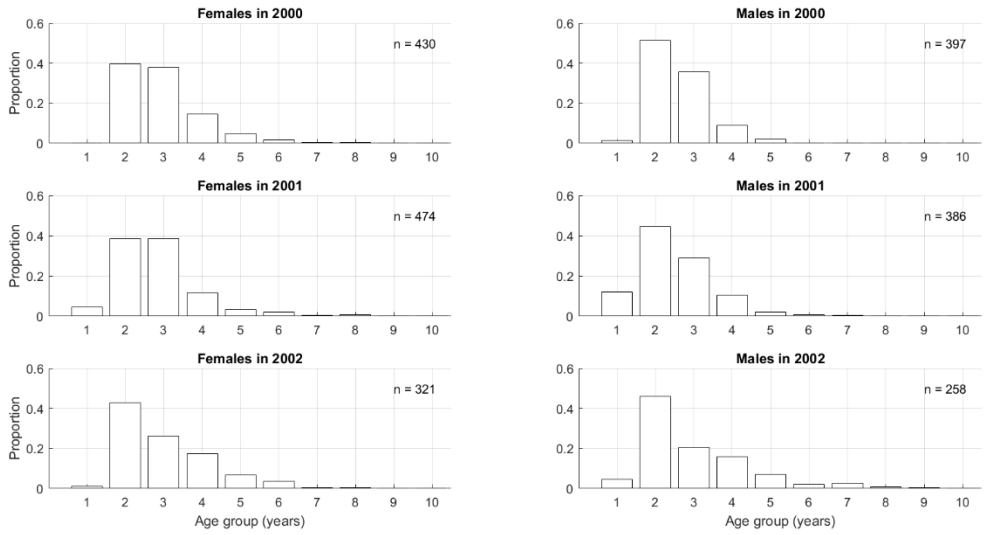

Figure 17. Age group frequencies of Spanish mackerel by fishing year and sex; n is the number of fish.

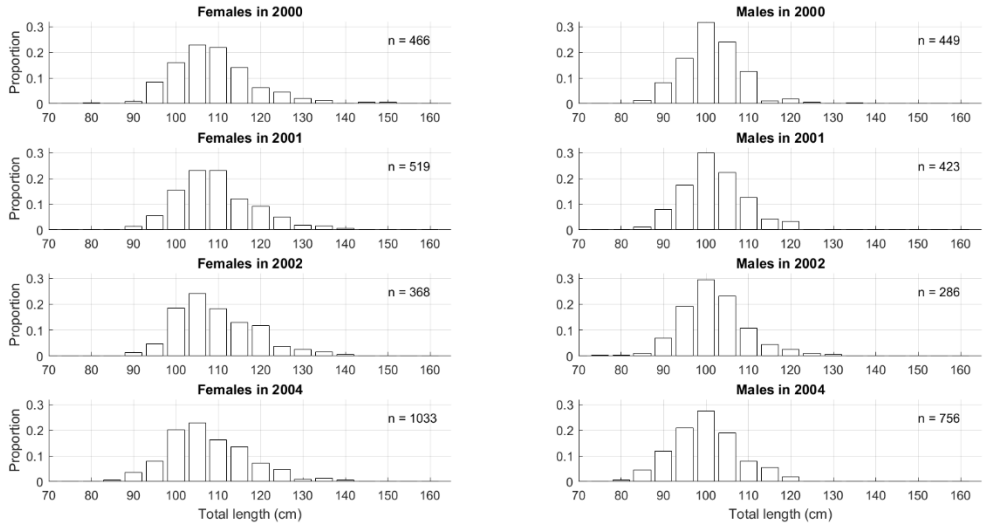

Figure 18. Total length frequencies of Spanish mackerel by fishing year and sex; n is the number of fish. The 2000–2002 data was collected through DAF monitoring and the 2004 data was from AFMA voluntary fisher recordings.

Table 7. Sex specific von Bertalanffy growth parameters used to predict fish total length (cm) from age group data (years). Parameter standard errors are in brackets.

Parameter	Female	Male
l^{∞}	160.320 (11.697)	159.950 (24.304)
κ	0.133 (0.033)	0.081 (0.034)
a^0	-5.781 (0.979)	-9.926 (2.310)
RMSE (std)	6.2	5.2
d.f.	792	644
Adjusted R^2	0.58	0.52

Population dynamics model

In total four stock analyses were conducted to explore uncertainty in the input data. The analyses varied the assumed level of harvest, the catch rate index and natural mortality (*M*):

1. Base reported harvests, GLMb catch rates and *M* estimated;
2. Base reported harvests, GLMb catch rates and *M* fixed = 0.3 year^{-1};
3. Base reported harvests, GLMM catch rates and *M* estimated; and
4. Inflated harvests, GLMb catch rates and *M* estimated.

Estimation of natural mortality was conducted to explain the lack of old fish in the 2000–2002 aging data. The fixed *M* value in analysis 2 was tested to explore a lower value consistent with

the previous Torres Strait and the Australian east coast stock assessments (Begg et al., 2006; Campbell et al., 2012).

The estimated parameters for the four analyses are listed in Table 8, with MCMC parameter traces and variation displayed in Appendix 3. All four analyses resulted in model convergence and sound fits to the input data of catch rates and fish age-length structures (Appendix 3). The results differed between models and suggest precaution is needed for interpreting stock productivity and for setting of management targets for harvest and fishing effort.

The model results assumed deterministic stock-recruitment relationships, constant *M*, age-based vulnerability calibrated on 2000–2002 Bramble Cay data, standardised catch rates were proportional to the exploitable population biomass and that Torres Strait Spanish mackerel comprise of a single stock.

The estimate of recruitment compensation ($r_{comp.} = r_{max.}$) or steepness (h) was not achieved in the first stock assessment due to the limited time series of data (Begg et al., 2006). The estimation was successful herein but varied with model settings (Table 8). The values of steepness are more easily interpreted than $r_{comp.}$ and the formulation measured the expected proportion of virgin recruitment at 20% of virgin egg production (Myers et al., 1999; Begg et al., 2005; Begg et al., 2006). The estimated steepness values from analyses 2 and 3 were higher than analyses 1 and 4 and suggested a more resilient fish stock when *M* was lower or catch rates were increasing (GLMM). The lower estimates of steepness from analyses 1 and 4 resulted from the lower GLMb catch rates and when M was estimated. The estimates of virgin recruitment numbers-of-fish (R_0) were positively correlated with steepness and ranged between 78000 and 259000 fish year^{-1} (Table 8).

The estimates of fish 50% and 95% age-at-vulnerability were consistent between analyses, with $a_{50} \approx 1.6$ years and $a_{95} \approx 2.4$ years (Table 8). Spanish mackerel aged older than or equal to the 2+ age group were mostly fully vulnerable to fishing.

The Spanish mackerel age structures used in the analyses were quite truncated with few older fish (Figure 16). In order to fit this pattern, the analyses estimated high values of *M* (>0.39 year^{-1}; analyses 1, 3 and 4 in Table 8). The high values of *M* were greater than those considered on Australia's east coast (described in Table 5) and may indicate the Bramble Cay samples were not representative of the broader Torres Strait waters or that older fish are moving to surrounding areas (e.g. Papua New Guinea and northern Queensland waters north of 15°S). Spatially stratified fish samples are required to test these questions and confirm stock boundaries. The sampling of Spanish mackerel along the east coast of Australia was expanded in 2003 to account for spatial biases and variation (Sumpton and O'Neill, 2004; Tobin and Mapleston, 2004). Monitoring options for spatial sampling of Spanish mackerel through Torres

Strait waters were modelled in the previous stock assessment and suggested 30 to 40 operation catches were needed from each fishing region per year to approximate the underlying fish length and age structures of the exploited population (Begg et al., 2006).

Table 8. Maximum likelihood parameter estimates for the four sensitivity analyses. Standard errors for all estimates are shown in parenthesis; natural mortality M yr^{-1} was fixed in analysis 2, r_{comp} is the recruitment compensation ratio, h = steepness (proportion) and was calculated from r_{comp}, R_0 = virgin recruitment-numbers of fish, a_{50} = age at 50% vulnerability and a_{95} = age at 95% vulnerability.

Analysis	Settings		Estimates					
	Catch rates	Harvest	r_{comp}	h	R_0 / 10^6	a_{50}	a_{95}	M
1	GLMb	Base	2.218 (0.442)	0.357 (0.044)	0.167 (0.042)	1.562 (0.106)	2.378 (0.239)	0.447 (0.040)
2	GLMb	Base	5.815 (0.818)	0.592 (0.030)	0.078 (0.003)	1.508 (0.107)	2.328 (0.264)	0.3
3	GLMM	Base	4.432 (3.304)	0.526 (0.109)	0.112 (0.030)	1.561 (0.115)	2.390 (0.264)	0.396 (0.047)
4	GLMb	Inflated	2.137 (0.415)	0.348 (0.042)	0.259 (0.069)	1.569 (0.105)	2.391 (0.233)	0.456 (0.040)

The previous stock assessment of Spanish mackerel used data up to the end of the 2003 fishing year. The assessment concluded the Torres Strait stock was fished near maximum sustainable yield (MSY) and exploitable biomass was 26–67% of virgin levels (Begg et al., 2006). Now for this updated assessment, 11 more years of data have been analysed where harvests and fishing effort have declined since 2007 (Figure 8 and Figure 9). The following predictions were made for the 2014 fishing year:

- For all four analyses the fishing mortality indicators were sustainable ($F_t < F_{MSY}$, Figure 18a).
- However, analyses 1 and 4 still measured possible high fishing pressure in the last five years 2010–2014 ($F_{\max} \approx F_{MSY}$, Figure 18b).
- Levels of median fish recruitment appeared healthy (Figure 18c).
- For analyses 1, 2 and 4, the estimated mature female spawning stock was at about 40% of virgin levels (Figure 18d). The estimate was near 60% for analysis 3. There was no suggestion of stock collapse or recruitment overfishing ($E_t > E_{20\%}$). The lower E_t predictions of analyses 1, 2 and 4 used GLMb catch rates that assumed little increase in the stock since about 1999 (Figure 14b).

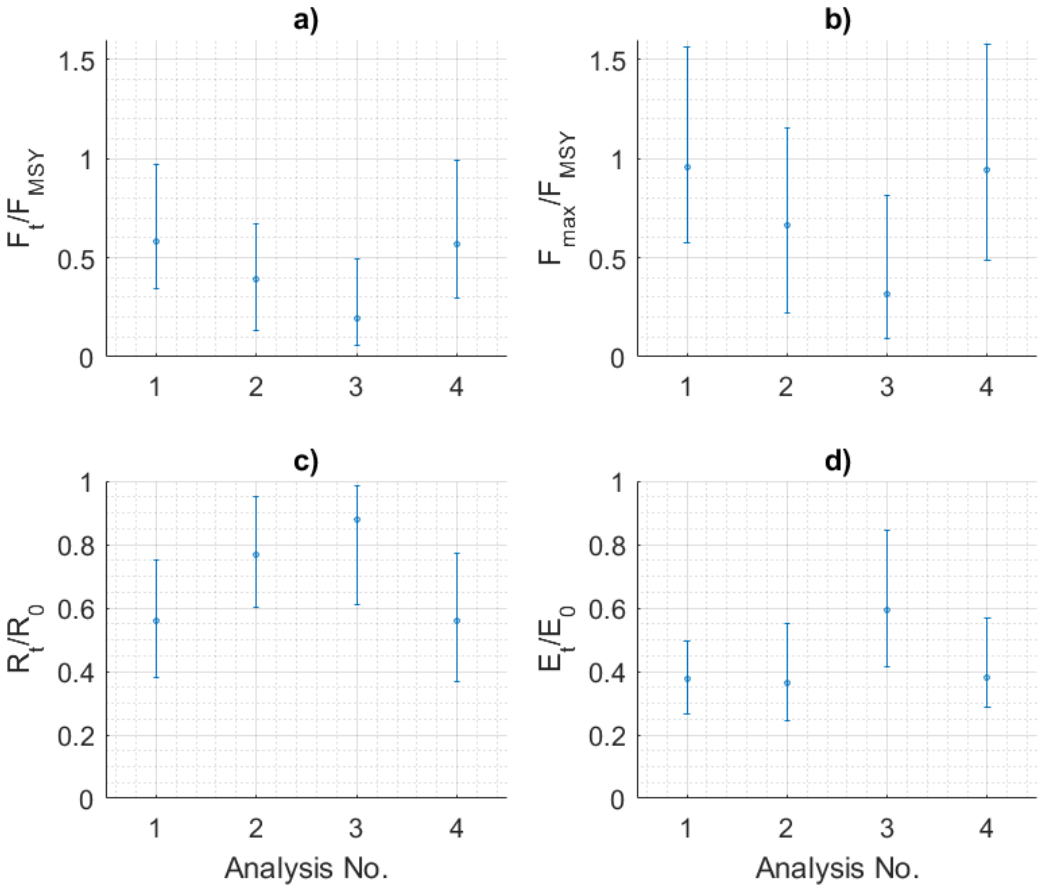

Figure 19. The estimated stock status ratios of Spanish mackerel for a) fishing mortality (F) in the t = 2014 fishing year compared against F for MSY, b) maximum F from the last 5 years 2010–2014, c) fish recruitment compared against virgin and d) female egg production compared against virgin. The errors bars cover the minimum and maximum estimates and the point estimates (circles) are the medians from the MCMC simulations.

As outlined in the methods section, fishery management reference points were estimated corresponding to equilibrium (average) B_{MSY} and assumed $B_{MEY} \approx 0.6B_0$. The reference points correspond to the concepts used by the Australian Government (Australian Government, 2007). No formal or other reference points have yet been set for Torres Strait finfish (Patterson et al., 2015). In the draft management plan for Torres Strait finfish only reference is made to ensuring the total catch of target species is at or below agreed annual limits (Australian Government, 2013).

The reference point estimates and their variances are displayed in Figure 19. The estimates varied with analysis settings and the exact true values remain unclear; and will so without improved long term monitoring. The estimates suggest the harvests taken prior to 2007 (Figure 8a) were near or exceeding maximum sustainable levels (as noted by Begg et al., 2006). The reference point predictions are summarised as follows:

- MSY was estimated near 150 t for analyses 1 and 2 (Figure 19a).
- MSY was higher near 200 t for analyses 3 and 4 with larger error (Figure 19a).
- Analysis 4 had the highest reference point harvests assuming the inflated harvest schedule (Figure 19a & b).
- Annual harvests below 150 t was estimated from analyses 1–3 to maintain heathy biomass and catch rates (Figure 19b).
- The fishing effort E_{MSY} estimate from analysis 3 (Figure 19c) was uncertain due to greater error on r_{comp} and steepness (Table 8).
- E_{MSY} from analyses 1, 2 and 4 ranged 800–1250 operation days (Figure 19c).
- The total fishing effort levels to attain average $B_{0.6}$ ranged 400–700 operation-days year^{-1} across analyses (Figure 19d).
- Average catch rate levels for implying B_{MSY} were about 23 Spanish mackerel operation-day^{-1} for analyses 1, 2 and 4 (Figure 19e). The analysis 3 catch rate was lower at about 14 fish.
- Average catch rates for implying $B_{0.6}$ were highest at 45 fish for analysis 2 assuming lower *M*, lowest at 28 fish for analysis 3 assumed the GLMM index and about 35 fish for analyses 1 and 4 (Figure 19f)

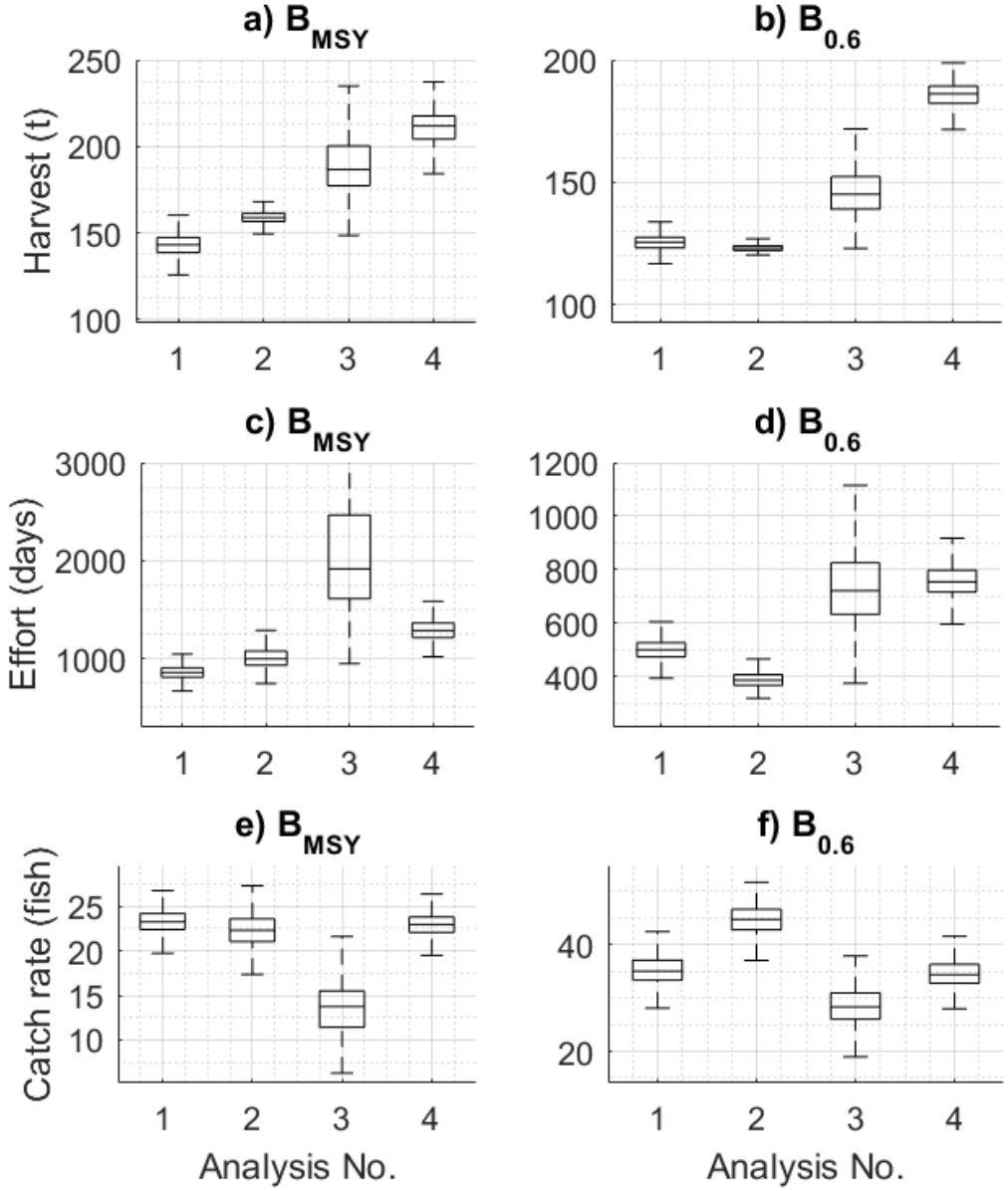

Figure 20. The estimated equilibrium reference points for Spanish mackerel, where the first column of boxplots (a, c and e) were for the exploitable biomass at MSY ($B_{MSY} \approx B_{0.4}$) and the second column of boxplots (b, d and f) were for a higher exploitable biomass at 60% of virgin ($B_{MEY} \approx B_{0.6}$); each row of the reference point boxplots were for harvest, fishing effort (operation days) and catch rate operation-day^{-1}. Each boxplot illustrates the distribution around the median (line in the middle of each box). The bottom and top of each box were the 25th and 75th percentiles. The whisker lengths indicate about 99% coverage of the MCMC simulations. For boxplot c) analysis 3, the upper effort estimates extended above 3000 days.

Conclusions

The stock assessment analyses of Torres Strait Spanish mackerel conclude that the recent harvests 2007–2014 and population estimates were sustainable. Since 2008 the Torres Strait Finfish Fishery has been reserved for Traditional Inhabitants, on whose behalf the Torres Strait Regional Authority (TSRA) leases out fishing licences to non-Traditional Inhabitants. Over this time commercial fishing effort had eased compared to before 2008 (Figure 9). Despite the reduction, the leasing process should still consider the revised estimates of sustainable harvests for Spanish mackerel, with the aim to generate sustainable markets and revenue for the benefit of Torres Strait communities. Future management should also consider benchmarking a target reference point above B_{MSY} to ensure healthy population biomass and catch rates of Spanish mackerel; in order to achieve and balance sustainability, economic, social and cultural objectives (Australian Government, 2007; Australian Government, 2013; Australian Government, 2015). If future average harvests increase above 150 t and/or fishing effort increases above 1000 operation days (Figure 20), then catch rates of Spanish mackerel may erode long term.

A harvest strategy framework (Sloan et al., 2014) for the finfish fishery has been sought by the PZJA (Torres Strait Scientific Advisory Committee project call, 2016) to guide decisions on future monitoring, harvests and fishing effort and leasing arrangements. Stock status indicators and reference points have been calculated herein that can support design of a harvest strategy, but further investment in monitoring data is required to reduce indicator variances and biases. A total of nine monitoring data recommendations were listed in the 2006 stock assessment report (Begg et al., 2006). A number of these are outstanding after 10 years. In order to service future harvest strategy procedures for Torres Strait Spanish mackerel (empirical or stock model based) improvements in the data are required:

- Verify records on fishing effort and harvest through logbook, docket book and electronic reporting systems [*for harvest and/or standardised catch rate assessments*]. This involves recording and validating:
    - trip harvests and average fish weights using unload/sale receipts,
    - number of dories used and hours fished each operation day,
    - the number of and fishing locations of the primary operation and dories using VMS/GPS latitude and longitude coordinates,
    - number of fish caught each operation and dory day,
    - zero catches, and
    - days when fishing is stopped due to capacity limitations (too many fish).
- Monitor and estimate Spanish mackerel harvests taken by non-commercial sectors [*for stock model assessments*].

- Conduct regular (annual or biennial) long term monitoring of fish age-length structures that are spatially representative of the Torres Strait [*for mortality and/or stock model assessments*].
- Collect fine scale spatially representative genetic fish samples to test the single stock assumption and define stock boundaries [*for stock model assessments*].

Review of the stock structure literature is complex and the single stock hypothesis is not clear cut for Torres Strait Spanish mackerel. Genetic results suggest Spanish mackerel exists as localised assemblages and experience attenuated levels of reciprocal gene flow that is biased towards males (Buckworth et al., 2007). However, otolith isotopes suggest some similarity between Torres Strait and Gulf of Carpentaria Spanish mackerel (Newman et al., 2009). No stock structure data have been evaluated from north east Queensland (north of 15°S) or Papua New Guinea waters.

This stock structure uncertainty does not undermine the management and assessment of Torres Strait Spanish mackerel as a single unit and at this time it would be detrimental to combine Torres Strait data into a larger area with other jurisdictions. This is so because of the seasonal and spatial predictability of Spanish mackerel aggregations and risks of localised overfishing. This risk and event has been documented for spawning aggregations along Queensland's east coast (Tobin et al., 2013; Tobin et al., 2014). The stock structure uncertainty highlights that finer spatial scaled sampling is required to further discriminate Spanish mackerel between the Torres Strait and surrounding waters.

If future improvement in data is not cost effective or supported, then use of precautionary reference points to judge abundance (standardised catch rate) indicator signals is essential for mitigation of indicator variance and uncertain management decisions.

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Appendix 1: Catch rate diagnostics

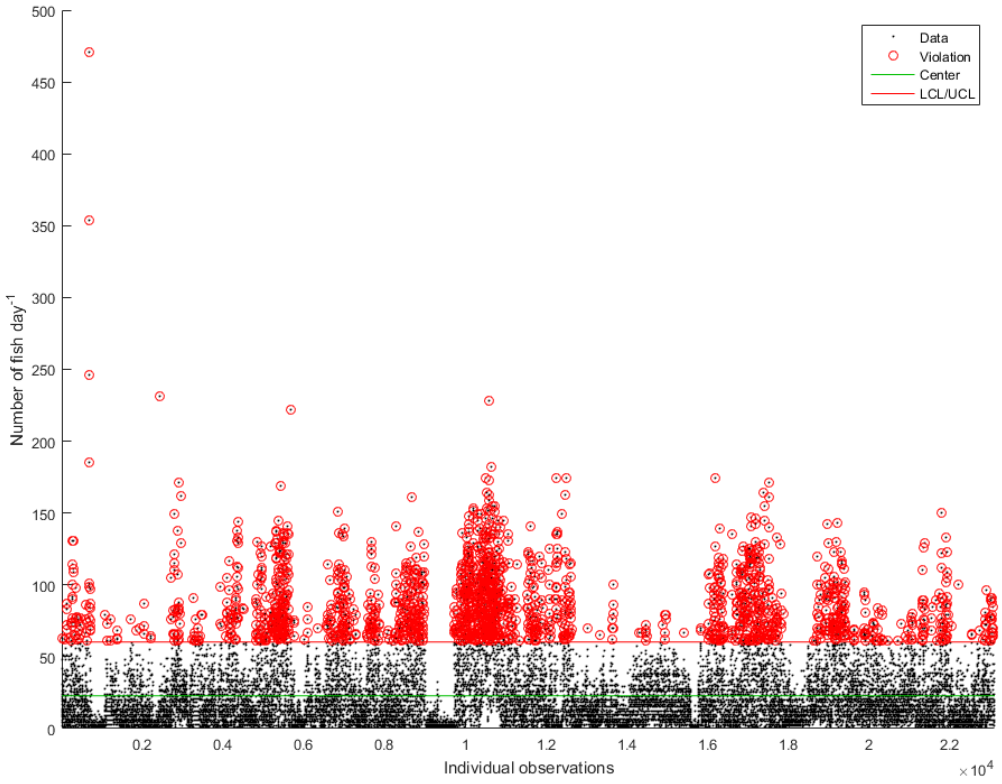

Figure 21. Shewhart control chart for each daily Spanish mackerel harvest by vessel (observed data unfiltered). The centre green line is the overall mean and upper and lower control limits (UCL, LCL) at three standard errors from the centre line. Out of control limits for normally distributed data/expectations are marked with a red circle.

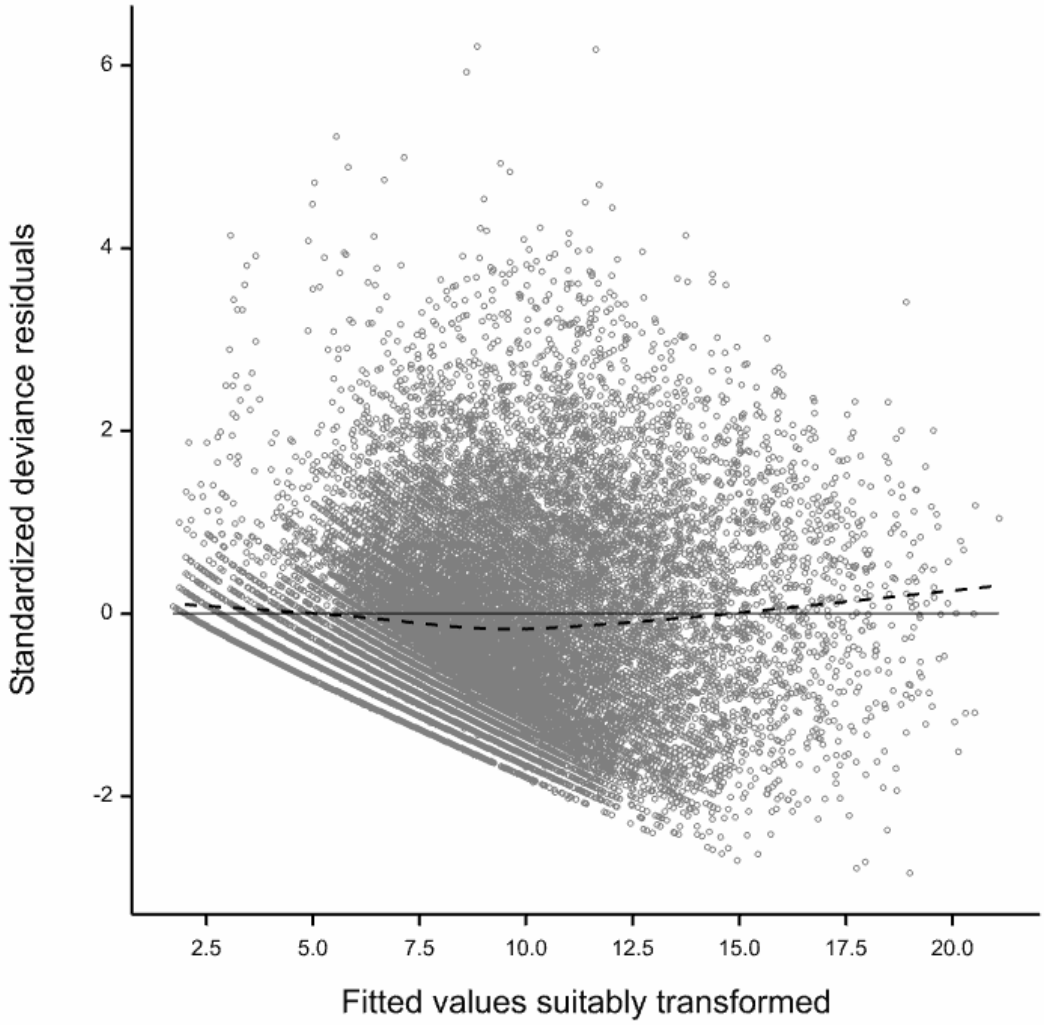

Figure 22. Plot of standardised residuals against fitted values from the Poisson GLMb analysing numbers of Spanish mackerel with vessel and logbook main effects (model b, Table 9). The plot shows circle symbols for the goodness-of-fit data, a solid zero reference line and a dashed smoothed trend line.

Table 9. Analysis of deviance tables for the over-dispersed Poisson models used to standardise catch rates: a) Poisson generalised linear model (GLM) with no modelled logbook effect, b) Poisson GLM with logbook main effect, and c) Poisson generalised linear mixed model with nested random effects of logbook by vessel.

a) Poisson GLMa with no logbook effect

Adjusted R^2= 0.38
Residual mean deviance = 13.0
Residual degrees of freedom (d.f.) = 22468

Fixed terms	**d.f.**	**F statistic**	**pr.**
Fishing year	26	53.86	<0.001
Vessel	39	96.87	<0.001
s_1	1	19.16	<0.001
s_2	1	384.56	<0.001
s_3	1	270.74	<0.001
s_4	1	74.15	<0.001
Number of tenders	1	1028.99	<0.001
Lunar phase	1	203.16	<0.001
Lunar phase advanced	1	571.81	<0.001
windns	1	6.07	0.014
windnsQ	1	13.12	<0.001
windew	1	5.8	0.016
windewQ	1	60.92	<0.001

b) Poisson GLMb with logbook main effect

Adjusted R^2 = 0.38
Residual mean deviance = 13.0
Residual degrees of freedom (d.f.) = 22467

Fixed terms	**d.f.**	**F statistic**	**pr.**
fishyear	26	32.61	<0.001
boat	39	97.1	<0.001
logbook	1	13.17	<0.001
c12	1	21.06	<0.001
cs12	1	385.1	<0.001
c6	1	274.9	<0.001
cs6	1	71.2	<0.001
tenders	1	1032.94	<0.001
lunar	1	203.02	<0.001
lunar_adv	1	571.24	<0.001
windns	1	6.15	0.013
windnsQ	1	12.94	<0.001
windew	1	5.85	0.016
windewQ	1	60.89	<0.001

c) Poisson GLMM with Normal random boat.logbook effects

Residual mean deviance = 14.75 (s.e. = 0.14)
Residual degrees of freedom (d.f.) = 22504

Fixed terms	**d.f.**	**F statistic**	**pr.**
fishyear	26	28.64	<0.001
c12	1	20.47	<0.001
cs12	1	315.21	<0.001
c6	1	243.59	<0.001
cs6	1	62.76	<0.001
tenders	1	938.21	<0.001
lunar	1	181.04	<0.001
lunar_adv	1	499.67	<0.001
windns	1	4.9	0.027
windnsQ	1	11.57	<0.001
windew	1	4.85	0.028
windewQ	1	54.46	<0.001
Random terms		**component**	**s.e.**
boat		0.3	0.11
boat.logbook		0.18	0.07

Table 10. Analysis of deviance table for the over-dispersed Poisson model used to standardise catch rates between 2003 and 2015. The reduced time-series data included the total hours fished per vessel day.

d) Poisson GLM with logbook data after June 2003

Adjusted R^2= 0.49
Residual mean deviance = 12.6
Residual degrees of freedom (d.f.) = 7030

Fixed terms	**d.f.**	**F statistic**	**pr.**
Fishing year	11	11.07	<0.001
Vessel	17	121.16	<0.001
s_1	1	2.81	0.0094
s_2	1	103.72	<0.001
s_3	1	89.9	<0.001
s_4	1	42.18	<0.001
Number of tenders	1	205.06	<0.001
Hours fished (combined for all tenders)	1	90.01	<0.001
Lunar phase	1	110.02	<0.001
Lunar phase advanced	1	199.18	<0.001
windns	1	12.71	<0.001
windnsQ	1	5.4	0.020
windew	1	9.26	0.002
windewQ	1	18.55	<0.001

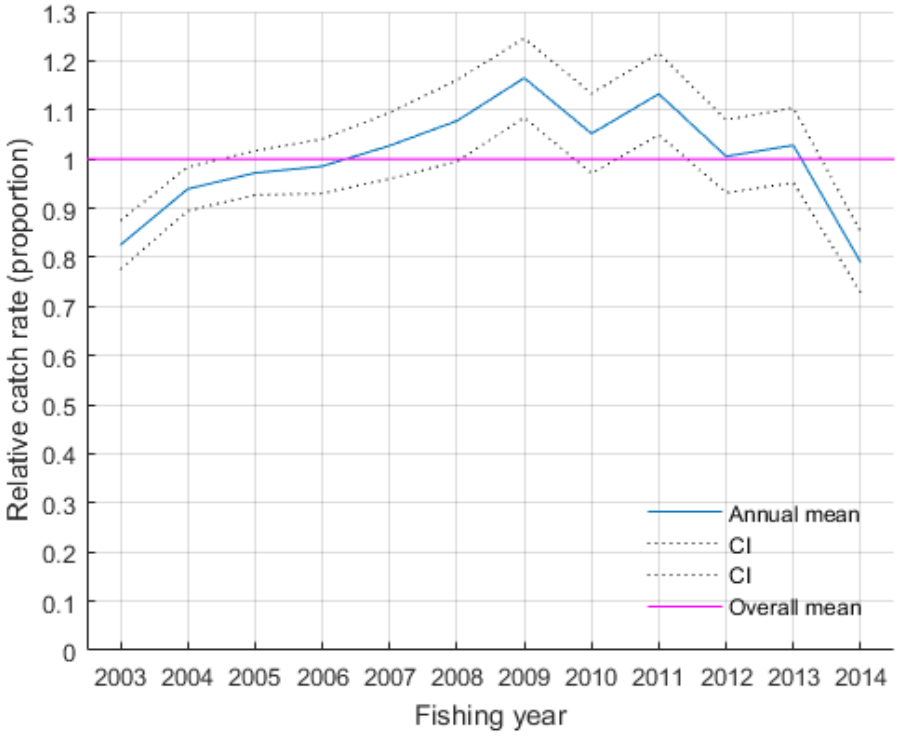

Figure 23. Spanish mackerel average catch rates by fishing year 2003–2014 as predicted from the over-dispersed Poisson GLM (Table 10; analysis d). The data set included the total hours fished per vessel day. The catch rate time series was scaled relative to the overall mean (y-axis = 1, reference point line for the overall mean catch rate). The error lines indicate the 95% confidence intervals (CI) on the yearly means.

Appendix 2: Calculation of fish age group

J. Langstreth, Fisheries Queensland, 2015

Recommendation on assigning age group to Torres Strait Fish

- **For fish caught in April** (9 fish): age group = increment count. (No adjustment required). However, as April is 6 months after October, if you choose to use them in the ALK, then you should consider adjusting the length as they are likely to have had significant growth from the same cohort of fish caught back in October (possibly in the order of 5-10 cm growth for the main age groups)
- **For fish caught in October :**
    - **New edge types –** age group = increment count
    - **Intermediate edge types (codes 1 & 2) –** age group = increment count
    - **Wide edge types –** age group = increment count **+ 1**

Information to base recommendation

For the GOC & EC Spanish (based on LTMP data), the trend in the timing of edge types being laid down on the otolith are very similar (Figure 23 and Figure 24). (I have plotted EC by fin yr & GOC by calendar year based on our respective LTMP sampling seasons). New edge types are mostly visible on the otolith from June/July, and as spring growth occurs, we can observe intermediate growth (translucent material) on the edge from September.

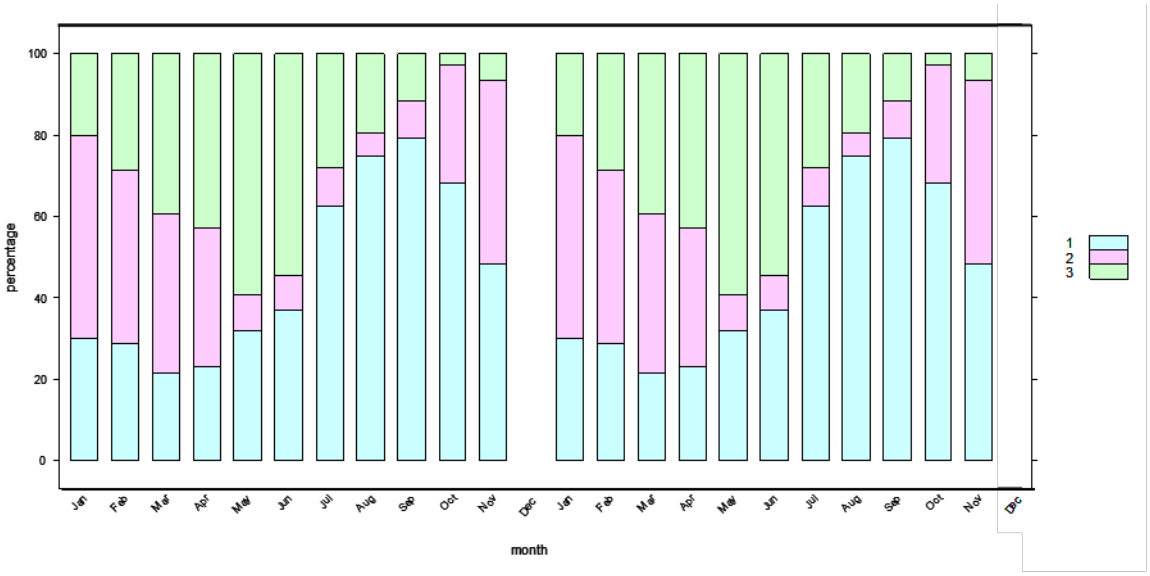

Figure 24. Gulf trend for edge type by month.

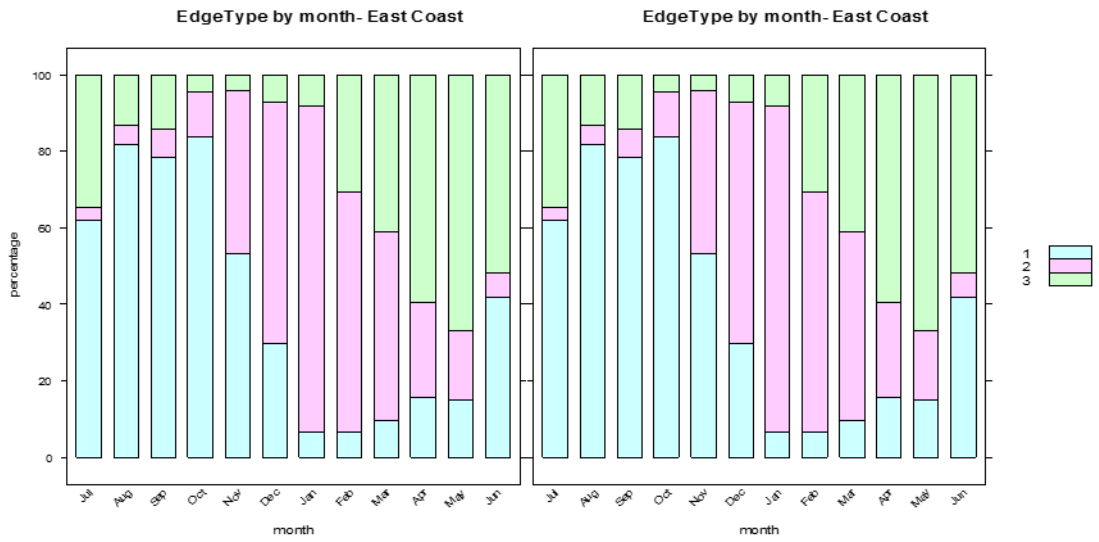

Figure 25. EC trend for edge type by month.

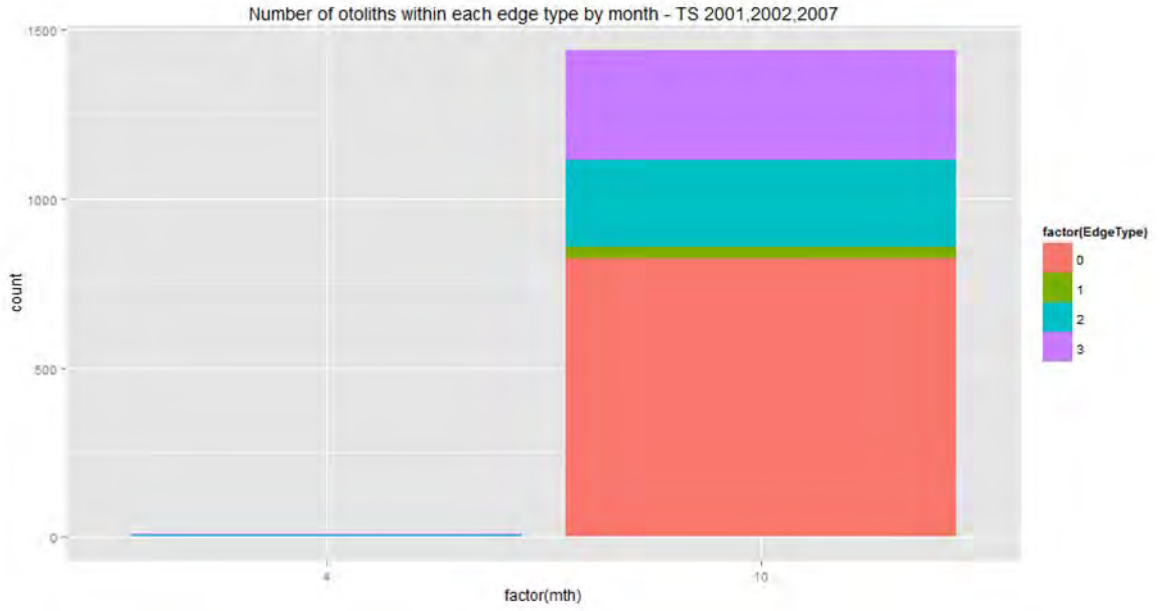

Figure 26. Torres Strait - edge type by month.

Note –edge type was not recorded during the first year of sampling in 2000.

- The majority (57%) of TS fish sampled during October are in the '**New'** Edge type (Figure 25). This suggests that for these, their increment count accurately reflects their age group (i.e. age that these fish will attain in that financial year). E.g. a 2 year old fish with a new increment shows 2 increments and will not show another new increment until the next August-Oct period in the following financial year.

- However, for fish that have a **wide** edge (23%), the increments showing on the otoliths are one less than would be if the fish lasted for the remainder of the financial year. They should be kept in the same cohort with fish that have just shown their 'new' edge type. Therefore the fish would be in one higher than increment count. This is supported by the fact that there are 13 0-wide fish in the TS data, which have to be in the 1-year age group to have reached minimum legal size (it is highly unlikely these fish are under 4 months old). So we should plus one to the increment count for fish with wide edge types as the age class and age group should be one higher than the otolith shows.
- For **intermediates** (20%), at this time of year, fish have most likely had some significant growth already since "winter" and therefore laid down some translucent material following laying down their opaque increment. This is in line with what occurs on the EC & in GOC fisheries (see plots above). These fish will not lay down another opaque band/increment before the end of the financial year, and are therefore their increment count represents the age group (max. age they will attain in that financial year).
- **For fish caught in April**, they are either intermediates or wides. In April, being near the end of the financial year, fish will have laid down their increment for that financial year already & not go through the cycle to lay down another before the end of June. If there were 'news' caught in April (but there aren't), we would take one increment off to calculate age group.

Code recording the interpretation of the otoliths margin (For Torres Strait Data). This is different for EC & GOC data.

0. Opaque on the margin (New)
1 0-33% of the margin is translucent (Intermediate)
2 34-66% of the margin is translucent (Intermediate)
3 67-100% of the margin is translucent (Wide)

For East Coast – 1 – New, 2 – Intermediate, 3 - Wide

Appendix 3: Stock model diagnostics

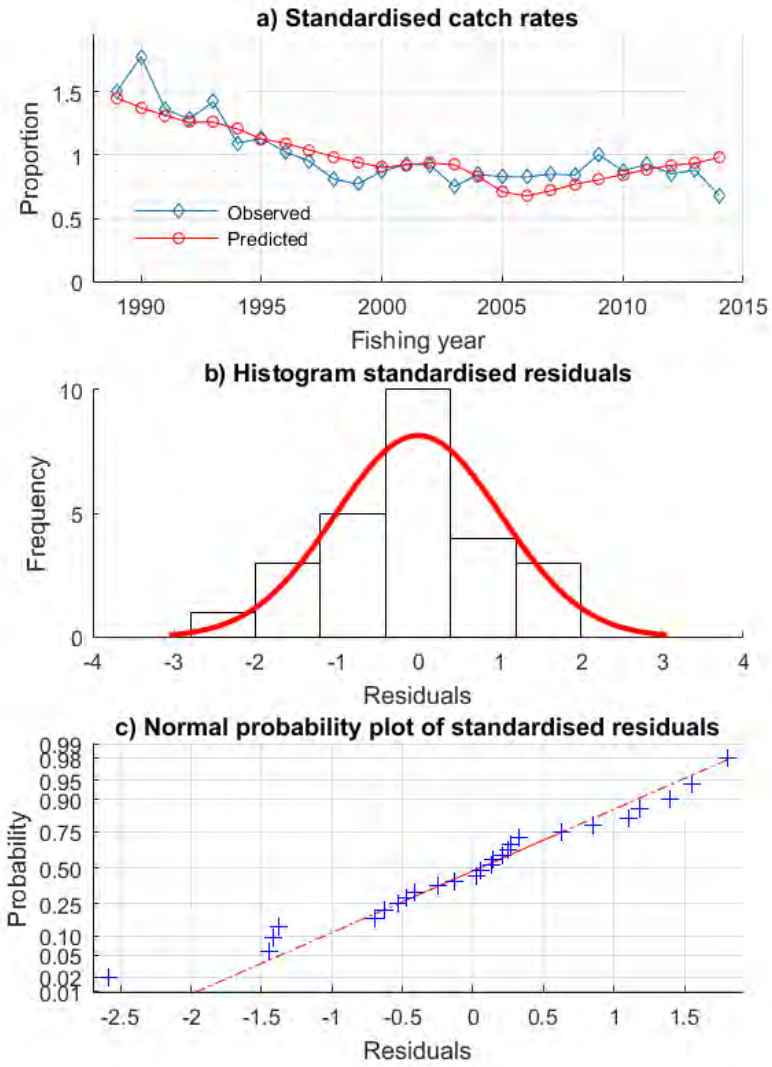

Figure 27. Stock analysis 1 catch rate fit and standardised residuals.

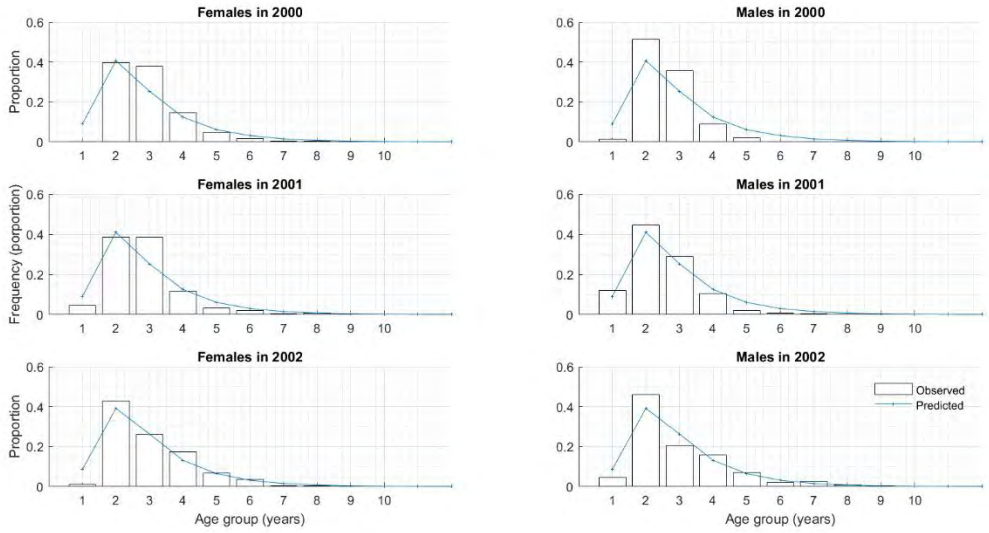

Figure 28. Stock analysis 1 prediction of fish ages. The predicted model fits were similar for other analyses.

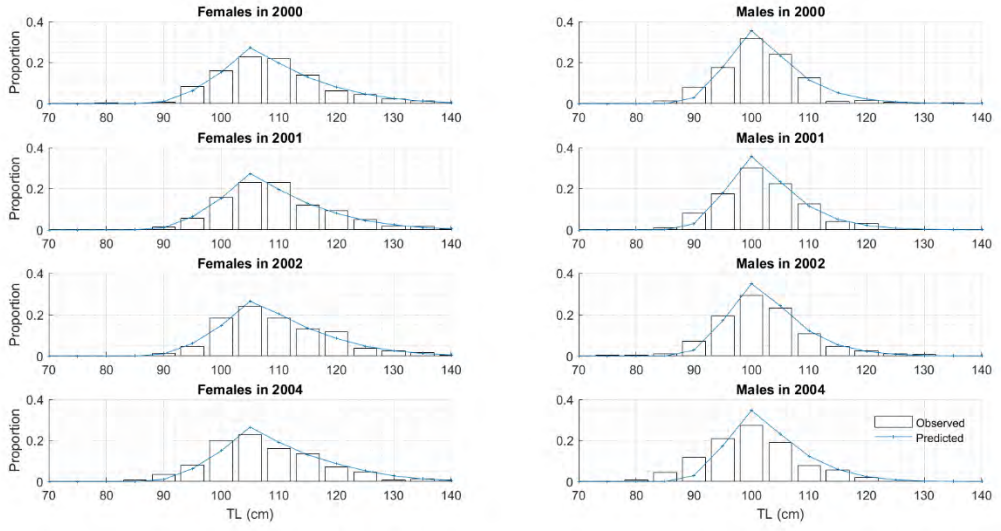

Figure 29. Stock analysis 1 prediction of fish total lengths. The predicted model fits were similar for other analyses.

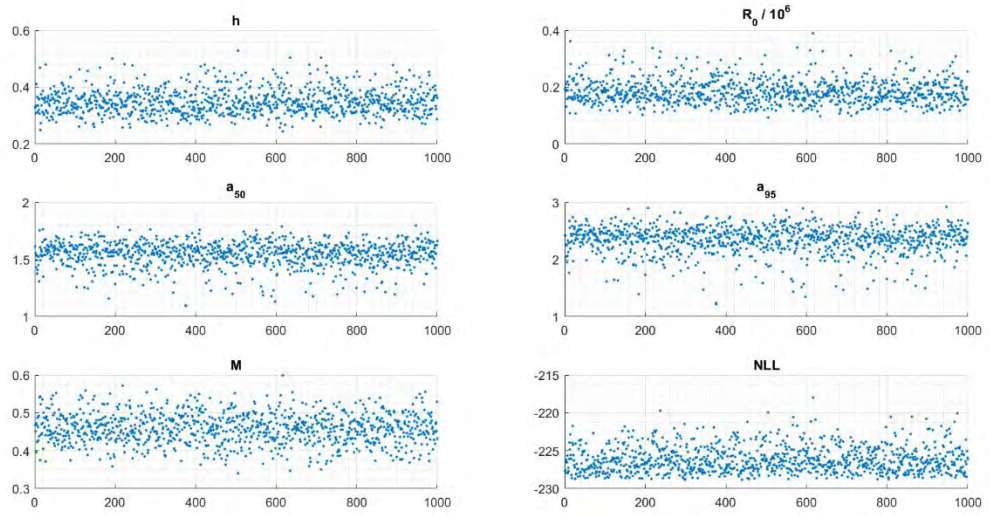

Figure 30. Serial plot of the retained values from the stock model analysis 1 Markov chain Monte Carlo optimisation (MCMC), where h = steepness (proportion), R_0 = virgin recruitment-numbers of fish, a_{50} = age at 50% vulnerability, a_{95} = age at 95% vulnerability, M = natural mortality yr^{-1} and NLL = combined negative log-likelihood. n = 1000 data points per subplot. Auto correlations were low and nonsignificant between -0.05 and 0.05 and the heidel test nonsignificant and passed stationary for all parameters p>0.1.

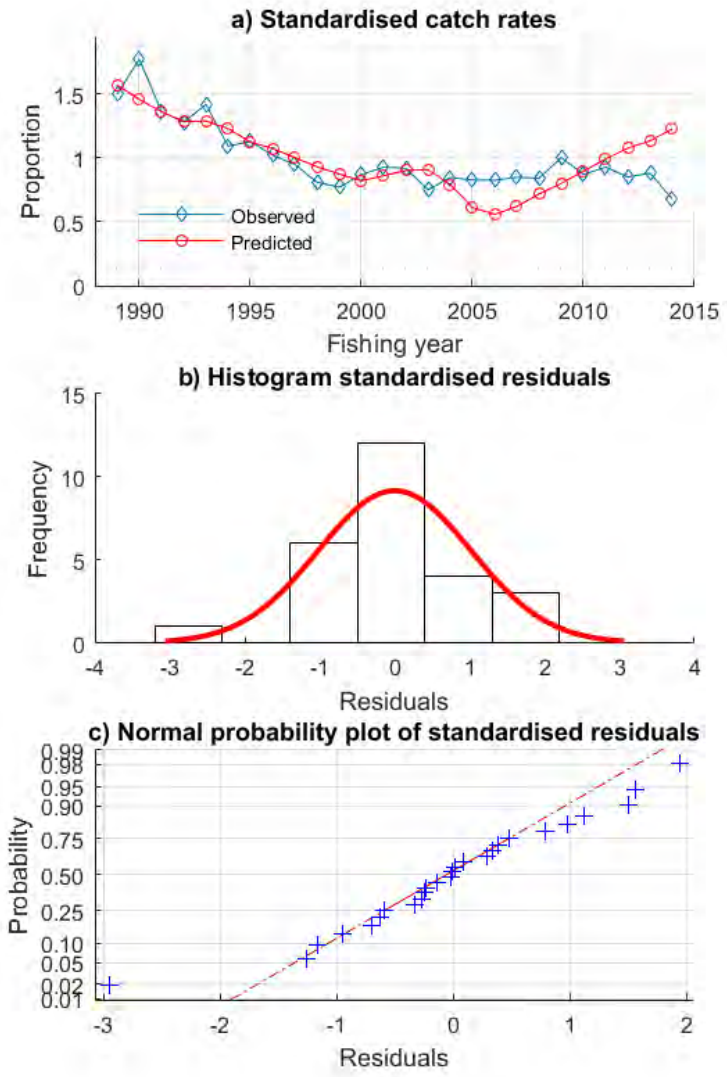

Figure 31. Stock analysis 2 catch rate fit and standardised residuals.

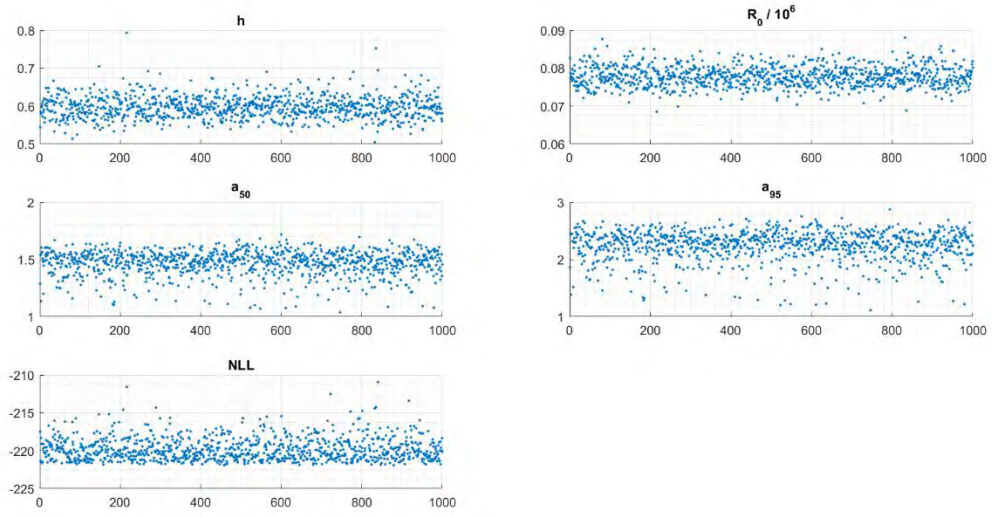

Figure 32. Serial plot of the retained values from the stock model analysis 2 Markov chain Monte Carlo optimisation (MCMC), where h = steepness, R0 = virgin recruitment, a50 = age at 50% vulnerability, a95 = age at 95% vulnerability and NLL = combined negative log-likelihood; natural mortality M was fixed = 0.3 yr^{-1}. n = 1000 data points per subplot. Auto correlations were low and nonsignificant between -0.03 and 0.03 and the heidel test nonsignificant and passed stationary for all parameters p>0.5.

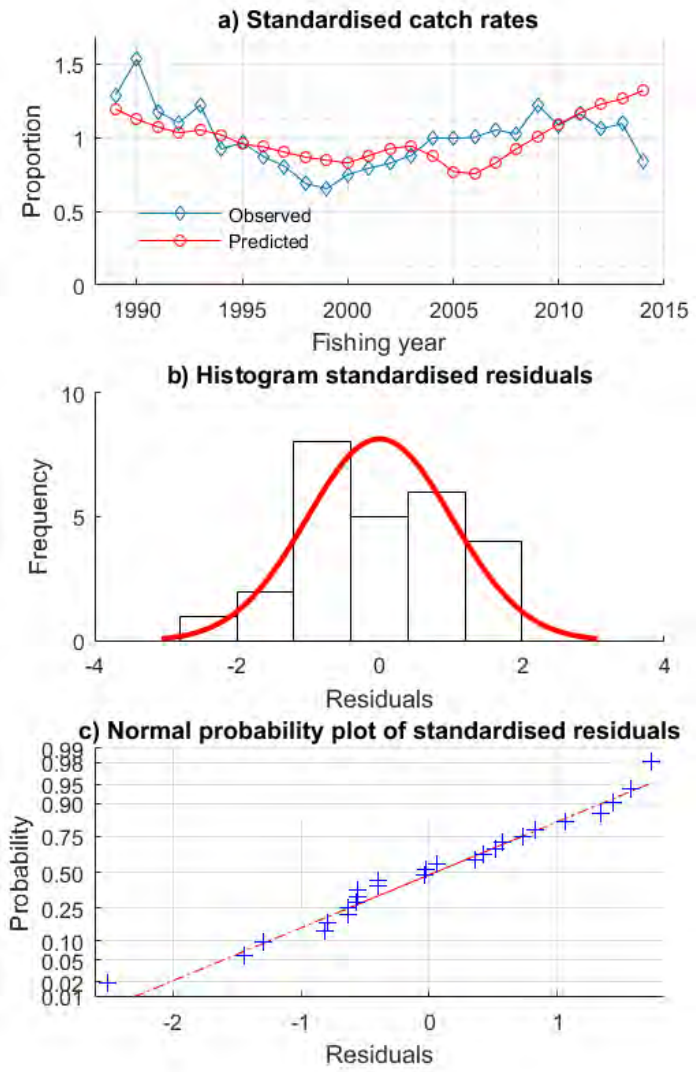

Figure 33. Stock analysis 3 catch rate fit and standardised residuals.

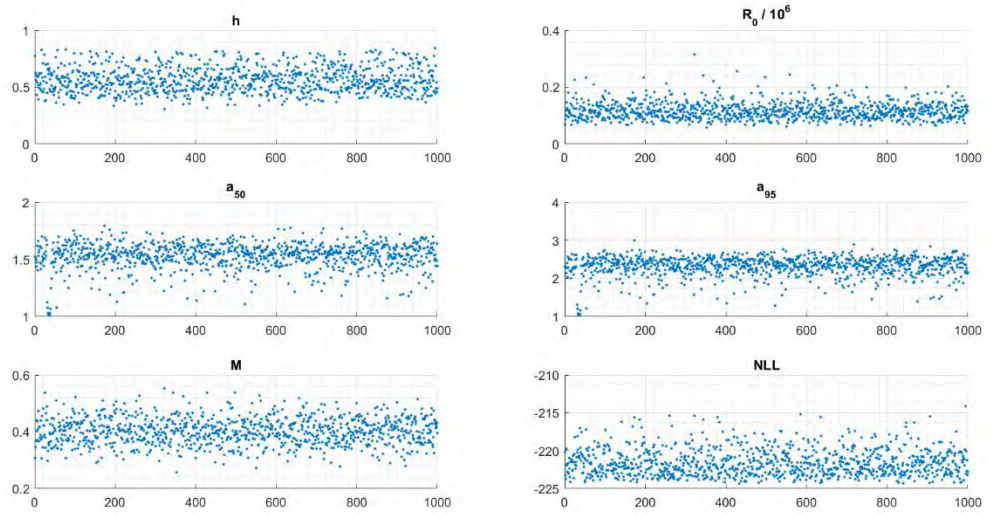

Figure 34. Serial plot of the retained values from the stock model analysis 3 Markov chain Monte Carlo optimisation (MCMC), where h = steepness, R_0 = virgin recruitment, a_{50} = age at 50% vulnerability, a_{95} = age at 95% vulnerability, M = natural mortality and NLL = combined negative log-likelihood. n = 1000 data points per subplot. Auto correlations were low and nonsignificant between -0.04 and 0.12 and the heidel test nonsignificant and passed stationary for all parameters p>0.2.

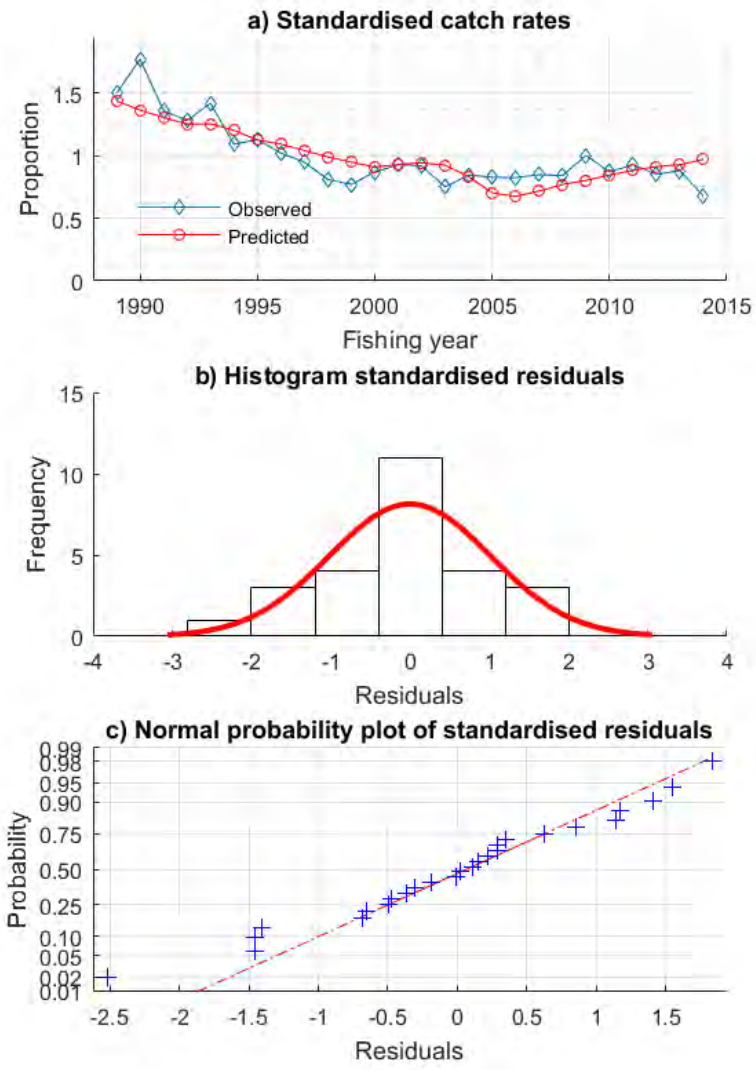

Figure 35. Stock analysis 4 catch rate fit and standardised residuals.

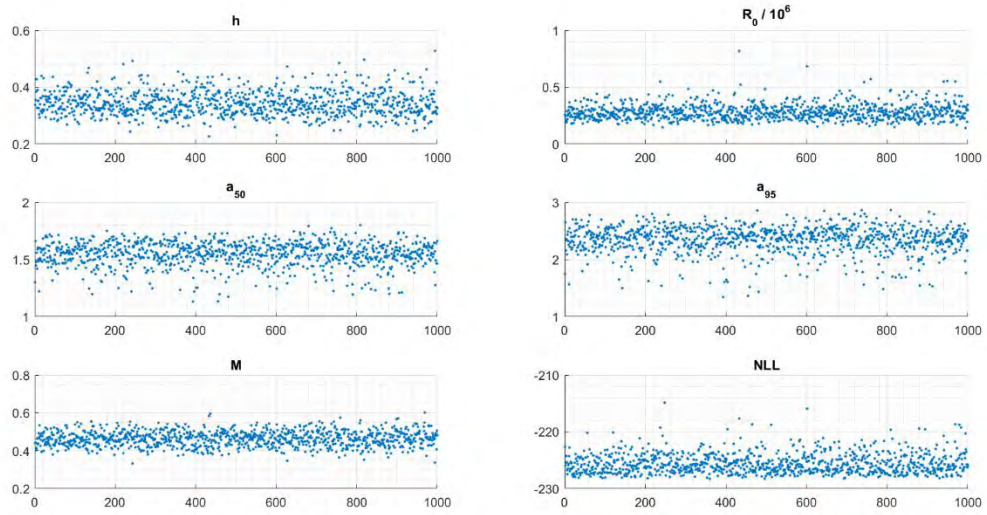

Figure 36. Serial plot of the retained values from the stock model analysis 4 Markov chain Monte Carlo optimisation (MCMC), where h = steepness, R_0 = virgin recruitment, a_{50} = age at 50% vulnerability, a_{95} = age at 95% vulnerability, M = natural mortality and NLL = combined negative log-likelihood. n = 1000 data points per subplot. Auto correlations were low and nonsignificant between -0.08 and -0.02 and the heidel test nonsignificant and passed stationary for all parameters p>0.15.

Appendix 4: Commercial fishing log – TSF01

Torres Strait Finfish Working Group 2017.01

Meeting Record

16-17 March 2017

Note all meeting papers and records are available on the PZJA webpage:

www.pzja.gov.au

Australian Government

Australian Fisheries Management Authority

Box 7051, Canberra Business Centre, ACT 2610 / Ph. (02) 6225 5555 / Fax (02) 6225 5500 / AFMA Direct 1300 723 621 afma.gov.au

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Meeting Participants

Members and declaration of interests

Name	Position	Declaration of interest
Andy Bodsworth	Chair	Independent Consultant – Cobalt MRM (recently developed Torres Strait Finfish Action Plan report for TSRA/FRDC), co-investigator on FRDC and TSRA Top Western Fisheries Feasibility project led by A Tobin.
Andrew Trappett	FWG Executive Officer	Nil
Selina Stoute	AFMA Member	Nil
Tom Roberts	QDAF Member	Nil
Mariana Nahas	TSRA Member	Nil
Michael O'Neill	Research Member	Principal Fisheries Scientist, QDAF. Principal scientist for TSSAC project to develop a harvest strategy for the Torres Strait Finfish Fishery.
David Brewer	Research Member	Independent Consultant. Principal scientist for TSSAC project to develop a harvest strategy for the Torres Strait Finfish Fishery. Previous CSIRO researcher for TSSAC project investigating traditional take of finfish in Torres Strait.
Maluwap Nona	Industry Member	TIB licence holder. Chairperson Malu Lamar.
Rocky Stephen	Industry Member	TIB licence holder. President Kos and Abob Fisheries
Frank Fauid	Industry Member	TIB licence holder
Tony Vass	*Industry (sunset licence holder representative)	No financial interest in Torres Strait Fisheries. Holds Queensland East Coast quota for coral trout and 'other' finfish species. Previous Torres Strait finfish operator. Representative for sunset licence holders.

Observers

Name	Position	Declaration of interest
Jerry Stephen	*TSRA Board - Fisheries Portfolio	TIB licence holder. Traditional Owner, Ugar Island. Member, Fisheries Quota Management Committee Deputy chair TSRA

Name	Position	Declaration of interest
Joseph Posu	PNG NFA	Nil
Ian Liviko	PNG NFA	Nil
John Ramsay	TSRA Program Manager, Fisheries	Nil
Andrew Tobin	Researcher	Independent consultant. Investigator on TSSAC project to develop a harvest strategy for the Torres Strait Finfish Fishery. PI on FRDC barramundi, crab fishery project. Owns a retail seafood outlet that buys product from the Torres Strait.
John Matthew	TSRA	Nil

* Permanent observer

Apologies

Name	Position
Eliziah Wasaga	Industry Member
Tenny Elisala	Industry Member

Action items

Number	Action
1.	AFMA, TSRA and Malu Lamar to meet out-of-session to consider an appropriate process to canvass community aspirations and considerations for removing the western line closure
2.	The FWG to meet again in October 2017 to consider the TACs for the 2018 – 2019 season.
3.	AFMA to investigate the feasibility of the Torres Strait coral trout stock being assessed as part of the 2018 east coast coral trout assessment scheduled to be undertaken by the Queensland Government.

Recommendations

Number	Recommendation
1.	The FWG recommended a Spanish mackerel TAC of 125 t for the 2017-18 fishing season based on: • a target biomass reference point of B_{60} • applying a step-down TAC of 125 t for the 2017-18 season only (to minimise the operation impact of the proposed TAC reduction from 187t), supported subject to further advice from the Scientific Technical Working Group on the likely impacts on the stock if catches exceed the Recommended Biological Catch in the 2017/18 season

Number	Recommendation
	without a step-down the recommended TAC would be 113t (RBC 125t - 12t for estimated subsistence catch taken outside the commercial fishery)
2.	Consistent with the FWG recommendation from its meeting on 12-13 July 2016 the coral trout TAC (134.4t) remain unchanged for the 2017/18 fishing season.

Agenda Item 1 - Preliminaries

1.1. Opening Prayer / Acknowledgement of Traditional Owners / Welcome / Apologies

Mr Frank Fauid opened the meeting in prayer.

Meeting chairperson, Andy Bodsworth, welcomed members and observers and noted that the fishery was in an important stage of development and the advice collected through this working group would provide valuable input to the upcoming PZJA decision making process.

Apologies were received from members Tenny Elisala and Elizah Wasaga. Meeting observer, Patrick Mills attended up to agenda item 2.7 and returned to present item 5.7. Andrew Tobin was noted as an apology for the second day of the meeting.

1.2. Adoption of Agenda

The Finfish Working Group (FWG) adopted the agenda with one change to remove agenda item 5.1. It was noted that the harvest strategy project had not yet commenced due to contracting delays. The FWG therefore agreed for an update on the harvest strategy project to be provided out of session.

1.3. Declaration of Interests

The FWG generally noted that there could be potential conflicts of interest for members and observers when providing information and advice on some agenda items.

All members provided an update on their declaration of interests. Observers also advised on their interests which are recorded under the section titled: *Meeting Participants*.

1.4. Actions Arising

The FWG noted the status of the previous action items including an update on the nature of changes to AFMA logbooks as detailed in the tabled paper.

Agenda Item 2 – Fishery Updates

2.1. AFMA management

The FWG noted the AFMA management update as detailed in the tabled agenda paper and discussed the following:

Western line closure

The FWG noted progress since the last FWG meeting to remove the western line closure (as detailed in the agenda paper, work is ongoing to compile outcomes of previous consultation

processes). The FWG noted again that the western closure reflects a historical jurisdictional boundary rather than a specific management purpose.

An industry member advised that if the area of the western closure was to be reopened consideration should first be given to:

- how much fishing the area could support noting that the fishing grounds are different from those in the east and concern that the area may not be able to support the number of licences in the fishery; and
- the potential for alternative livelihoods or business opportunities for traditional owners such as ecotourism.

Other industry members were generally supportive of this proposal and advised that further community consultation should occur before the western area of the fishery was reopened, to gauge community aspirations on future usage.

Noting there are no existing agreements in place to guide resource sharing between sectors (fishing, tourism etc) the FWG agreed for following **action**:

- AFMA, TSRA and Malu Lamar to meet out-of-session to consider an appropriate process to canvass community aspirations and considerations for removing the western line closure.

Foreign compliance update

The FWG noted the update from the AFMA Foreign Compliance Operations officer as detailed in the agenda paper. Members and observers provided the following updates and comments:

- communities are concerned that PNG Daru markets are reportedly selling turtle and dugong caught in the Torres Strait;
- future compliance risks assessment should include a level of consultation with stakeholders to ensure community concerns and knowledge are taken into account; and
- industry was very concerned that a tanker went off-course in the Torres Strait the previous week and that AFMA should respond to such risks. AFMA acknowledged that it was indeed a serious matter and that AMSA were the appropriate body to respond.

2.2. TSRA update

The FWG noted an update from the TSRA as detailed the paper distributed at the meeting (**Attachment A**).

2.3. Native Title

Speaking on behalf of Malu Lamar, Mr Maluwap Nona advised that Malu Lamar would be establishing a company for the purposes of holding any future allocations of fishing access rights and quota. It was also advised that Malu Lamar and the TSIRC would be signing an official partnership agreement and similar partnerships are being discussed with Kauareg and Northern Peninsula Area traditional owners.

2.4. PNG – National Fisheries Authority Update

The FWG noted the following updates from PNG-NFA officers:

- Very little interest exists in PNG in fishing for finfish species at present with the exception of barramundi. It was advised that barramundi catches have reportedly been declining in recent years (e.g. year 2000 catches were over 100 tonnes, 2015 catches were around five tonnes).

- More fishers were using lures nowadays which are considered less selective (capturing all size classes) than mesh gillnets which have historically been used which are selective for certain size classes. PNG-NFA are giving some consideration to regulating against the use of lures in the barramundi fishery.
- Funding is set aside for research and stock assessment work for barramundi but a work plan is yet to be finalised. Assistance from AFMA and CSIRO to support a stock assessment may be sought.
- Indonesian buyers were having a heavy influence in PNG marketplaces placing a strong demand for seafood species with commercial value which are purchased and exported across the border.
- PNG-NFA advised that as the majority of their catch data comes from commercial export companies, they are reviewing catch-reporting in the western province; with a focus on artisanal fishery and local market fisher's data.
- Reports have been received that the invasive species snakehead and climbing perch are present in the area of the western province. It was reported that snakehead fish have commercial value and are sold in marketplaces.

Some industry members queried whether any consideration had been given to trading and developmental opportunities between Torres Strait and PNG treaty villages. PNG-NFA advised that there could be some future opportunities for co-operation. The AFMA member advised that the PNG-Australian Bilateral Treaty meetings would be the best forum to progress these issues and the Department of Foreign Affairs and Trade is the responsible agency.

2.5. QDAF update

The FWG noted the following general updates from the QDAF member:

- Consultation on the Queensland Government's Green paper to guide fisheries reform has been completed and the outcomes are under consideration.
- QDAF is updating their Spanish mackerel stock assessment which is expected to be published September/October and will be used to inform future Total Allowable Catch setting.
- There is no east coast harvest strategy for Spanish mackerel. The Queensland government has committed to using the updated assessment to guide the development of a harvest strategy.
- A decision was pending on setting coral trout quota following a recent meeting with industry. It was expected that industry would be advised of the outcomes mid-April.
- White spot disease had recently been detected in prawns in Moreton Bay, outside of the area of the original Logan River outbreak. It was noted that trawlers operating in the Moreton Bay do not also operate in the Torres Strait.

Charter and recreational catch data

As requested from the July 2016 FWG meeting, the QDAF member provided an overview of available data for the Queensland state charter boat and recreational fish catches from the area of the Torres Strait.

Charter fishing catch data

- Under the QDAF information disclosure policy, data stemming from less than five boats could not be released. It was advised that charter boats keep a daily logbook of: area fished (main reef fished), number of fishers, crew, species and numbers caught, species and numbers released and kilograms retained for the trip.
- For the time period 1995-2014 (a 19 year timespan) a total of 360 days had been fished by 10 licensed charter operators in the Torres Strait. 19.58 tonnes of reef-fish had been retained with the majority being reef fish such as coral trout with minor catches of Spanish mackerel. The eastern islands of the Torres Strait were the main areas fished. Bag and size limits apply to charter boat operators.

- The 10 nm island closures (as per sunset licence conditions) do not apply for charter boat operators. Recreational and charter boat fishing is regulated under the laws of Queensland which is separate to the *Torres Strait Fisheries Act 1984*.

Recreational fishing catch data

- Only limited data with large amounts of error is available on recreational catch by fishers in the Torres Strait. Only 3 households provided data during the 2014/15 Queensland recreational survey.

The FWG noted the following comments from members:

- Communities are concerned that they have no say in the regulation of charter fishing operations in the Torres Strait. The industry permanent observer advised that it was unlikely charter vessels would have fished the waters around Bramble Cay due to its remoteness.
- Malu Lamar would like to be involved in any future recreational fishing survey in the Torres Strait.

The FWG agreed to the following:

- overall the data indicates that charter catches have likely been low to date;
- the Queensland recreational survey data as currently analysed is not adequate to produce a meaningful catch estimate.
- while recreational catches are also likely to be relatively low, a future priority should be to explore options to develop a reliable recreational catch estimate (for example supplement the survey coverage in the region, consider options to extrapolate from other data, fishing diaries).
- understanding the scale and therefore the likely impacts of recreational and charter fishing on commercial stocks is important for the management of the fishery.

2.6. Domestic compliance update

The FWG noted the update on domestic compliance provided by the QDAF member as detailed in the agenda paper and advice from members:

- industry and community concern remains over the limited number of days spent on the water in the Torres Strait by Queensland Boating and Fisheries Patrol. It was suggested that a QBFP office should be re-established in the Torres Strait and that the traditional owners should be engaged as fisheries officers as per the functional model of the Torres Strait Ranger program.
- AFMA advised that initiatives were being progressed to improve compliance beyond on-the-water patrols such as the implementation of vessel monitoring systems, mandatory fish receiver reporting and the development of a public register of fishing licences held.
- Malu Lamar advised that consideration should be given to listing barramundi cod as a protected species in the Torres Strait (given that commercial and traditional fishers could take this species here) due to its potential future value for ecotourism.

2.7. Strategic overview and update (including economic and market trends)

The FWG noted the following update by industry members and observers on recent fishery performance, trends, activities and issues occurring in the Torres Strait finfish and relevant fisheries issues:

- industry is eager for more Traditional Owners to enter the Finfish Fishery.

- Meriam fishers have been successfully increasing their effort with recent finfish catches around 500kg per day being taken by five to six dories. This catch is being frozen for the local market and also being sent to Cairns via barge.
- more representation from active fishers is needed on the working groups to ensure on-water fishing practices and business development issues were understood. It was also noted that this would broaden the on-water knowledge base of how data is used for fishery management purposes and could facilitate uptake of logbooks. An active fisher from Mer (e.g. Alan Passi), should be invited to the next FWG meeting as an observer for this purpose.
- a new finfish business is being established at Poruma.
- local restaurants are seeking locally caught Spanish mackerel but are finding supply difficult.
- the Ugar industry association is working to develop a five year business plan following on from its success with its bech de mer. The plan will assist the association to become commercially independent. The association is advocating for a similar joint business plan to be developed among the eastern communities. This association is seeking to have this done prior to making investments in things such as freezers to ensure smart/viable investments are made.

The FWG noted the following update from the QDAF member:

- QDAF reported that coral trout caught southwards of Bowen attract a price premium of $5 to $10 per kilogram due toa market preference for fish with a strong red colouration.
- QDAF member advised that some east coast operators were currently tied up due to not being able to acquire coral trout quota.

The FWG noted an update on the FRDC funded project on scoping the development of Barramundi, jewfish and crab fisheries in the top-western waters of the Torres Strait by Andrew Tobin, the Principle Investigator for the project.

Mr Tobin advised that the project has four elements:

1. A desktop scoping study. Collate past research findings etc.
2. Field surveys to understand local stock abundance and whether it could support a local fishery. Aim to commence field work after Easter.
3. A stop-go review to determine if there is enough industry interest and stock available to justify proceeding with the study.
4. An evaluation of infrastructure, skills and business needs to support an active fishery.

The FWG noted the PZJA will likely require advice from the FWG to evaluate any proposal to develop and/or expand new fisheries to ensure they are sustainable. The FWG encourage early engagement with the FWG to ensure any future proposals may be considered in a timely manner.

Dr Tobin also noted that a PZJA scientific permit will be required to undertake the field activities.

Speaking on behalf of Malu Lamar, the representative requested that the PBCs in the relevant communities be engaged as soon as possible and that the terms and conditions of the work for this project be clearly agreed.

Agenda Item 3 – Recommending Total Allowable Catches for the 2017/18 fishing season

3.1. Spanish mackerel

The FWG noted advice from the Finfish Technical Scientific Working Group (STWG) arising from its November 2016 meeting and catch estimates from outside the fishery (traditional and recreational take).

Subject to further advice from the Finfish Scientific Technical Working Group on the likely impacts on the stock should the Recommended Biological Catch be exceeded in the upcoming season the FWG **recommended** a Spanish mackerel TAC of 125 t for the 2017-18 fishing season based on:

- A target biomass reference point of B_{60}. The FWG supported a higher biomass target above B_{MSY} and the Commonwealth default B_{MEY} target of B_{48}, to ensure a healthy population biomass and catch rates in order to achieve and balance sustainability, economic, social and cultural objectives. The FWG noted that a harvest strategy is being developed for the fishery which will establish long term reference points for the stock.
- Advice from the TSWG for a Recommended Biological Catch of 125 t (referred to at the current meeting as the 'total kill' recommended for the stock by all fishers both commercial and non-commercial). The FWG noted that the TSWG accepted the updated stock assessment as the best available stock assessment for Spanish mackerel whilst also noting sources of uncertainty in the assessment. The FWG further noted advice from the TSWG that a level of uncertainty is expected in fishery stock assessments and that the current assessment should serve to guide future research and data priorities for the fishery.
- Best estimates of other sources of fishing mortality (subsistence (-12 t), recreational (no estimates available), charter (negligible catches recorded), PNG catch sharing (0 t) as detailed in **Table 1** (below).
- Applying TAC step-down for the 2017/18 fishing season only. Noting the scale of the proposed TAC change (down from 187t) a phased reduction in the TAC (or step-down) for the 2017/18 season was supported subject to further advice from the Scientific Technical Working Group on the likely impacts on the stock if catches exceed the Recommended Biological Catch in the 2017/18 season. The FWG also noted that the current TAC has not been caught in recent years and therefore the operational impact of a TAC reduction should be relatively small. The FWG noted that without the suggested step-down approach the recommended TAC would be 113t (RBC 125t - 12t taken outside the fishery).

Discounting other sources of fishing mortality

The FWG noted the requirements of the Australian Government policy (detailed in the *Commonwealth Fisheries Harvest Strategy Policy and Guidelines 2007*), that all sources of mortality (catch) should be taken into account when setting a TAC. This generally means the TAC equates to the RBC for the species minus expected catches to be taken outside of the fishery.

The FWG discussed both the accuracy of available catch estimates and whether it was still necessary to discount other catches when pursuing a higher target biomass (i.e. having a target reference point of B_{60} rather than B_{MSY} or the Commonwealth default B_{MEY} target of B_{48}).

TSRA representatives noted that other fisheries, such as TRL followed a different approach and did not necessarily deduct other sources of mortality in setting a TAC. The TSRA member queried whether that, if the RBC is derived from commercial fishery data only, other sources of mortality

are ‘accounted for’ by not being included in the model used to estimate the spawning biomass. The Scientific Member confirmed that the RBC (125t) does not include a discount for non-commercial catches (for example subsistence catches).

TSRA representatives suggested that the 12 t subsistence catch estimate (from Bussilachi research papers) was likely to be an overestimate. This estimate was referred to the TSWG for clarification out of session.

The FWG noted that:

- consistent with contemporary fisheries management, the precautionary principle and Australian Government harvest strategy policy, estimates of other Spanish mackerel catches should be discounted from the RBC when developing a TAC recommendation. Catch estimates may change overtime as new data becomes available. ; and
- the purpose of the higher biomass target B_{60} is to ensure a healthy population biomass and catch rates in order to achieve and balance sustainability, economic, social and cultural objectives. A higher biomass means that more fish will be available for purposes other than commercial fishing. For example more fish will be left to support traditional fishing.

Table 1. Agreed Spanish mackerel catch estimates outside of the fishery for the 2017/18

Source of catches	Expected catch (t)	Comments
Subsistence catch (kai kai) by traditional inhabitants	12	Based on data from *Busilacchi 2013*. Note this includes total of catch estimates for Mer, Masig and Erub Islands. The FWG agreed in July 2016 that the catch figures from the *Busilacchi 2008* research are the best estimates of traditional take of finfish. While some members considered this figure to be an overestimate, the FWG had no further empirical information available to recommend a different estimate.
Recreational	No estimates available	The FWG agreed that the QLD recreational data for the Torres Strait region is too limited to derive a catch estimate. Total catches are expected to be low. The FWG agreed for it to be a priority in future years to explore possible cost-effective options to develop a reliable estimate for recreational catches.
Charter	Negligible catches recorded	Available QLD logbook records show Charter boat line catches are low. Logbook records for the period between 1995 and 2014 report a total of 19.58 tonnes of mixed species taken from Torres Strait waters. The FWG agreed that catches are likely to be negligible.
PNG catch sharing	0	PNG_NFA have declined to enter into catch sharing arrangements for 2017/18.
Total discounts	**- 12**	
RBC (125t) – total for other catches (12t)	**113t**	
TAC with step-down applied	**125t**	

Concerns over exceeding the RBC

The FWG noted advice that the TSRA Board had approved for 110 t of Spanish mackerel to be leased to sunset license holders in the upcoming season and that the Finfish Quota Management Committee considered a TIB take of 15 t (10 t being the highest recorded catch following the 2008 buyout plus a 5 t buffer noting that under reporting of catch is known to be occurring).

The FWG noted the recommendation from the STWG that if harvests increase above 150 t and/or fishing effort increases above 1000 operation days, then catch rates may erode in the long term.

Concerns were raised by some industry members that the reduction in TAC coupled with the high proportion of catch proposed to be leased to the sunset sector would limit potential economic growth for the TIB sector particularly if more freezers would likely come back into operation. The FWG noted that leasing arrangements were separate to providing advice on recommended TACs, and that discussion on implementing the TAC was scheduled for Agenda Item 5.4.

Other

- While noting that this is outside the scope of the FWG, the Malu Lamar representative recommended that the FQMC membership be expanded to include representatives from both Malu Lamar and the fishing industry.
- TSRA representatives strongly expressed their disappointment that the FWG had not met to consider the TAC prior to the end of 2016. The TSRA has previously advised the PZJA that it is a business requirement for the TSRA Finfish Quota Management Committee to meet in February each year in order to make leasing recommendations to the March Board Meeting. The TSRA stated again the requirement for the FWG to meet no later than October 2017. The TSRA representative made it clear that it was a non-negotiable business requirement of the TSRA Board to consider the leasing recommendations of the Finfish Quota Management Committee in March each year.

3.2 Coral trout

The FWG reaffirmed its recommendation from its meeting on 12-13 July 2016 that the coral trout TAC (134.9 t) remain unchanged for the 2017/18 season.

The FWG noted that there was no new information to guide a different recommendation at this time. It was further noted that the harvest strategy to be developed will guide future assessments and TAC recommendations.

The FWG noted that based on catches being significantly below the TAC (reported catches remaining around 20-40t) it was not deemed necessary to reconsider the TAC to discount estimates of other fishing mortality (e.g. subsistence take) at this time. The FWG however agreed that this should be undertaken when new information becomes available to review status of the stock and subsequent TACs.

The FWG noted the following advice from members:

- a Queensland east coast coral trout assessment is planned for 2018 and there is potential for the Torres Strait stock to be included in the assessment;
- feedback from boats fishing for live coral trout in the 2016/17 season to date had been favourable with good catch rates and survival rates;
- the status of live boats returning to the Torres Strait in upcoming seasons would be dependent on maintaining high catch rates and market dynamics across both the TS and east coast. A price premium paid is paid for red coloured fish which are found in southern Queensland

Recommendation: Consistent with the FWG recommendation from its meeting on 12-13 July 2016 the coral trout TAC (134.4t) remain unchanged for the 2017/18 fishing season.

Action: AFMA to investigate the feasibility of the Torres Strait coral trout stock being assessed as part of the scheduled 2018 east coast coral trout assessment scheduled to be undertaken by the Queensland Government.

3.3 Other reef line species

The FWG noted previous advice from its 12-13 July 2016 meeting that subject to further consideration by the Technical Scientific Working Group (TSWG) of coral trout to by-product catch ratios when targeting coral trout and total take of 'other species' by other sectors –

> *there should be no further increase above 30 tonnes until systems are in place to independently verify catches, a species-specific risk assessment has been undertaken and where applicable catch triggers and control rules have been agreed.*

The FWG noted advice that the Technical Scientific Working Group was unable to discuss the development of a work plan to assess risk and manage expansion on other reef line species at its meeting on 10 November 2016 due to time limitations.

The FWG reaffirmed its advice that future expansion in effort for 'other' species requires effective risk assessment and management measures. The FWG agreed that taking into account the risks identified by the FWG at its last meeting there is also a need to review the 30t limit in light of the species composition of catches taken this season.

The FWG noted advice that targeted fishing for other species by sunset sector boats had not yet occurred in the 2016/17 season. Instead operators had focused on fishing for live coral trout. TSRA advised that there is less interest from sunset licence applicants to target other species in 2017/18 fishing season.

The FWG noted that the scope of the harvest strategy project does not include other reef-line species though there may be capacity to commission work in parallel to this project should the need arise. In the immediate-term the FWG supported in-principle for any further work to assess the potential to expand effort on other species be undertaken subject to having:

a. a detailed fishing proposal describing the nature of any proposed expansion;
b. scientific advice on the conditions for any expansion in terms of species, location, catch levels, data collection requirements and any other matters required to mitigate risks to the stocks;
c. where appropriate, management measures and policies be considered by the FWG; and
d. funding available to support the required scientific advice.

Agenda Item 4 – Research

4.1. Traditional take catch estimates: past estimates (Dr Busilacchi) and future research (CSIRO)

The FWG noted the update on the research project titled "*The subsistence coral reef fish fishery in the Torres Strait: monitoring protocols and assessment"* as detailed in the agenda paper and the milestone report.

The FWG noted that the:

- initial pilot phase survey work on Erub Island is now complete. Reports indicate that the project was well received by the Erub community with good attendance and support given at a community meeting introducing the project and CSIRO scientists;
- survey was unable to engage a long-term community monitor with the pre-arranged candidate falling through due to other commitments. Instead a revised single 'snapshot' survey was taken by the CSIRO staff while on the island. Despite community support, the survey was limited by time and participation levels. Some people were not entirely comfortable with providing their individual catch data;
- Erub fishers association Chairperson remained very positive about the work conducted at Erub noting that it was likely the first step of a longer process required to get monitoring arrangements established;
- project team had met with Malu Lamar, AFMA and TSRA in 2016 before the project began to get general project guidance advice including community engagement;
- project had been recommended by the FQMC and subsequently funded by the TSRA (administered by AFMA);
- project is planning to roll out training of monitors on Poruma and Masig islands with community permission being given. The Mer community is also supportive.

In light of findings from the Erub pilot phase the FWG recognised there is a risk that without change the project may not be able:

- to obtain sufficient data to produce a reliable estimate of traditional take; or
- to establish an on-going community-based data collection program.

The FWG generally agreed however the project will likely provide a baseline for further investment in data-collection and establishing ongoing data collection programmes. It was also noted that realistically achieving these aims could be expected to take some time.

The FWG noted the following advice from members:

- close engagement with the PBCs is central to the success of these kind of projects. Ideally the PBC would be given responsibility to manage the data collection programmes in the same way that they have responsibility for the Turtle and Dugong Management Plans;
- further community awareness is required to encourage reporting and that small incentives (financial or material) could improve the participation rates;
- paid positions need to be created at the community level (not within government agencies) to progress and resolve fisheries issues and improve community awareness and communication. This would also provide employment. The TSRA member advised that TSRA were investigating the potential to establish fishery extension officers that could assist communities with these projects.
- Malu Lamar and the TSRA Fisheries Portfolio member further emphasised that all research projects occurring in the Torres Strait should engage with them before the projects begin to ensure that communities are aware of the purpose of the research and any terms and conditions are agreed and understood.

The FWG **agreed** that AFMA should convene another meeting of the traditional-take project team to consider possible options for addressing ongoing project risks in light of lessons learnt from work completed at Erub.

4.2. Update – Smart phone technology for remote data collection

The FWG noted the project update was available for members in the agenda paper and did not discuss it further.

4.3. Update – defining the status of Torres Strait Spanish mackerel to inform future fisheries allocation and sustainable fishing

The FWG noted the project update was available for members in the agenda paper and did not discuss it further.

4.4. Research priorities

The FWG noted that consideration of research priorities is an important standing item for the FWG to ensure research investment and management resources are effectively targeted. The FWG noted the research priorities identified at its last meeting and agreed to revisit the list alongside the development of the harvest strategy. The harvest strategy is expected to assist in identifying future data and research needs.

Agenda Item 5 – Management

5.1. Finfish harvest strategy project update

The FWG noted that an out-of-session update would be provided on this project once the funding contract had been completed.

5.2. Options for ongoing scientific advice

The FWG noted the tabled paper which outlined options for gaining future scientific advice and recommended that a formal Resource Assessment Group (RAG) be established:

- using the standard Terms of Reference for the PZJA RAGs as set out in the PZJA Fisheries Management Paper No. 1 (PZJA FMP No. 1);
- comprise the membership: a Chairperson; Government (AFMA, QDAF, TSRA); three industry members (note TSWG has two industry members); and three scientific (members)

The FWG noted that AFMA would make an open call for applicants for the scientific and industry members and applicants would be assessed by a PZJA agency selection panel.

The FWG also noted the following advice from members:

- Malu Lamar representative advised that they do not wish to attend a RAG directly but strongly recommend that traditional owners be present who are active fishers. It was suggested that a Finfish RAG would benefit from having advice from fishers from Ugar, Erub and Mer Islands. Rocky Stephen, Dan Sailor and Alan Passi were recommended; and to minimise costs and time, RAG meetings could potentially be held alongside working group meetings.

5.3. Formalising finfish total allowable catches

The FWG noted advice that although a plan of management is in place for the Finfish Fishery, under the finfish management plan TACs may only be determined by the PZJA following the allocation of quota units (or units of fishing capacity). The plan of management allows for the allocation of quota units however this has not yet been undertaken. Until such time that an allocation occurs, TACs may be implemented by way of licence condition. The FWG noted that catch limits are currently only applied to sunset licences. TIB catches are not limited.

The FWG agreed that limiting catches to an agreed total allowable catch (TAC) is important for ensuring the sustainability of the fishery and achieving agreed management targets. The FWG further noted that with a reduced Spanish mackerel TAC for the 2017/18 fishing season, and depending on future growth in TIB sector catches, Spanish mackerel catches may approach (or possibly exceed) the RBC (or total recommended kill).

The TSRA advised that for as long as there is a leasing process (i.e. TIB sector not fishing the whole TAC) it is unlikely that a TAC would be exceeded as catches could be reduced by reducing the amount of tonnage being made available to sunset operators.

The FWG considered regulatory and non-regulatory (by other agreements/arrangements) management options for limiting catches to the TAC and noted the following comments and advice from some members:

- a TAC could be difficult to enforce in the absence of improved catch reporting (for example will management be able to detect when the TAC is exceeded);
- a level of overcatch may be sustainable when there is a higher target biomass reference point (i.e. having a target reference point of B_{60} rather than B_{MSY} or the Commonwealth default B_{MEY} target of B_{48}) and given catch reductions since the buyout;
- sufficient catch should be reserved for the TIB sector to allow sustainable expansion without risking an overcatch and impacting the stock. In the absence of reliable TIB catch data the TSRA advised that they rely on the expertise of the members of the Finfish Quota Management Committee (FQMC) to provide a best estimate of the TIB commercial catch. For 2017/18 season this was estimated by the FQMC at 15 tonnes;
- measures should be introduced as a matter of priority to limit the risk of overcatching in any year; and
- Research members advised that regular over-catching of the RBC would likely have negative impacts on the stock. These impacts can take a long time to remedy. It was also noted that if the stock was assessed as subject to overfishing by ABARES further downstream effects may occur such as future market access, branding of products etc.
- TSRA advised, in their opinion, that the finfish leasing process is already an effective non-regulatory measure to constrain catches to below the TAC, as the amount made available for leasing out each year is dependent on the TIB sector's catch and aspirations of the coming season.

Two options were identified:

Option 1 – status quo for the 2017/18 fishing season; catch limits only on sunset licences with proposed leasing (110t) then for the 2018/19 fishing season; implement the TAC across all licence holders and if necessary adjust leasing to further minimise the risk of overcatching. Under this option there is a risk that recommended TAC will be overcaught in 2017/18 (having regard for catch estimates and proposed sunset licence leasing). This option was supported by TIB representatives and the TSRA Fisheries Portfolio member.

Option 2 – minimise the risk of overcatching for the 2017/18 fishing season by lowering the proposed lease amount.

It was noted that option two was a more precautionary approach while option one provided phased introduction of management change. The FWG agreed to seek advice from Scientific Technical Working Group on likely impacts on the stock from exceeding the Spanish mackerel RBC in 2017/18. .

5.4. Estimates of traditional inhabitant boat sector catches

The FWG noted catch estimates of TIB commercial sector reported from reports and journals ranging from 9t to 22 t for Spanish mackerel as detailed in the agenda paper. The FWG also noted the FQMC agreed a reasonable estimate for TIB catches for the upcoming season to be 15t or less (based on maximum reported catch of 10t since the 2008 buyout and adding 5t).

The FWG discussed the accuracy and relevance of these estimates for predicting future TIB catches. One of the TIB representatives noted that 10 tonnes was the likely current catch level, although future improvements to infrastructure would likely increase annual catches to above 15 tonnes beyond the 2017/18 season. It was noted thatchanges have occurred in the fishery overtime (e.g. participation levels, buyout, 10 nm closures) which may influence total TIB catch. It was further noted however that in the absence of accurate catch estimates a precautionary approach should be taken.

The FWG noted that underestimating the total take either by adopting less precautionary estimates and/or under reporting, increases the risk that the RBC (or recommended total kill) will be exceeded. This can negatively impact the status of the stock and should be avoided.

The FWG encouraged all fishers to fill out logbooks to provide accurate information and reiterated its support for improving data collection systems, in particular implementing a mandatory fish receiver system.

5.5. Development of a public register

The FWG supported the development of a public licensing register noting it is proposed to cover all fishers, all fisheries, scientific permits and PNG cross endorsed vessels and make the following details of each licensee available:

a. Company or individual's name

b. Licence type (Fishing licence (TIB, TVH), Sunset, Carrier A, B or C)

c. Licence Number

d. Vessel identifying number (the boat mark), or "No Boat" status

e. Licence expiry date

f. Fishery endorsements (TRL, CT, SM, Prawn, BDM, Treaty endorsement)

g. Catch or Effort allocation where applicable (Prawn effort, sunset catch allocation)

The FWG noted that the register would ***not*** include contact details for licensees and is proposed to be made available on the PZJA website and updated at least monthly.

5.6. Future management priorities

The FWG noted that consideration of management priorities is an important standing item for the FWG to ensure management resources are effectively targeted. The FWG noted the management priorities identified at its last meeting and recommended no change. The FWG however noted that climate change impacts and management responses should be considered for FWG work plan in the medium-term.

5.7. Crewing of traditional inhabitant boats

The FWG noted the proposal by Torres Strait Fishers Association (TSFA) to allow for more non-indigenous fishers to be employed as crew on Traditional Inhabitant Boat licenced vessels. Mr Mills advised that TRL primary/tender vessel operators cannot get crew run their tenders and some are tied-up altogether. Mr Mills further advised that the current crewing restrictions make it difficult for operators to be viable (for example to pay back loans) and discourage investment. TSFA were seeking the flexibility to have three non-traditional inhabitant crews on the primary/tender operations and were focused on getting skilled foreign divers from the PNG treaty villages (utilising the 457 visa scheme as other fisheries do). The FWG noted advice from the AFMA member that approvals under the relevant immigration laws would be required to use foreign divers and that the Department of Foreign Affairs and Trade might be able to provide some useful guidance.

Noting that the general level of support from the industry members and in-principle support for removing impediments to traditional inhabitant participation in the fisheries, the FWG recommended consultation with the broader industry and communities be undertaken to develop possible management options for further consideration.

5.8. Draft 2017/18 AFMA Finfish Fishery budget

The FWG noted the draft AFMA 2017/18 Finfish Fishery budget which is based on convening two FWG meetings.

5.9. Grant of carrier licenses to non-traditional inhabitants

The FWG noted advice that there is interest from small non-traditional inhabitant businesses to freight seafood in the Torres Strait and that these vessels require a carrier licence. The FWG noted advice that the PZJA licencing policy, as described in the 2004 licencing guide, is ambiguous for these types of applications. AFMA sought FWG advice on any concerns with the grant of new carrier licences to non-traditional inhabitant persons/businesses subject to specific conditions.

In line with advice from industry members the FWG **recommended** that further industry and community consultation take place to gauge stakeholder opinions on the grant of new carrier licences to non-traditional inhabitant persons/businesses.

Agenda Item 6 – Other Business

The FWG Chairperson thanked participants for their input into the meeting. AFMA advised the next meeting would likely be held in October or November 2017 and participants would be advised on the meeting date out-of-session.

Mr Frank Fauid closed the meeting in prayer at 12:45 PM.

Attachment A – TSRA Update Paper

Australian Government

TSRA
www.tsra.gov.au

Torres Strait Regional Authority Update

Finfish Leasing

- The Finfish Quota Management Committee met on 16-17 February
- The TSRA Board considered the recommendations of the Committee on 1-2 March

Fisheries Programme projects

- Five projects are currently in progress that stem from the Finfish Action Plan:
  - Feasibility study for barramundi, jewfish and mud crab commercial fisheries in Gudumalulgal communities
  - Feasibility study for development of a bait fishery
  - Marketing, branding and export requirements for Torres Strait seafood
  - Infrastructure and services audit, and
  - Fishing skills audit
- The TSRA has published a Torres Strait Fisheries Guidebook, which sets out the management arrangements for fisheries in a small waterproof booklet.
- The Fisheries Programme will be supporting TIB fishers with the installation of VMS systems on primary vessels
- An Indigenous Cadetship Programme will commence in 2017
  - The cadetship will provide mentoring to tertiary students by the Fisheries Programme
  - The longer-term goal is develop Torres Strait Islanders to be employed in the TSRA Fisheries Programme
- The Fisheries Programme is seeking support from AFMA to train Torres Strait Islanders to be trained and employed in the AFMA observer programme
- The TSRA has completed a review of the New Zealand Maori model of community ownership of fisheries access rights
  - Further work on the development of a Torres Strait community management framework will continue through 2017 based on these results and the TSRA Board's direction
  - This work is a key component of the Road map to 100 per cent ownership of Torres Strait fisheries by Traditional Inhabitants
- The TSRA Economic Development Programme is currently seeking applications for the REIS Fisheries Growth Package
  - This package is available to both existing and new businesses seeking to build commercial fishing businesses in the Torres Strait.

Torres Strait Scientific Technical Finfish Working Group

Meeting Record

6 April 2017

Teleconference 1400-1520

Note all meeting papers and record available on the PZJA webpage:

www.pzja.gov.au

Australian Government

Australian Fisheries Management Authority

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Contents

Meeting Participants

Attendance

Name	Organisation	Declaration of interest
Selina Stoute	A/g Chair AFMA	Nil
Andrew Trappett	AFMA, Meeting EO	Nil
Dean Pease	AFMA, EO support	Nil
Eva Plaganyi	CSIRO	Research funding. Principal scientist for TSSAC project to develop a harvest strategy for the Torres Strait Beche-de-mer Fishery.
Tom Roberts	DAF QLD	Nil
John Ramsay	TSRA	Nil
Mariana Nahas	TSRA	Nil
John Mathews	TSRA	Nil
Jerry Stephen	TSRA, Fisheries Portfolio Member	TIB licence holder. Traditional Owner, Ugar Island. Member, Fisheries Quota Management Committee Deputy chair TSRA
Michael O'Neill	QDAF	Research funding. Principal scientist for TSSAC project to develop a harvest strategy for the Torres Strait Finfish Fishery.
David Brewer	Upwelling P/L	Research funding. Principal scientist for TSSAC project to develop a harvest strategy for the Torres Strait Finfish Fishery. Previous CSIRO researcher for TSSAC project investigating traditional take of finfish in Torres Strait.
Kenny Bedford	Industry	TIB licence holder. President - Erub Fisheries Management Association
Tony Vass	Industry	Nil. Does not own or operate a licence in Torres Strait. Holds Queensland East Coast quota for coral trout and 'other' finfish species.

Action items

Number	Action
1.	AFMA and TSRA to provide the subsistence catch calculations drawn from *Busilacchi 2008* work out-of-session and confirm the final reported subsistence catch estimate.

Recommendations

Number	Recommendation
1.	Total Allowable Catch for the 2017/18 fishing season to remain at or below the 125 t RBC noting that: • due to uncertain catch estimates a precautionary approach should be adopted; and • it is unlikely that Fishery will be meeting the agreed management target of building to B_{60} if catch is around 150 t. The 150 t catch scenario has a 30 per cent probability of reducing the stock below current estimated levels (B_{40}) and it is unlikely the stock will rebuild towards the agree target reference point B_{60}.

Preliminaries

The Scientific Technical Working Group (STWG) noted apologies from Andrew Tobin and Andy Bodsworth. Mr Bodsworth was scheduled to Chair the meeting, however he was unable to attend due to unexpected circumstances. The meeting was chaired by Selina Stoute.

The STWG noted that purpose of the meeting was to provide advice on the likely impacts of Spanish mackerel catches exceeding the Recommended Biological Catch (RBC) of 125 tonnes for the 2017/18 fishing season.

The STWG also noted that the TSRA had tabled paper on the meeting day titled '*Spanish mackerel subsistence catch and the proposed Total Allowable Catch limit*' for discussion.

Likely stock impacts from exceeding the Spanish Mackerel RBC in 2017-18

Meeting paper titled: *Spanish mackerel TAC for 2017-18* **(Attachment A)**.

The STWG noted the Finfish Working Group (FWG) recommended at its meeting on 16-17 March 2017 that further advice be sought from the STWG on the impact of Spanish mackerel catch exceeding the 125 t RBC for the 2017/18 fishing season. The FWG advised that based on agreed that total catches in the upcoming season may possibly range between **131-144 t,** based on:

- best estimates of subsistence take by traditional inhabitants (12 t *Busilacchi 2008)*;

- the range of TIB commercial catch estimates (9 t reported by *Busilacchi et al 2012* and 22 t reported by *O'Neill & Tobin 2016*); and
- a sunset catch allocation of 110 t.

The STWG also noted and considered the risk profile provided by Dr O'Neill which charts the probability of the stock falling below the current estimated biomass of around B_{40} over the next four years with five different catch scenarios ranging between 100 t and 200 t.

The STWG noted that the five catch scenario risk profiles **(Attachment A, Figure 1)** were generated from stock analysis two and the analysis indicates that:

- catch scenarios over 150 t have a higher probability of reducing the stock below current estimated levels (B_{40}), particularly after one year;
- the catch scenario of 150 t has a 30 per cent probability of reducing the stock below current estimated levels (B_{40}) and it is unlikely the stock will rebuild towards the agree target reference point B_{60}; and
- catch scenarios of 100 t and 125 t have a significantly reduced probability of the stock falling below current estimated levels (B_{40}) and it is likely that the stock will rebuild towards the agreed target reference point B_{60}.

TSRA questioned the reliability of the risk profiles given the predicted biomass level had not changed significantly since the *Begg et al 2006* assessment (maintaining around B_{40}) despite a reported reduction in commercial catches.

TSRA advised that with reduced commercial catches, evidence of the stock rebuilding should have been detected in the same way the risk profiles forecast the stock rebuilding with catch scenarios of 100-125 t. TSRA also questioned whether or not the CPUE data series was reliable given that the CPUE data comprised only 3-4 operators. AFMA noted that the CPUE time series includes more than 3-4 operators.

Dr O'neill advised that:

- the updated stock assessment includes new data and is not strictly comparable to the Begg *et al* 2006 assessment; and
- the standardised CPUE index has remained quite flat in recent years (while catch falls the standardised CPUE index has remained relatively constant) and it is unclear as to why this is occurring. Recruitment variation may explain some of the trends, however the extent of variation is uncertain. Similar uncertainties are being experienced for Spanish mackerel stocks on the east coast of Queensland.

TSRA recommended that the STWG consider the likelihood of catches actually being taken when considering overall risk (noting that risk is comprised of both consequence and likelihood). TSRA advised that on their review of *Busilacchi 2008* they found the report estimated subsistence catch for Spanish mackerel to be 7.86 t and not 12 t as presented at the FWG meeting on 16-17 March 2017.

AFMA advised that the previously agreed catch estimates for the various sectors are based on the best available information and that any alternate estimates must be evidence based. The STWG noted that when there is uncertainty around catch information a precautionary approach must be taken, particularly if considering potentially less conservative catch estimates.

The STWG **agreed** for AFMA and TSRA to provide the subsistence catch calculations drawn from *Busilacchi 2008* work out-of-session and confirm the final reported subsistence catch estimate.

Concern was raised that the *Busilacchi* work only included catch estimates for Mer, Erub and Ugar; however Spanish mackerel are caught by all Torres Strait communities and also by recreational fishers. AFMA agreed that further work is required to improve the catch estimate so it may be considered representative of catch for the region.

AFMA noted that it will be a high priority for the future RAG to provide advice on data needs and research priorities for the Fishery, building on the recommendations from the updated stock assessment and previous meetings of both the FWG and STWG. This includes investigating possible cost-effective options for developing a recreational catch estimate.

The working group noted the following comments from members:

- Catches should be managed in accordance with the best available science, if the science is showing catches should be 125 t then this is what the Fishery should stick to. Catches should not be increased above what the assessment is recommending.
- The risk profile indicates that the risk remains flat at 150 t, so having catches above 125 t but below 150 t may be acceptable for the next year only.
- Given the level of uncertainty raised even about the standardised CPUE data and if catch estimates are more uncertain than has been accounted for, the risk is likely to be larger than what is shown in the risk profiles **(Attachment A, Figure 1)**. From a scientific point of view there should be a more precautionary approach taken, the STWG agreed that 125 t is the recommendation at the time and it is based on the best available science.
- In light of uncertainty the precautionary principle should be applied.
- TIB finfish licence numbers have increased from 136 to 270. This suggest at least some level of increased TIB interest in the Fishery, this adds to the uncertainty in the estimates of likely TIB catch.
- Not taking the precautionary principle is in no-ones interest. Taking more than the RBC provides short-term gain with potential consequences. Even if the risk likelihood is low it would be unwise to go against the best available science and scientifically valid catch estimates. We need to first improve the data to support increasing the TAC.
- Effective and timely information sharing is required between the various advisory groups for the Fishery (FWG, STWG and the TSRA Quota Management Committee).
- Effective catch monitoring for the Fishery is required as a matter of a priority.
- It would be helpful for future meetings to be provided the figure of the total leased catch for each fishing season. The STWG noted that TSRA would need to review its confidentiality arrangements before providing this information.

Having regard for the views of all members the STWG **recommended the total allowable** catch for the 2017/18 fishing season remain at or below the 125 t RBC noting that:

- due to uncertain catch estimates a precautionary approach should be adopted; and
- it is unlikely that Fishery will be meeting the agreed management target of building to B_{60} if catch is around 150 t. The 150 t catch scenario has a 30 per cent probability of reducing the stock below current estimated levels (B_{40}) and it is unlikely the stock will rebuild towards the agree target reference point B_{60}.

Spanish mackerel subsistence catch and the proposed Total Allowable Catch limit (TSRA paper)

Meeting paper titled: "*Spanish mackerel subsistence catch and the proposed Total Allowable Cath limit*" **(Attachment B)**.

TSRA advised that the paper was to be taken as read. No further discussion was had on the paper.