

# **1st MEETING OF THE PZJA TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP (HCRAG) – 6-8 October 2021**

**8:30am 6 October 2021 – 12:30pm 8 October 2021**

**TSRA Boardroom, Thursday Island**

## **AGENDA**

The meeting will open at 8:30 am on Wednesday 6 October 2021.

### **AGENDA ITEM 1 PRELIMINARIES**

#### **1.1 Acknowledgement of Traditional Owners, welcome and apologies**

The Chair will welcome HCRAG members and observers to the 1<sup>st</sup> meeting of the Torres Strait Hand Collectables Resource Assessment Group (HCRAG).

#### **1.2 Adoption of agenda**

The RAG is invited to consider and adopt the draft agenda.

#### **1.3 Declarations of interest**

HCRAG members and observers are invited to declare any real or potential conflicts of interests and determine whether a member may or may not be present during discussion of or decisions made on the matter which is the subject of the conflict.

#### **1.4 Terms of reference (TOR) of the RAG**

The HCRAG is invited to review the general RAG TOR outlined in PZJA FMP 1.

#### **1.5 Out of session correspondence**

The HCRAG is invited to note any out of session correspondence to the HCRAG in the lead up to the first meeting.

### **AGENDA ITEM 2 HCRAG UPDATES**

#### **2.1 Industry members**

Industry members are invited to introduce themselves and provide an update on matters concerning the Torres Strait Hand Collectable fisheries, in particular, providing comment on fishing patterns, behaviours, prices, and market trends.

#### **2.2 Scientific members**

Scientific members are invited to provide an update on relevant research matters relevant to Torres Strait Hand Collectable fisheries.

#### **2.3 Government Agencies**

The HCRAG is invited to note updates from AFMA, TSRA and Fisheries Queensland on matters relevant to Torres Strait Hand Collectable fisheries.

## **2.4 Native Title**

The HCRAG will note a verbal update from the Malu Lamar (Torres Strait Islander) Corporation RNTBC representative if available to attend.

## **2.5 PNG National Fisheries Authority**

The HCRAG will note an update from the PNG National Fisheries Authority if available to attend.

### **AGENDA ITEM 3 FINAL RESULTS OF THE BECHE-DE-MER STOCK SURVEY (CSIRO)**

The HCRAG is invited to consider the final results of the eastern Torres Strait stock survey of Beche-de-mer species that took place in December 2019 - January 2020.

The HCWG considered the preliminary survey results at its August 2020 meeting and agreed to consider the finalised survey results and their implications for future management arrangements across all species in the BDM Fishery at their meeting in early 2021.

### **AGENDA ITEM 4 BLACK TEATFISH TRIAL OPENING 30 APRIL – 3 MAY 2021 AND FUTURE OPENINGS**

Considering the outcomes of the 2021 black teatfish trial reopening and in accordance with conditions 5, 6 and 7 of the Re-opening Decision Rule in the BDM Harvest Strategy, the HCRAG is invited to:

- review whether data collection during the trial opening was conducted satisfactorily;
- consider the analysis of the data collected and its suitability to inform a future TAC and potential to stay open; and
- provide advice to the Hand Collectables Working Group and the PZJA:
  - on the potential for future fishery openings including an appropriate TAC, interval between openings and reporting and data collection requirements and any other conditions that should apply.
  - identify additional data that should be collected during future openings (e.g. length sampling).

Industry observers will be invited to participate during this discussion to inform the RAG's consideration.

### **AGENDA ITEM 5 HARVEST STRATEGY IMPLICATIONS OF SCIENTIFIC SURVEY RESULTS AND CATCH DATA**

The HCRAG is invited to consider the implications of the final scientific survey results and annual catch data on the implementation of the BDM Harvest Strategy, including current classifications and triggers for surveyed species, data requirements and remaining gaps.

Considering the final results of the scientific stock survey and under the guidance of the Beche-de-mer Harvest Strategy, the HCRAG is invited to recommend to the HCWG and the PZJA TACs for the 2022 fishing season in line with the BDM Harvest Strategy.

### **AGENDA ITEM 6 ECOLOGICAL RISK ASSESSMENT (CSIRO)**

The HCRAG is invited to note an update from CSIRO on the Ecological Risk Assessment (ERA) process and provide comment on the draft ERA for the Torres Strait Beche-de-mer Fishery (if available).

**AGENDA ITEM 7    CLIMATE CHANGE IMPACTS ON TORRES STRAIT FISHERIES**  
**(subject to CSIRO's availability)**

The HCRAG is invited to note a presentation from CSIRO on the outcomes of the project *Scoping a future project to address impacts from climate variability and change on key Torres Strait Fisheries*.

**AGENDA ITEM 8    RESEARCH PRIORITIES**

The HCRAG is invited to consider the annual and five-year research plans for Hand Collectable Fisheries and recommend research priorities to the HCWG and the Torres Strait Scientific Advisory Committee research priorities for funding in 2022-23.

**AGENDA ITEM 9    OTHER BUSINESS**

The HCRAG is invited to nominate any other business for discussion.

**AGENDA ITEM 10   RAG PRIORITIES AND DATE FOR NEXT MEETING**

The HCRAG is invited to discuss a suitable date for the next meeting.

**The Chair must approve the attendance of all observers at the meeting. Individuals wishing to attend the meeting as an observer must contact AFMA ([fisheriesTI@afma.gov.au](mailto:fisheriesTI@afma.gov.au)).**

**The meeting will be voice recorded for the purpose of developing the meeting minutes and will be deleted once the meeting outcomes have been finalised.**

<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting No. 1 6-8 October 2021</b>
<b>PRELIMINARIES Welcome and apologies</b>	<b>Agenda Item 1.1 For NOTING</b>

## **RECOMMENDATIONS**

1. That the Resource Assessment Group **NOTE**:
  - a. an acknowledgement of Traditional Owners;
  - b. the Chair's welcome address;
  - c. apologies received from members unable to attend.
2. No formal apologies have been received however Scientific Member, Steve Purcell may only be able to participate at the meeting via video conference due to the current NSW COVID-19 situation and related travel restrictions.
3. The QDAF Member Ms. Samantha Miller has advised that she will be participating via video conference.



<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting No.1 6-8 October 2021</b>
<b>PRELIMINARIES Adoption of agenda</b>	<b>Agenda Item 1.2 For DECISION</b>

## **RECOMMENDATION**

1. That the Resource Assessment Group consider and **ADOPT** the draft agenda.

## **BACKGROUND**

2. A first draft annotated agenda was circulated to members and observers on 21 June 2021.
3. The draft agenda was revised to include minor comments from members and recirculated on 30 June 2021.

<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting No. 1 6-8 October 2021</b>
<b>PRELIMINARIES Declarations of interest</b>	<b>Agenda Item 1.3 For DECISION</b>

## RECOMMENDATIONS

1. That the Resource Assessment Group members:
  - a. **DECLARE** all real or potential conflicts of interest in Torres Strait hand collectable fisheries at the commencement of the meeting (**Table 1**).
  - 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 Resource Assessment Group regarding the management of conflicts of interest.
  - d. **NOTE** that the record of the meeting must record the fact of any disclosure, and the determination of the Resource Assessment Group 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.
3. Resource Assessment Group members are asked to declare all real or potential conflicts of interest or update the standing list of declared interests (**Table 1**) if required.
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.

**Table 1. HCRAAG member and observer Declarations of Interest to be updated at the meeting. For members who are also members of the Hand Collectable Working Group, the interest declared by those persons at the last HCWG meeting (7 August 2020) are shown.**

Name	Position	Declaration of interest
<b>Members</b>		
Sian Breen	Chair	To be declared
Tim Skewes	Scientific Member	Independent Consultant. Previously a employed by CSIRO. Current co-investigator on TSSAC project 'measuring non-commercial fishing in the Torres Strait'. Current co-investigator on TSRA funded project 'Stock survey of Torres Strait Beche-de-mer species'. Previous principal scientist for Torres Strait Scientific Advisory Committee (TSSAC) project to develop a harvest strategy for the TSBDMF. Previous CSIRO researcher for TSSAC project investigating traditional take of finfish in Torres Strait.
Steve Purcell	Scientific Member	Has interest in invertebrate fishery research has previously worked in the assessment of sea cucumber fisheries in the Pacific and New Caledonia, and on restocking/sea-ranching research. Specialist in sea cucumber ecology and fisheries. Will be involved in a sea cucumber population survey in New Caledonia to inform the CITES Appendix II listing of black and white teatfish.
Eva Plaganyi-Lloyd	Scientific Member	To be declared
Michael Passi	Traditional Inhabitant Member Kemer Kemer Meriam	TIB licence holder and full time BDM operator. Hand Collectable Working Group Member.
Milton Savage	Traditional Inhabitant Member Kaiwalagal	To be declared
Mark Pearson	Traditional Inhabitant Member Kulkagal	To be declared
George Morseau	Traditional Inhabitant Member Maluialgal	To be declared
Thomas Mooka	Traditional Inhabitant Member, Gudumalulgal	To be declared
Selina Stoute	AFMA Member	Employed by AFMA, no pecuniary interests or otherwise
Mark Anderson	Torres Strait Regional Authority (TSRA) Member	Employed by TSRA, no pecuniary interests as an individual, TSRA holds fishing licences on behalf of traditional inhabitants.
Samantha Miller	QDAF Member	Employed by Queensland Government and working in the Management and Reform

Name	Position	Declaration of interest
		Section, managing the East Coast Sea Cucumber and other harvest fisheries in Queensland. No pecuniary interests or otherwise.
Danait Ghebregabhier	Executive Officer, AFMA	Employed by AFMA, no pecuniary interests or otherwise

#### Permanent Observers

Yen Loban	TSRA Fisheries Portfolio Member	TIB licence holder; TSRA Board Member for Ngurupai
Ian Liviko	PNG National Fisheries Authority	To be declared.

#### Casual Observers

Ian Butler	Australian Bureau of Agriculture and Resource Economics (ABARES)	To be declared.
Keith Brightman	TSRA Fisheries Portfolio Member	Employed by TSRA, no pecuniary interests or otherwise
Quinten Hirakawa	TSRA officer	Employed by TSRA and TIB licence holder with a BDM endorsement.
Leo Dutra	CSIRO Staff	To be declared
Miriana Sporcic	CSIRO Staff	To be declared

<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting No. 1 6-8 October 2021</b>
<b>PRELIMINARIES</b> <b>Terms of reference</b>	<b>Agenda Item 1.4 FOR NOTING</b>

## RECOMMENDATION

1. That the HCRAAG **DISCUSS** and **PROVIDE ADVICE** on the role of a RAG and the terms of reference for the group as outlined in the [PZJA Fisheries Management Paper No. 1 \(FMP 1\)](#).

### ***Need for the Hand Collectables RAG***

1. On 12 October AFMA sought advice from the PZJA Hand Collectable Working Group (HCWG) on establishing a Resource Assessment Groups (RAG) with a focus on the beche-de-mer (BDM) fishery. The HCWG was fully supportive.
2. The BDM fishery has seen an increase in effort in recent years and industry supports further sustainable development. At the same time two key species (black and white teatfish) have been listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Given these developments, a RAG will play a very important role in advising on the status of BDM stocks, reviewing data collection programs as they develop, advising on and reviewing data analysis and other factors impacting on the fishery and the environment in which it operates.

### ***Role of the RAG***

3. The role of a 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 Hand Collectables 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 Working Group (Hand Collectables Working Group (HCWG) in this instance). 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 Hand Collectables RAG will report to the PZJA. It also informs the HCWG and the Torres Strait Scientific Advisory Committee (SAC), 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 HCWG and HCRAAG have some common membership, it is essential that members' roles be recorded and differentiated by the respective Chairpersons.

### **RAG Terms of reference**

7. The general terms of reference for a RAG are outlined in the *PZJA Fisheries Management Paper No. 1* (FMP 1) (pg. 9) which guides the operation and administration of PZJA consultative groups. AFMA proposes these ToR for the HCRAG without change:
  - 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

<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting No. 1 6-8 October 2021</b>
<b>PRELIMINARIES Out of session correspondence</b>	<b>Agenda Item 1.5 For NOTING</b>

## RECOMMENDATIONS

1. That the Resource Assessment Group **NOTE** the correspondence circulated out of session.

## BACKGROUND

2. The following correspondence was circulated out of session since 26 May 2021. Copies of this correspondence can be requested at any time from the HCWG Executive Officer.
3. A correspondence summary is provided at each meeting to ensure members have not missed any out-of-session business or notifications.

Date	Item
<b>Date</b>	<b>AFMA emailed meeting agenda papers to all HCRAG members and observers.</b>
4 and 18 August 2021	AFMA emailed all HCRAG members proposing to re-schedule the meeting to 6-8 October until active COVID-19 cases and restrictions settle down to allow a face-to-face meeting to be convened safely.
8 July 2021	AFMA emailed all HCRAG members proposing to re-schedule the meeting to 23-25 August until active COVID-19 cases and restrictions settle down to allow a face-to-face meeting to be convened safely.
2 July 2021	AFMA emailed all HCRAG members seeking any written updates that members would like to provide for the meeting by Tuesday 6 July 2021 to be included as part of the agenda papers.
30 June 2021	AFMA emailed all HCRAG members revised Agenda for HCRAG1 capturing minor comments received.
21 June 2021	AFMA emailed all HCRAG members Draft Agenda for HCRAG1 seeking comments by 30 June 2021.
26 May 2021	AFMA emailed all HCRAG members proposing 21-23 July as the meeting date for HCRAG1.

<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting No.1 6-8 October 2021</b>
<b>RESOURCE ASSESSMENT GROUP INDUSTRY MEMBER UPDATES</b>	<b>Agenda Item 2.1 For NOTING &amp; DISCUSSION</b>

## RECOMMENDATIONS

1. That the Resource Assessment Group (RAG):
  - a. **NOTE** any verbal updates provided by Traditional Inhabitant industry members;
  - b. **DISCUSS** any strategic issues, including economic trends, relevant to the development of the Torres Strait Hand Collectable Fisheries.

## BACKGROUND

2. Verbal reports are sought from industry members under this item.
3. It is important that the RAG develops a common understanding of any strategic issues, including economic, fishing and research trends relevant to the management of Torres Strait Hand Collectable Fisheries, including within adjacent jurisdictions. This ensures that where relevant, the RAG is able to have regard for these strategic issues and trends.
4. RAG industry members are asked to provide any updates on trends and opportunities in markets, processing and value adding. Industry is also asked to contribute advice on economic and market trends where possible.



<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting No.1 6-8 October 2021</b>
<b>RESOURCE ASSESSMENT GROUP SCIENTIFIC MEMBER UPDATES</b>	<b>Agenda Item 2.2 For NOTING &amp; DISCUSSION</b>

## RECOMMENDATIONS

1. That the Resource Assessment Group (RAG):
  - a. **NOTE** any verbal updates provided by Scientific members;
  - b. **NOTE** the scientific publications on the update of conversions ratios for beche-de-mer species and white teatfish surveys provided as **Attachment A**; and
  - c. **DISCUSS** any strategic research projects or issues that may be relevant or of interest to Torres Strait Fisheries.

## BACKGROUND

2. Verbal reports are sought from scientific members under this item.
3. Scientific Member Dr Éva Plagányi has requested the circulation of two scientific publications relevant to the BDM Fishery:
  - a. Update conversion ratios for beche-de-mer species in Torres Strait, Australia (authored by Nicole Murphy, Timothy Skewes and Éva Plagányi).
  - b. Successful use of a remotely operated vehicle to survey deep-reef habitats for white teatfish (*Holothuria fuscogilva*) in Torres Strait, Australia (authored by Nicole Murphy, Timothy Skewes, Steven Edgar, Kinam Salee and Éva Plagányi).
4. It is important that the RAG develops a common understanding of any strategic issues, including economic, fishing and research trends relevant to the management of Torres Strait Hand Collectable Fisheries, including within adjacent jurisdictions. This ensures that where relevant, the RAG is able to have regard for these strategic issues and trends.
5. Scientific members are asked to contribute advice on any broader strategic research projects or issues that may be relevant or of interest to Torres Strait Fisheries.



Issue 41 – March 2021

# BECHE-DE-MER

## information bulletin

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#### Editor

Igor Eeckhaut  
Biology of Marine Organisms and Biomimetics  
6, Av. Champ de Mars  
University of Mons  
7000 Mons Belgium  
Email: Igor.Eeckhaut@umons.ac.be

#### Production

Pacific Community  
BP D5, 98848 Noumea Cedex  
New Caledonia  
Fax: +687 263818  
Email: cfpinfo@spc.int  
www.spc.int

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### Editorial

This 41th issue of the SPC *Beche-de-Mer Information Bulletin* includes 16 original articles and scientific observations from a wide variety of regions around the world. We first want to express our congratulations to Dr Marie Bonneel, Dr Cathy Hair and Dr Hocine Benzait who recently received their PhDs. Dr Bonneel received her PhD from the University of Mons in Belgium, and her dissertation is titled “Sea cucumbers as a source of proteins with biomimetic interest: Adhesive and connective tissue – stiffening proteins from *Holothuria forskali*”. Dr Hair received her PhD from James Cook University in Australia, and the title of her dissertation is “Development of community-based mariculture of sandfish, *Holothuria scabra*, in New Ireland Province, Papua New Guinea”. Dr Benzait received his PhD from the Université de Mostaganem in Algeria, and his dissertation is titled “Ecologie, dynamique de la population et reproduction d’*Echinaster sepositus*, *Ophioderma longicauda* et de *Parastichopus regalis* au niveau de la côte de Mostaganem”.

The first article by Simone et al. (p. 3) recalls that at the last meeting of the Conference of the Parties to CITES in August 2019, three species of teatfish were included in CITES Appendix II. This inclusion has opened the door for potential new species listings.

The next four articles are original research contributions. Two articles are from Murphy et al. One (p. 5) provides updated conversion ratios for beche-de-mer species in Torres Strait, Australia. These values are useful for stock assessments, management and monitoring of the beche-de-mer fishery in Australia. In their second article (p. 8), the authors show the results of a field survey of eastern Torres Strait where they used a remotely operated vehicle to survey sea cucumbers. Ram et al. (p. 12) investigates the effect of salting time on the collagen content of the body wall of *Holothuria scabra*. They observed that after 72 hours of salting, collagen fibers are almost totally destroyed and disappear from the body wall of sandfish. The analysis of *Parastichopus regalis*’s digestive content, by Elakkermi et al. (p. 15), reveals that it includes mostly fine sedimentary particles and that a very small part is composed of foraminiferans, annelids, fragments of mollusc shells, sponge spicules, echinoderm ossicles, diatoms and cyanobacteria.

The next three articles concern field observations. Tanita et al. (p. 19) observed several juvenile teatfish showing intermediate ventral colour morphs and provide illustrations of these variations. Schagerström and Sundell (p. 22) and

Norwegian red sea cucumber (*Parastichopus tremulus*) fishery and aquaculture north of 60°N latitude: Feasible or fictional?

G. Christophersen et al. p. 25

Green sea turtle, *Chelonia mydas*, feeding on *Synapta maculata* (Holothuroidea: Synaptidae) on a seagrass bed (*Syringodium isoetifolium*) at Reunion Island, western Indian Ocean

T. Mulochau et al. p. 37

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F. A. Solís-Marín et al. p. 48

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T. P. Bondaroff p. 55

The sea cucumber and its role in the blue economy in Colombia

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K. Mezali et al. p. 69

L'inscription de trois espèces d'Holothuries à l'Annexe II de la CITES entre en vigueur

M. Di Simone et al. p. 73

Présentation de la pêche aux holothuries au Bénin

Z. Sohoun et al. p. 75

#### COMMUNICATIONS

WANGUMAR: A new company focused on advice and consultancy in sea cucumber aquaculture and fisheries management from the Mediterranean and northeast Atlantic regions p. 79

Sea cucumbers are now harvested in more than 80 countries p. 81

PhD theses p. 82

Publications related to holothurians, published in 2020 p. 85

NOAA Central Library p. 86

Christophersen (p. 25) describe the biology of *Parastichopus tremulus* whose distribution is in the northeast Atlantic Ocean, mainly along the Norwegian and Swedish coasts. This species shows significant potential as a commercial product for the Chinese market. Mulochau et al. (p. 37) provide us with some extraordinary photos of a green turtle looking for and eating *Synapta maculata* in seagrass and coral blocks at Reunion Island.

Two articles follow, and relate past stories about sea cucumbers. I first describe the history of *Holothuria scabra* aquaculture in Madagascar and talk about the history behind the creation of Indian Ocean Trepan, which is becoming one of the largest sandfish aquaculture companies in the world (p. 40). Solís-Marín et al. (p. 46) then tells us an extraordinary story where sea cucumber ossicles were found in a ritual deposit of consecration, found 2 m below the monolith of the Earth goddess Tlaltecuhli (Mexico). They have identified vestiges of 20 species of echinoderms, including five species of sea cucumbers.

Sea cucumber crimes in India and Sri Lanka are analysed by Bondaroff (p. 55). Similarly, Rodríguez-Forero (p. 66) explains the situation in Colombia, and the interest in developing a blue economy programme in that country. Mezali et al. (p. 69) show us the results of a survey in Algeria for analysing consumer behaviour to introduce sea cucumbers on the local Algerian market.

González-Wangüemert (p. 79) describes WANGUMAR, a new consultancy company linked to sea cucumber fisheries and aquaculture in the Mediterranean and northeast Atlantic regions. Lovatelli (p. 81) announces the second edition of the global guidebook for identifying commercially exploited sea cucumbers, and kindly invites people to contribute to it.

Also included in this issue are various communications (p. 79) about publications and PhD dissertations. This issue is the first where we present English and French sections. The article by Simone et al. in English, also appears in French (p. 73). Finally, Sohoun et al. (p. 75) give us, for the first time, information on sea cucumber fishing in Benin (West Africa).

I deeply thank Kim Des Rochers for her editing and proofreading work on the articles in English.

**Igor Eeckhaut**

# The listing of three sea cucumber species in CITES Appendix II enters into force

Marie Di Simone,<sup>1</sup> Arnaud Horellou<sup>1</sup> and Chantal Conand<sup>2</sup>

## Introduction

At the last meeting of the Conference of the Parties to CITES (CoP 18) in August 2019, three species of sea cucumber were added to CITES Appendix II: *Holothuria nobilis*, *H. fuscogilva* and *H. whitmaei* (Di Simone et al. 2020). The international trade in these species is now regulated and controlled in accordance with the provisions of Appendix II: CITES permits and certificates will be required for international movements, attesting to the legality and sustainability of shipments. In the absence of these documents, the shipments must be seized as they are expected to be illegal trade (CITES Secretariat 2020).

Appendix II controls and regulates trade to ensure that it is based on the management (methods and volumes) of sustainable takes. Transactions will also be tracked and compiled in the Parties' annual trade reports and recorded in the CITES trade database (CITES Secretariat 2020).

## An entry into force of listing: Why a delay?

This listing entered into force on 28 August 2020 after a 12-month delay in implementation agreed to by Parties at the last CoP (CITES Secretariat 2020).

This delay was intended to allow range States of these species and importers to prepare and effectively enforce the listing, including the establishment of adequate procedures for management, identification, monitoring and permitting procedures (CITES Secretariat 2020). Indeed, this amendment posed significant implementation issues that would certainly not have been resolved in the 90-day period after which a CITES Appendix listings become legally binding (CITES Secretariat 2020).

Sea cucumbers support important industries and are the basis of livelihoods for communities in remote areas with few alternatives for economic activity. It was, therefore, agreed on by the Parties that regulations should be put in place to ensure the survival of these species in the wild (CITES Secretariat 2020).

## Implementation of listing: Establishment of a non-detriment findings

A listing to CITES Appendix II leads to the establishment of a non-detriment findings (NDF). The NDF is issued after a scientific risk assessment – based on an analysis of the mode of exploitation, its effects on the population, the measures and the risks – so as to determine if the removal of a species in its natural environment is detrimental or not (SPC 2010).

Thus, an NDF must include the following main information:

1. populations: levels, trends, environments, densities, locations and resilience;
2. management and harvesting: fished sites vs non-fished sites, fishing methods, conservation programmes and quotas; and
3. control measures.

This includes determining the state of a population by assessing stocks, setting catch quotas and spatial and temporal closures of fisheries, and enforcing these measures, which ensure and commit the Party to the sustainable exploitation of these three species (Shedrawi et al. 2019).

## Challenges encountered in establishing an NDF

Sea cucumbers represent a novelty for CITES Parties, particularly the methods of implementation and acquisition of skills.

There remains a lack of scientific information on sea cucumber biology, ecology and population dynamics. However, this information is essential to establishing comprehensive management plans capable of ensuring sustainable harvesting and conservation of these species (CITES 2019). The data required to carry out an NDF are, therefore, difficult to assess in the absence of this information (CITES 2019).

Also, the existing data most often concerns all sea cucumber species, and individual species are rarely differentiated in trade statistics or trade reports (CITES 2019).

<sup>1</sup> French CITES Scientific Authority, National Museum of Natural History, Paris, France. Email: marie.di-simone@mnhn.fr and arnaud.horellou@mnhn.fr

<sup>2</sup> National Museum of Natural History, Paris, France. Email: chantal.conand@mnhn.fr

Finally, the capacities of a country's management body and scientific authority are sometimes insufficient to collect the information required to assess the risk of international trade for the survival of the species in its territory (Shedrawi et al. 2019). For example, Pacific Island countries and territories are already facing difficulties in implementing effective and sustainable management measures due to economic and technical constraints (Shedrawi et al. 2019).

## What next?

The listing of these three sea cucumber species in CITES has opened the door for potential new species listings (Di Simone et al. 2020). According to Purcell et al. (2012), there are 58 species of sea cucumbers of commercial interest in the world. This number can only increase: species with a high commercial value are becoming rare or even depleted, and harvesting efforts will target other species that are not yet traded (i.e. those with a low commercial value) which were not previously listed (Purcell et al. 2012).

For the next CoP, the European Union plans to make a proposal to list all European sea cucumber species in Appendix II.

In addition, the CITES Secretariat is finalising a study that will serve as the basis for a toolkit that Parties can use to ensure the implementation of new rules that affect the trade in these sea cucumbers. These efforts are supported by funding from the European Union (CITES Secretariat 2020).

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# Updated conversion ratios for beche-de-mer species in Torres Strait, Australia

Nicole E. Murphy,<sup>1,\*</sup> Timothy D. Skewes<sup>1</sup> and Éva E. Plagányi<sup>1</sup>

## Abstract

As part of the newly endorsed Torres Strait Beche-de-mer Harvest Strategy, conversion ratios for commercial beche-de-mer species were reviewed. Accurate conversion ratios are required to determine total catches in a standard unit (e.g. wet gutted or landed weight) from data that records catch weight in several different processing stages. These values are useful for stock assessment, management and monitoring of the beche-de-mer fishery in Torres Strait, and elsewhere in Australia.

**Key words:** beche de mer, conversion ratios, sea cucumber, Torres Strait, fisheries

## Introduction

### Total allowable catch

Total allowable catch (TAC) is considered by the European Union Common Fisheries Policy to be a cornerstone conservation measure (Karagiannakos 1996). TAC represents the amount of fish of a species that can be taken from a fishery in a prescribed period. A TAC is set for a species and managed through a range of mechanisms.

### Torres Strait beche-de-mer fishery

The Torres Strait beche-de-mer (BDM) fishery is a multi-species, wholly commercial, traditional inhabitant fishery (Skewes et al. 2000; Skewes et al. 2004). Twenty-three commercial sea cucumber species have been recorded in Torres Strait (Murphy et al. 2019). The fishery has undergone closures and reduced catch limits for important fishery species (Skewes et al. 2010) for a number of years. However, the implementation of recent management measures, such as revised species TACs (Plagányi et al. 2020), along with a shift in focus from historically high-value to medium-value species, has maintained the fishery as a potentially significant source of income for local Torres Strait islander communities.

A newly endorsed multi-tier harvest strategy (Torres Strait Beche-de-mer Harvest Strategy<sup>2</sup>) has been implemented since January 2020 for the fishery. It incorporates modern management strategies, traditional fisheries practices, and community decision-making processes (Plagányi et al. 2020). Precautionary evidence-based methods for reviewing and setting TAC levels for species are used. New TACs were set for species of hairy blackfish (*Actinopyga miliaris*), deepwater redfish (*A. echinites*), greenfish (*Stichopus chloronotus*) and curryfish (*S. herrmanni* and *S. vastus*). Previously, these species were grouped in a multi-species “basket”, although

increased fishing pressure as a result of increased market value required the species to be monitored individually (Plagányi et al. 2020).

### Conversion ratios

Catch data for the Torres Strait BDM fishery are recorded in a number of different processed states, such as live, wet gutted, salted, boiled and salted, and fully processed (dry) (Skewes et al. 2004). It is important that the relationship between the measurement of sea cucumbers in different stages of processing, from live product to dried and ready for market be determined. This allows data from different processing states to be converted by applying species-specific conversion ratios, with results used for tracking quotas for individual species.

Compulsory catch reporting was introduced to the Torres Strait BDM fishery in 2017. Fishers are required to record catch information on Torres Strait catch disposal records (TDB02) as part of the mandatory Fish Receiver System (PZJA 2017). This includes reporting the total mass of each species landed, as well as the processing method, so that conversion ratios can be used to convert all reported catch to a standard weight (i.e. wet weight gutted) for the fishery (Plagányi et al. 2020).

As part of the Torres Strait Beche-de-mer Harvest Strategy and the inclusion of new individual TACs for some species, conversion ratios for 18 commercial BDM species in Torres Strait were reviewed and updated.

## Methods

Locally relevant conversion ratios for the Torres Strait BDM fishery – which are suitable for converting weights available from abundance surveys and fishery data to the required management weight metric (wet weight gutted) – were originally compiled by Skewes et al. (2004). The study found

<sup>1</sup> Commonwealth Scientific and Industrial Research Organisation, Oceans and Atmosphere, Brisbane, QLD 4072, Australia. \*Corresponding author email: nicole.murphy@csiro.au

<sup>2</sup> <https://www.pzja.gov.au/the-fisheries/torres-strait-beche-de-mer-fishery>

the majority of conversion ratio information available in the literature was for values for whole live weight to dry weight (Conand 1989; Preston 1990). Intermediate processing stages such as boiled or salted were found to be sparse, with many ratios estimated from oven-dried specimens (Harriot 1985), or using experimental methods that were not fully defined (Skewes et al. 2004). Processing methods, and resulting yields, were also found to be variable (Preston 1990).

A hierarchical approach was therefore used, with species conversion ratio values updated first using data from previous Torres Strait studies (Skewes et al. 2004) and raw data from Prescott et al. (2015), second from literature reviews, and third by the use of conservative proxies to fill gaps for processing state information for species (Purcell et al. 2009; Ngaluafé and Lee 2013; Prescott et al. 2015; Ram et al. 2016). Ratio decisions were based on current processing methods, average value calculations and the removal of outliers (Table 1).

## Results

Conversion ratios for total whole fresh weight from wet to dry product (including values from other studies) were noted from Ngaluafé and Lee (2013; Table 1 and Table 3), with whole fresh weights also noted from Purcell et al. (2009; Table 2). Inverse values for gutted to salted and dried to gutted, were derived from Skewes et al. (2004) and Prescott et al. (2015). Empirical values were calculated for gutted to salted, gutted to dried, salted to dried, salted to gutted and dried to gutted, from Purcell et al. (2009). Calculations from raw data provided by Dr Shijie Zhou were used for live to gutted, live to dried, gutted to dry and dried to gutted (Prescott et al. 2015). Averages were taken where multiple values existed for species and processing state. Proxy values using the most conservative value for species for processing state, were used to fill in gaps for species (Table 1).

## Discussion

Updated conversion ratios for BDM species are currently the best estimator for converting pooled catch data from one processed state to another, where the size frequency of the catch is not known. For example, for converting catches in gutted weight to processed weight for comparison with export data, and for tracking the TAC for individual species. These values are useful for stock assessments and are important for management and monitoring of the Torres Strait BDM fishery and other BDM fisheries in Australia.

Conversion ratios also provide an insight to the efficiency of BDM processing methodologies, and for assessing the effect of any future changes in processing techniques.

This review, and information from fishers and management agencies, shows that a critical conversion ratio information gap now occurs for curryfish species, a newly targeted species group for Torres Strait that require specialised processing upon collection due to their tendency to easily disintegrate. This involves an early boil and then salting of the animal before it can be weighed. The new curryfish processing stage will require

a new conversion ratio to be determined (i.e. wet-boiled and salted) so that fishery catch data can be converted to standard (wet gutted) weight for the application of management rules.

## Acknowledgments

This project was funded by the Torres Strait Regional Authority, the Australian Fisheries Management Authority, and the Commonwealth Scientific and Industrial Research Organisation. Raw data for some species were provided by Dr Shijie Zhou. Thank you to all Torres Strait traditional owners for regularly hosting us on their land and supporting this research.

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**Table 1.** Torres Strait beche-de-mer species and conversion ratio values for each processing state.

Common name and species	Live to gutted	Live to salted	Live to dried	Gutted to salted	Gutted to dried	Salted to dried	Salted to gutted	Dried to gutted
Deepwater redfish <i>Actinopyga echinities</i>	0.692 <sup>3</sup>	0.652 <sup>h</sup>	0.088 <sup>av13</sup>	0.964 <sup>h</sup>	0.152 <sup>f3</sup>	0.309 <sup>h</sup>	1.706 <sup>h</sup>	6.579 <sup>f3</sup>
Stonefish <i>Actinopyga lecanora</i>	0.894 <sup>c1</sup>	0.652 <sup>c1</sup>	0.154 <sup>cv12*</sup>	0.729 <sup>1</sup>	0.158 <sup>fv12*</sup>	0.253 <sup>1</sup>	1.372 <sup>1</sup>	6.329 <sup>1</sup>
Surf redfish <i>Actinopyga mauritiana</i>	0.684 <sup>2*</sup>	0.652 <sup>h</sup>	0.084 <sup>av12*</sup>	0.873 <sup>4</sup>	0.187 <sup>v2*4</sup>	0.286 <sup>4</sup>	1.145 <sup>d</sup>	5.347 <sup>cqv2*4</sup>
Hairy blackfish <i>Actinopyga miliaris</i>	0.480 <sup>4</sup>	0.652 <sup>h</sup>	0.067 <sup>av14</sup>	0.964 <sup>4</sup>	0.209 <sup>4</sup>	0.217 <sup>4</sup>	1.037 <sup>d</sup>	4.785 <sup>e</sup>
Deepwater blackfish <i>Actinopyga palauensis</i>	0.818 <sup>cv13</sup>	0.593 <sup>cv13</sup>	0.175 <sup>abv1</sup>	0.728 <sup>fv13</sup>	0.190 <sup>fv13</sup>	0.262 <sup>fv13</sup>	1.374 <sup>fv13</sup>	5.263 <sup>fv13</sup>
Burrowing blackfish <i>Actinopyga spinea</i>	0.544 <sup>3</sup>	0.375 <sup>3</sup>	0.073a <sup>1</sup>	0.689 <sup>3</sup>	0.135 <sup>3</sup>	0.195 <sup>3</sup>	1.449 <sup>3</sup>	7.424 <sup>3</sup>
Leopardfish <i>Bohadschia argus</i>	0.665 <sup>cv12</sup>	0.572 <sup>c1</sup>	0.115 <sup>cv12</sup>	0.777 <sup>1</sup>	0.171 <sup>v12</sup>	0.233 <sup>1</sup>	1.286 <sup>1</sup>	5.841 <sup>gv12</sup>
Brown sandfish <i>Bohadschia vitiensis</i>	0.735 <sup>c1</sup>	0.612 <sup>c1</sup>	0.116 <sup>c1</sup>	0.834 <sup>1</sup>	0.157 <sup>1</sup>	0.189 <sup>1</sup>	1.199 <sup>1</sup>	6.337 <sup>1</sup>
Lollyfish <i>Holothuria atra</i>	0.436 <sup>cv12*</sup>	0.236 <sup>c1</sup>	0.063 <sup>alxcv12*</sup>	0.586 <sup>1</sup>	0.150 <sup>12*</sup>	0.256 <sup>1</sup>	1.706 <sup>1</sup>	6.289g <sup>12*</sup>
Elephant trunkfish <i>Holothuria fuscopunctata</i>	0.519 <sup>4</sup>	0.652 <sup>h</sup>	0.133 <sup>abv14</sup>	0.911 <sup>4</sup>	0.242 <sup>4</sup>	0.263 <sup>4</sup>	1.097 <sup>d4</sup>	4.132 <sup>e4</sup>
White teatfish <i>Holothuria fuscogilva</i>	0.627 <sup>cv2*4</sup>	0.593 <sup>c</sup>	0.137 <sup>abv12*</sup>	0.775 <sup>1</sup>	0.237 <sup>fv2*</sup>	0.309 <sup>1</sup>	1.290 <sup>1</sup>	4.219g <sup>v12*</sup>
Golden sandfish <i>Holothuria lessoni</i>	0.645 <sup>3</sup>	0.526 <sup>3</sup>	0.098 <sup>a</sup>	0.815 <sup>3</sup>	0.152 <sup>f3</sup>	0.186 <sup>f3</sup>	1.226 <sup>3</sup>	6.588 <sup>f</sup>
Sandfish <i>Holothuria scabra</i>	0.496 <sup>4</sup>	0.355 <sup>4</sup>	0.049 <sup>av14</sup>	0.758 <sup>4</sup>	0.094 <sup>4</sup>	0.125 <sup>4</sup>	1.319 <sup>d</sup>	10.638 <sup>e4</sup>
Black teatfish <i>Holothuria whitmaei</i>	0.677 <sup>v2*31</sup>	0.529 <sup>3</sup>	0.108 <sup>av12*3</sup>	0.824 <sup>f1</sup>	0.177 <sup>fv2*3</sup>	0.220 <sup>f</sup>	1.213 <sup>f1</sup>	5.649 <sup>fgv2*3</sup>
Greenfish <i>Stichopus chloronotus</i>	0.894 <sup>h</sup>	0.652 <sup>h</sup>	0.175 <sup>h</sup>	0.964 <sup>h</sup>	0.242 <sup>h</sup>	0.309 <sup>h</sup>	1.382 <sup>h</sup>	11.364 <sup>h</sup>
Curryfish (common) <i>Stichopus herrmanni</i>	0.651 <sup>2</sup>	0.652 <sup>h</sup>	0.036 <sup>av1</sup>	0.964 <sup>h</sup>	0.114 <sup>2</sup>	0.309 <sup>h</sup>	1.706 <sup>h</sup>	8.772 <sup>g2</sup>
Curryfish (vastus) <i>Stichopus vastus</i>	0.894 <sup>h</sup>	0.652 <sup>h</sup>	0.175 <sup>h</sup>	0.964 <sup>h</sup>	0.242 <sup>h</sup>	0.309 <sup>h</sup>	1.706 <sup>h</sup>	11.364 <sup>h</sup>
Prickly redfish <i>Thelenota ananas</i>	0.667 <sup>cv4</sup>	0.481 <sup>c</sup>	0.055 <sup>abv14</sup>	0.736 <sup>14</sup>	0.088 <sup>v14</sup>	0.118 <sup>v14</sup>	1.358 <sup>dv14</sup>	11.364 <sup>ev14</sup>

Superscripts denote derived value source and reference: a) Table 3 (Ngaluafé and Lee 2013), b) Table 1 (Ngaluafé and Lee 2013), c) Table 2 (Purcell et al. 2009), d) inverse gutted to salted (Skewes et al. 2004), e) inverse dried to gutted (Skewes et al. 2004), f) empirical calculation (Purcell et al. 2009), g) inverse dried to gutted (Prescott et al. 2015), h) proxy value, v) average of multiple values; References: 1) Ngaluafé and Lee 2013, 2) Prescott et al. 2015, 2\* Calculation from raw data provided by S. Zhou (Prescott et al. 2015), 3) Purcell et al. 2009, 4) Skewes et al. 2004.



# Successful use of a remotely operated vehicle to survey deep-reef habitats for white teatfish (*Holothuria fuscogilva*) in Torres Strait, Australia

Nicole E. Murphy,<sup>1,\*</sup> Timothy D. Skewes,<sup>1</sup> Steven Edgar,<sup>2</sup> Kinam Salee<sup>1</sup> and Éva E. Plagányi<sup>1</sup>

## Abstract

A field survey of sea cucumber species of eastern Torres Strait, Australia was recently undertaken, in order to inform stock size estimates and distribution data for the Torres Strait beche-de-mer fishery. We also surveyed deep-reef (>20 m) strata (equivalent to habitat) to investigate deep-reef sea cucumber populations of white teatfish (*Holothuria fuscogilva*) using a remotely operated vehicle. The underwater camera system proved very successful at observing sea cucumbers. Although we surveyed habitat down to 50 m, we did not observe white teatfish deeper than 37 m.

The information gathered during the survey will be used to delimit and quantify the deep-reef white teatfish population for Torres Strait.

## Introduction

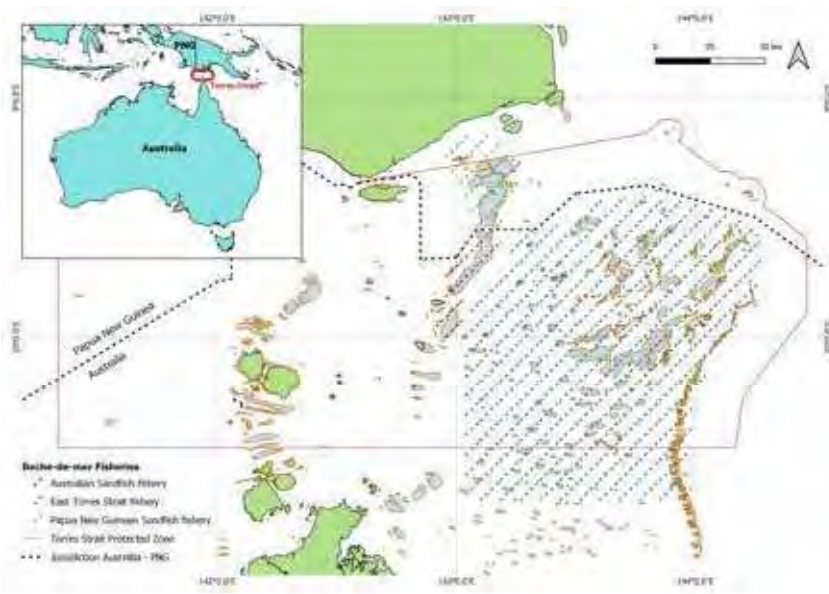
The Torres Strait beche-de-mer (BDM) fishery is a sea cucumber fishery on the Australian side of Torres Strait, north of Cape York. The fishery has two components: 1) the sandfish fishery that occurs on Warrior Reef and adjacent to the Papua New Guinea sandfish fishery, and 2) the eastern fishery that occurs in a 16,844 km<sup>2</sup> area of Torres Strait situated at its eastern extreme (Fig. 1). The eastern Torres Strait fishery contains about 1204 km<sup>2</sup> of shallow reef-top habitat, 185 km<sup>2</sup> of shallow reef edge (<20 m deep) habitat, and 600 km<sup>2</sup> of deep (>20 m) reef edge and deep lagoon habitat that accounts for about 64% of all the reefs in Torres Strait (Skewes et al. 2010).

A field survey of eastern Torres Strait sea cucumber species was undertaken during November 2019 and January 2020 in order to inform stock size estimates and distribution data for the fishery. Previous surveys of the Torres Strait BDM fishery have been undertaken in 2002, 2005 and 2009 (Skewes et al. 2004; Skewes et al. 2010), and were all restricted to <20 m due to diving regulations. Of interest for the recent survey was investigating the full extent of the distribution of white teatfish (*Holothuria fuscogilva*) in deeper (>20 m) habitats, in order to quantify total stock biomass and evaluate the potential for further sustainable development of this fishery.

An exploration of the deep-reef reef habitats for white teatfish was undertaken using a remotely operated vehicle (ROV). We were able to successfully survey 53 deep-reef transects for the first time for the Torres Strait BDM fishery.

## Methods

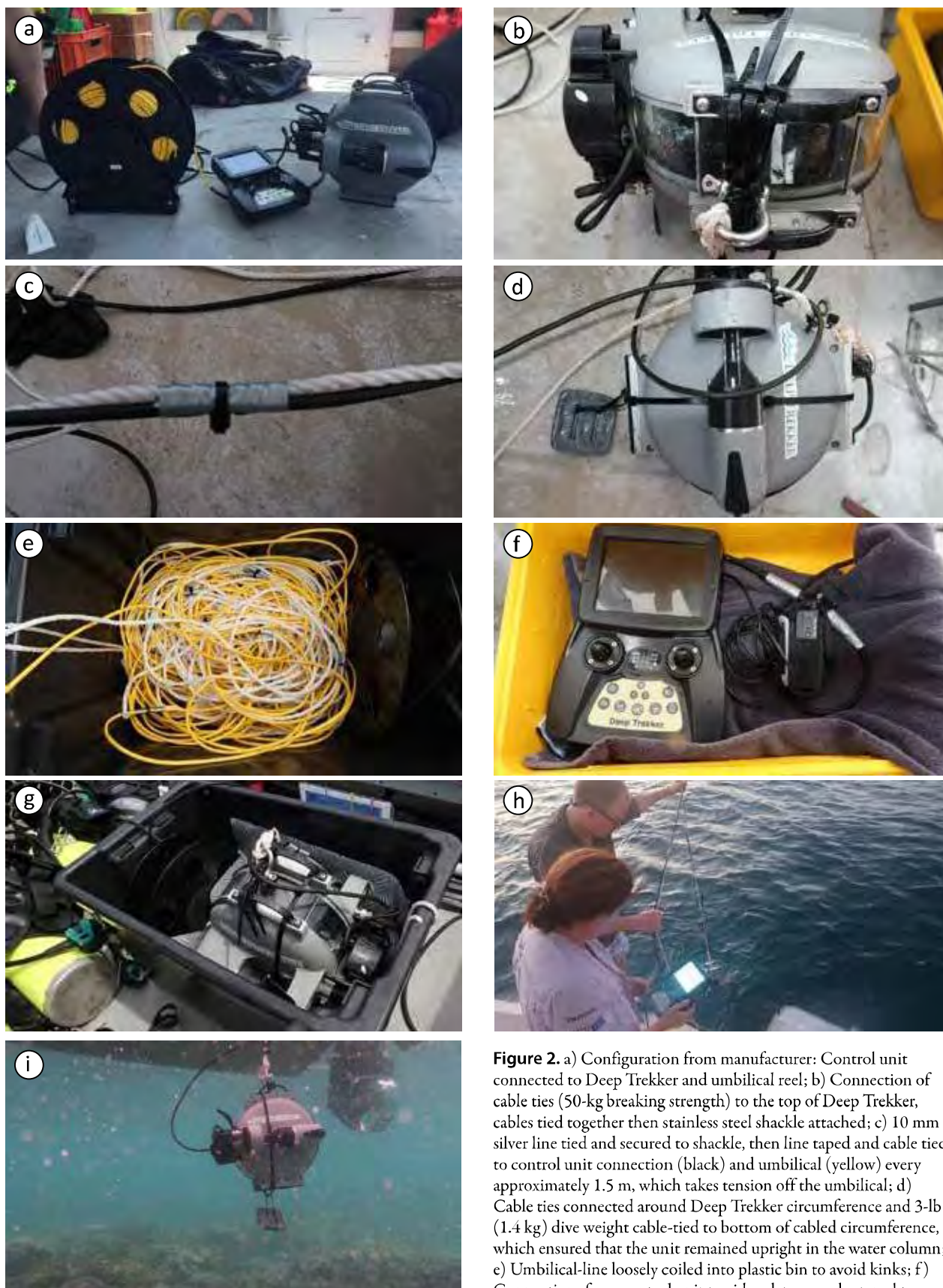
A DTG3 Deep Trekker ROV unit was modified and used to complement existing sea cucumber survey methods for Torres Strait. This involved deployment from a 5.0 m inflatable Naiad vessel, as well as handling the ROV in conditions of swell, wind and inclement weather (Fig. 2).



**Figure 1.** Approximate location of the three sea cucumber fisheries in Torres Strait, Australia.

<sup>1</sup> Commonwealth Scientific and Industrial Research Organisation, Oceans and Atmosphere, Brisbane, QLD 4072, Australia. \*Corresponding author email: nicole.murphy@csiro.au

<sup>2</sup> Commonwealth Scientific and Industrial Research Organisation, National Collections and Marine Infrastructure, Brisbane, QLD 4072, Australia



**Figure 2.** a) Configuration from manufacturer: Control unit connected to Deep Trekker and umbilical reel; b) Connection of cable ties (50-kg breaking strength) to the top of Deep Trekker, cables tied together then stainless steel shackle attached; c) 10 mm silver line tied and secured to shackle, then line taped and cable tied to control unit connection (black) and umbilical (yellow) every approximately 1.5 m, which takes tension off the umbilical; d) Cable ties connected around Deep Trekker circumference and 3-lb (1.4 kg) dive weight cable-tied to bottom of cabled circumference, which ensured that the unit remained upright in the water column; e) Umbilical-line loosely coiled into plastic bin to avoid kinks; f) Connections from control unit to video data recorder taped to provide protection and prevent pinching. Control-video system

placed in waterproof Pelican™ case; g) The Deep Trekker was placed on a rubber mat on top of the umbilical for transport - stopped entanglement or damage from sea conditions; h) Trial deployment and video recording from control unit; i) Observing Deep Trekker underneath the Naiaid vessel to determine the field of view. (images: N.E. Murphy)





**Figure 3.** Undertaking a survey transect from the Naiad vessel. (image: N.E. Murphy)

The Deep Trekker was used in a drop camera mode, where the ROV was negatively weighted and deployed from the vessel with a cabled tether and allowed to drift (or slowly towed) to collect data along transects undertaken from the Naiad vessel, for a set time (Fig. 3). Of note for the Deep Trekker was the controlled rotational capability and the 270°-vertical-degree view that allowed for inspection of potential targets, as well as the capability to record high-quality video.

## Set up

### *Undertaking transects*

For deep-reef transects (>20 m), the unit was deployed into the water and lowered to within 1 to 2 m of the sea floor. The video was switched on to record, and 10-minute drifts were undertaken, with one person viewing the control unit, another tending to the umbilical (by raising the ROV up or down manually to follow the seabed), a third person recording information on a datasheet (including targets timestamp and depth, GPS location and distance along transect), and a fourth person controlling the Naiad vessel. Transect depths ranged from 20 to 50 m, and were 40 to 675 m long.

Observations were made in real time. The number of sea cucumbers seen and any significant habitat observed were recorded on a sampling datasheet, together with depth and time. All recorded video was reviewed to verify sea cucumber identification and total number. Habitat information was also updated on transect datasheets.

### *Field of view*

The Deep Trekker field of view was determined by placing an object of known length on the transect and capturing

it on video, with a diver in the water also taking measurements. Several images were used (after review) for comparison and assessment.

## Outcomes

The white teatfish survey was exploratory and highly targeted. Deep-reef sites included sites adjacent to shallow reef edges, continuing down the reef slope, and in the deeper lagoons of the sunken northeasterly reefs of Torres Strait.

The DTG3 Deep Trekker ROV proved very successful at observing and quantifying sea cucumbers, including white teatfish. Although we surveyed habitats down to 50 m, we did not observe white teatfish deeper than 37 m. The average density of white teatfish in deep-reef habitats was the highest of any of the sampled strata (Fig. 4), at about 14 per hectare. Given the extent of the deep-reef habitat in east Torres Strait, the white teatfish in this habitat accounted for 72% of the entire white teatfish population in the area.

We are confident we have now delimited and quantified the deep-reef white teatfish population of eastern Torres Strait.

## Acknowledgments

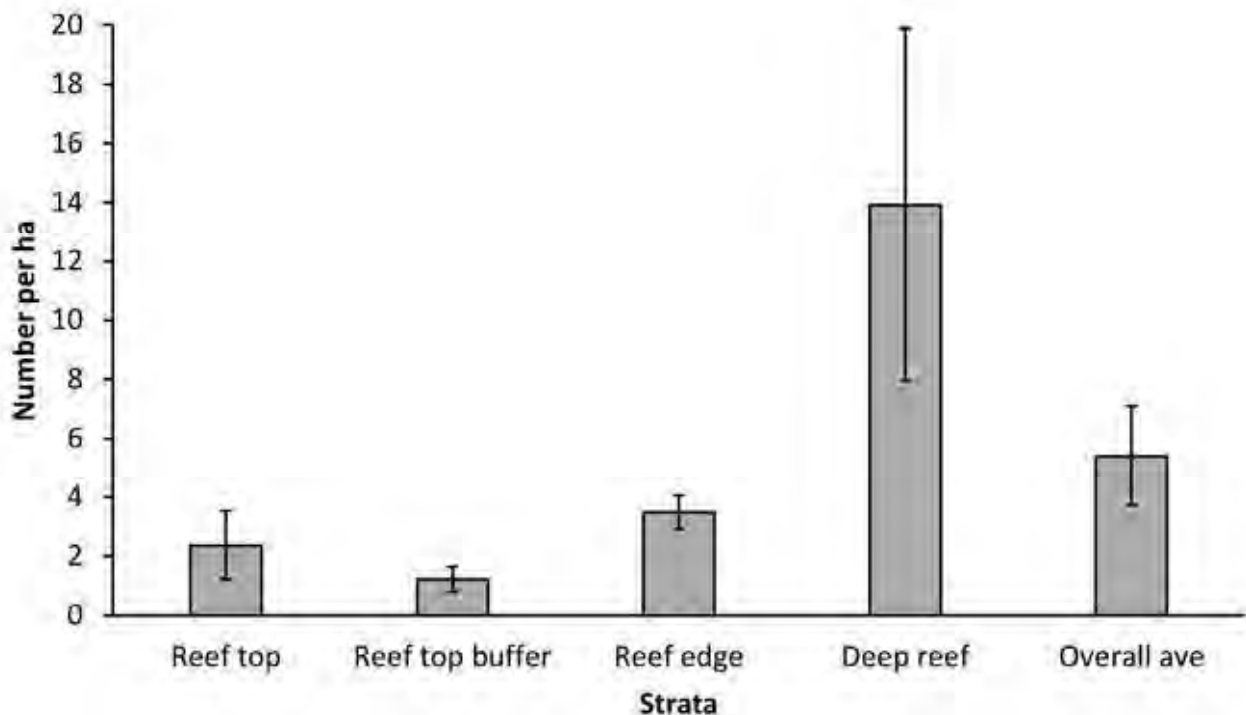
This project was funded by the Torres Strait Regional Authority (TSRA), the Australian Fisheries Management Authority, and the Commonwealth Scientific and Industrial Research Organisation. TSRA kindly offered a number of their ROV units to trial for surveying deep-reef habitats. Thank you to Ms Madeina David for her valuable assistance during the survey.

Thank you to all Torres Strait traditional owners for regularly hosting us on their land and supporting this research.

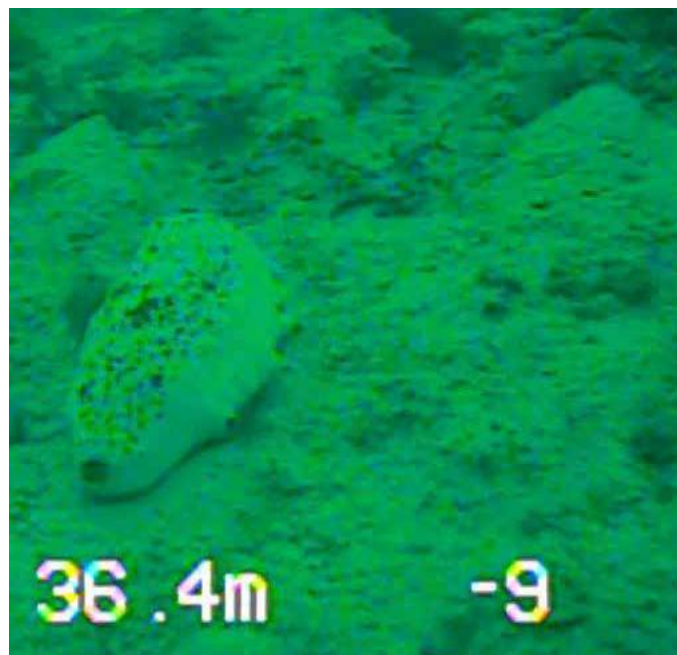
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**Figure 4.** Density (number per hectare) of white teatfish (*Holothuria fuscogilva*) in four reef strata (habitats), and the overall stratified density for eastern Torres Strait (ave = average; error bars = one standard error).



**Figure 5.** White teatfish (*Holothuria fuscogilva*) seen on underwater video transect. (image: N.E. Murphy)

# Salting affects the collagen composition of the tropical sea cucumber *Holothuria scabra*

Ravinesh Ram,<sup>1</sup> Roveena Vandana Chand,<sup>2</sup> Sue Reilly<sup>3</sup> and Paul Southgate<sup>4</sup>

## Abstract

The effect of salting time on the collagen content of the body wall of *Holothuria scabra* (sandfish) is investigated in the present work. Sandfish were harvested from Tavua Bay in Fiji, and processed using an upgraded technique. Sandfish were cooked for the first time followed by immersion in salt and then treated at different salting times of 24 hours (h), 36 h, 48 h and 72 h. The results show that after 72 h, collagen fibers were almost totally destroyed and disappeared from the body wall of sandfish. It is highly recommended that a new and better processing technique be established to prevent post-harvest nutritional losses from beche-de-mer for better value, and to ensure that salting does not exceed 48 h.

## Introduction

Sea cucumbers (called beche-de-mer or trepang when dried) are regarded as an authentic cuisine for a number of Asian consumers. It is regarded as a nutritious low-fat food source that is rich in protein and essential lipids. As bottom dweller invertebrates, sea cucumbers tend to bioaccumulate essential nutritional compounds of high value. Sea cucumbers are known to have medicinal benefits such as in the treatment of cancer, arthritis and a number of other medical ailments (Bordbar et al. 2011).

Collagen is a protein that is found in all sea cucumbers, and high-quality is found in tropical sea cucumbers (Dong et al. 2011). Significantly, given the importance of body wall texture in the value of sea cucumbers, collagen has been reported to make up at least 70% of the protein content in sea cucumbers (Saito et al. 2002) and, individually, between 3.4% and 24.3% of beche-de-mer dry weight (Liu et al. 2010; Zhong et al. 2015). Collagen belongs to a family of extracellular matrix proteins that maintain the integrity of various tissues. There are approximately 27 types of collagen found, with 42 distinct types of polypeptide chains and about 20 additional proteins and collagen-like domain, and 20 other collagens modified by enzymes (Kivirikko and Prokop 1995; Myllyharju and Kivirikko 2004). Collagen molecules are composed of three  $\alpha$  chains that are mainly stabilised by intra- and inter-chain hydrogen bonds that form the collagen triple helix (Zhang et al. 2013), which contains a repeat of the amino acids glycine, proline and hydroxyproline (Ichikawa et al. 2010). Collagen is used in leather

products, biomedical products (e.g. wound dressings, implants and drug carriers), and by the food industry in the production of gelatin (Nam et al. 2008).

There is limited literature on the possible changes in collagen content during the processing of sea cucumbers, and the effects of particular processing steps and conditions (e.g. temperature) on the collagen content of sea cucumber products. Niamnuy et al. (2008) studied changes in the protein composition and the physical effects on shrimp during boiling at different salt solutions. The findings revealed that increased salt concentrations affected the protein quality and texture of the shrimp. When the boiling time and salt concentration both were increased, protein denaturation was more common and the shrimp became harder due to the decrease in myofibrillar, sarcoplasmic and stroma proteins. Niamnuy et al. (2007) reported that boiling time affected shrimp quality through protein denaturation as well as the salt, moisture and protein content of shrimp. The final product's quality can only be determined through organoleptic evaluation, and the extent of quality loss (e.g. appearance, taste, texture and colour due to boiling time and various salt concentrations), affect the overall acceptance of the final product by the customer (Tapaneyasin et al. 2005).

In Fiji, sea cucumber processing is a destructive process, with a series of cooking, salting and drying steps followed by complete dehydration of the sea cucumber for prolonged storage. In Fiji, salting sea cucumbers is done for approximately 48–72 h before further cooking and drying. It is believed that salting leaches away essential proteins and salt-soluble amino acids that make up the proteins.

<sup>1</sup> Department of Fisheries, College of Agriculture, Fisheries and Forestry, Fiji National University, PO Box 1544, Nausori, Fiji. Corresponding author's email: ravineshram@gmail.com

<sup>2</sup> School of Marine Studies, Faculty of Science, Technology and Environment, University of the South Pacific, Laucala Campus, Private Mail Suva, Fiji

<sup>3</sup> Histology Unit, School of Marine and Tropical Biology, James Cook University, Townsville, Queensland 4811 Australia

<sup>4</sup> Australian Centre for Pacific Islands Research and School of Science and Engineering, University of the Sunshine Coast, Maroochydore, Queensland 4558 Australia

<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting No.1 6-8 October 2021</b>
<b>GOVERNMENT AGENCY UPDATES</b>	<b>Agenda Item 2.3 For NOTING &amp; DISCUSSION</b>

## RECOMMENDATIONS

1. That the Resource Assessment Group (RAG):
  - a. **NOTE** the update provided by the Australian Fisheries Management Authority (AFMA) below;
  - b. **DISCUSS** the progress to date against the Wildlife Trade Operation (WTO) conditions for the BDM fishery as summarised in Table 1;
  - c. **NOTE** the Communique from the Queensland Sea Cucumber Fishery Working Group's meeting on 23 August 2021 provided under **Attachment B** and any additional verbal updates provided by Queensland Department of Agriculture and Fisheries (QDAF); and
  - d. **NOTE** verbal updates provided by the Torres Strait Regional Authority (TSRA).

## KEY ISSUES

### ***Wildlife Trade Operation (WTO) Approval under the EPBC Act 1999***

2. The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires the Australian Government to assess the environmental performance of all commercial fisheries, including those in the Torres Strait, and promote ecologically sustainable fisheries management. Approval under the EPBC Act is necessary for fisheries to be able to legally export commercially wild caught seafood from Australia. Such approvals may be subject to conditions applicable to the responsible management authority and fishers.
3. The Torres Strait BDM Fishery was first accredited as an approved Wildlife Trade Operation (WTO) in June 2005 for a period of three years and was subsequently reassessed and re-approved in 2008, 2011, 2014 and 2017.
4. The fishery was last assessed in 2020 and, as of 23 December 2020, was declared by the Delegate for the Minister of the Environment, as an approved WTO under the EPBC Act until 30 November 2023 subject to several conditions being addressed during the period of the approval. The advice from the Delegate to AFMA on the WTO approval and the conditions imposed on the Torres Strait BDM Fishery is provided as **Attachment A**.
5. AFMA invites both the RAG and Hand Collectable Working Group (WG) to monitor progress against each condition and provide advice on addressing conditions. To assist the RAG and WG, **Table 1** provides a summary of relevant actions taken or proposed to address each condition.



**Table 1. progress to date against the Wildlife Trade Operation (WTO) conditions for the BDM fishery. A copy of the advice to AFMA on the WTO approval is also provided as Attachment A.**

WTO Conditions for the BDM Fishery	Progress as of September 2021
The Torres Strait Protected Zone Joint Authority must ensure that operation of the Torres Strait Bêche-de-mer is carried out in accordance with management arrangements defined in the <i>Torres Strait Fisheries Act 1984</i> , Torres Strait Fisheries Regulations 1985, Torres Strait Fisheries Management Instrument No.15 (Torres Strait Sea Cucumber Fishery), licence conditions and the Torres Strait Bêche-de-mer Fishery Harvest Strategy.	<b>On track:</b> The Torres Strait Bêche-de-mer Fishery continues to be managed in accordance with management arrangements in force under the <i>Torres Strait Fisheries Act 1984</i> .
The Torres Strait Protected Zone Joint Authority must inform the Department of Agriculture, Water and the Environment of any intended material changes to the Torres Strait Bêche-de-mer Fishery management arrangements that may affect the assessment against which <i>Environment Protection and Biodiversity Conservation Act 1999</i> decisions are made.	<b>On track:</b> There have been no material changes to management arrangements for the Fishery. As a result AFMA, on behalf of the PZJA, has not been required to inform the Department.
The Torres Strait Protected Zone Joint Authority must inform the Department of Agriculture, Water and the Environment of any intended changes to fisheries legislation that may affect the legislative instruments relevant to this approval.	<b>On track:</b> AFMA, on behalf of the PZJA, will inform the department of any intended changes to the fisheries legislation and subordinate instruments.
The Torres Strait Protected Zone Joint Authority must provide reports to the Department of Agriculture, Water and the Environment annually as per Appendix B of the <i>Guidelines for the Ecologically Sustainable Management of Fisheries - 2nd Edition</i> .	<b>On track:</b> AFMA, on behalf of the PZJA, will provide the first annual report by 30 November 2021.
The Protected Zone Joint Authority must complete an ecological risk assessment of the Torres Strait Bêche-de-mer Fishery by 1 January 2022 and develop an associated risk management strategy to address any risks identified in this assessment.	<b>On track:</b> The CSIRO have completed a draft ecological risk assessment for the fishery to be considered at this meeting under <b>Agenda Item 6</b> .
The Torres Strait Protected Zone Joint Authority must ensure that there is a sufficient level of compliance measures in place to ensure the sustainable management of the Torres Strait Bêche-de-mer Fishery, in accordance with the management arrangements in place for the fishery.	<b>On track:</b> To ensure AFMA's compliance efforts are targeted in the right areas an intelligence driven risk based approach, using Compliance Risk Management Teams (CRMTs) will be applied under the <a href="#">2020-21 National Compliance and Enforcement Program</a> . The 2020-21 Program will focus on

WTO Conditions for the BDM Fishery	Progress as of September 2021
	<p>four key areas, one of which is compliance within Torres Strait Fisheries, focusing on quota evasion and reporting of threatened, endangered and protected (TEP) species. This document explains AFMA's compliance program priorities and objectives for the 2020-21 financial year (FY) and performance in the 2019-20 FY.</p>
<p>By 1 November 2023 the Protected Zone Joint Authority must provide the department with a revised population estimate for Black Teatfish (<i>Holothuria whitmaei</i>) and White Teatfish (<i>Holothuria fuscogilva</i>) in the Torres Strait that is based on new information for the fishery, including catch data and fishery-independent data or scientific expert advice and an assessment of the impact of harvest on the stocks.</p>	<p><b>On track:</b></p> <p>AFMA, on behalf of the PZJA, is on track to meet this condition by the due date. During this meeting, HCRAG is invited to discuss and provide advice on the approach to providing a revised population estimate and an assessment of the impact of harvest on the stocks for both species.</p>
<p>The Torres Strait Protected Zone Joint Authority must limit the seasonal take of the following species listed under the Convention on the International Trade of Endangered Species (CITES), from the Torres Strait Bêche-de-mer Fishery to no more than:</p> <ol style="list-style-type: none"> <li>1) 15 tonnes of White Teatfish (<i>Holothuria fuscogilva</i>); and</li> <li>2) 20 tonnes of Black Teatfish (<i>Holothuria whitmaei</i>).</li> </ol> <p>The Torres Strait Protected Zone Joint Authority must report the amount of White Teatfish and Black Teatfish harvested by weight and where available, include the number of individuals, their lengths and locations of harvest, as part of the annual reporting referred to in Condition 4</p>	<p><b>In progress:</b></p> <p>The current TACs for white and black teatfish are 15t and 20t respectively. Black teatfish catches during the 2021 trial opening were well under the 20t TAC and catches of white teatfish to date are significantly below the TAC. AFMA will report black and white teatfish catches for 2021 and their location of harvest as part of the annual report to the department. Information on the number of and length of individual black and white teatfish collected will be provided to the department if and when available.</p>
<p>The Protected Zone Joint Authority must address any over harvest of the Total Allowable Catch (TAC) for either Black Teatfish (<i>Holothuria whitmaei</i>) or White Teatfish (<i>Holothuria fuscogilva</i>) in one season and ensure that any over harvest of the species is properly accounted for in subsequent fishing seasons in line with the provisions in the Torres Strait Bêche-de-mer Fishery's Harvest Strategy.</p>	<p><b>On track:</b></p> <p>AFMA, on behalf of the PZJA, will address any overcatch of black or white teatfish in accordance with the provisions in the fishery's harvest strategy.</p>



### ***CITES listing of black and white teatfish in August 2020***

6. The new WTO approval includes additional requirements that need to be met by the PZJA to manage the harvest of black and white teatfish which were listed under Appendix II of the Convention on the International Trade of Endangered Species of Wild Fauna and Flora (CITES) on 28 August 2020.
7. CITES is a binding international agreement aimed at preventing international trade from driving unsustainable population decline in species listed under the Convention. Species listed under Appendix II of CITES are not necessarily threatened with extinction, and may still be traded internationally provided the trade, or a specified level of trade, has been determined to be non-detrimental to the survival of the species in the wild.
8. The Department of Agriculture, Water and the Environment (DAWE) is Australia's CITES Scientific Authority and has made a positive non-detriment finding of the Torres Strait Beche-de-mer Fishery subject to the conditions of the Fishery's wildlife trade operation (WTO) approval. One of these conditions places a seasonal TAC limit of 20t and 15t for black and white teatfish respectively.

### ***ABARES Fishery Status Reports***

9. Each year, the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) compiles fishery status reports which provide an independent assessment of the biological status of fish stocks and the economic status of fisheries managed, or jointly managed, by the Australian Government (Commonwealth fisheries). The most recent ABARES Fishery Status Report was released in 2020 and summarises the performance of these fisheries in 2018 and over time, against the requirements of fisheries legislation and policy.
10. In the 2020 report, all BDM species are classified as not being subject to overfishing, with Sandfish being the only species in the Torres Strait that continues to be classified as overfished. The fishing mortality and stock status for two species taken in 2019 remains uncertain. The status of the Torres Strait Beche-de-mer and Trochus Fisheries is summarised in the table below.

**TABLE 19.1** Status of the Torres Strait Bêche-de-mer and Trochus fisheries

Biological status					
Stock	2018		2019		Comments
	Fishing mortality	Biomass	Fishing mortality	Biomass	
Black teatfish ( <i>Holothuria whitmaei</i> )					Fishery closed. No reported catch in 2019. Last full survey (2009) indicated that stock was recovering.
Prickly redfish ( <i>Thelenota ananas</i> )					Catch is below TAC. Last full survey (2009) indicated relatively stable densities.
Sandfish ( <i>Holothuria scabra</i> )					Fishery closed. No reported catch in 2019. Last full survey (2009) indicated that stock was overfished.
White teatfish ( <i>Holothuria fuscogilva</i> )					Catch is below TAC. Last full survey (2009) indicated relatively stable densities.
Other sea cucumbers (up to 18 species)					Uncertain biomass and fishing mortality status for at least 2 species taken in 2019.
Trochus ( <i>Trochus niloticus</i> )					No catch in 2019. Uncertain biomass status.
Economic status					
Estimates of NER and gross value of production are unavailable. Despite a decline in catch in 2019, NER are likely positive for this fishery. Increasing opportunities and participation for traditional inhabitants in the fishery are important objectives for this fishery.					
Notes: NER Net economic returns. TAC Total allowable catch.					
Fishing mortality					
Biomass					

■ Not subject to overfishing     ■ Subject to overfishing     ■ Uncertain  
■ Not overfished     ■ Overfished     ■ Uncertain

11. ABARES fishery status reports can be accessed on the ABARES website at:  
<https://www.agriculture.gov.au/abares/research-topics/fisheries/fishery-status#sections>

### Compliance outcomes for the 2020-21 season

12. AFMA has been delivering domestic compliance functions in the Torres Strait in accordance with the National Compliance and Enforcement Program. There are three (soon to be four) compliance officers based in the Thursday Island office delivering both domestic and foreign compliance outcomes.
13. In March 2020 all AFMA field duties were suspended due to COVID-19, however AFMA continued to monitor fishing operations via electronic means including vessel monitoring systems (VMS), remote monitoring, surveillance, intelligence and other sources of data.
14. AFMA recommenced limited operational field activities in August 2020 and continues to conduct these activities in accordance with best practise, mandatory social distancing and hygiene and in accordance with guidelines developed for field activities.
15. Despite some operational challenges in 2020, AFMA fisheries officers have delivered the following outcomes between July 2020 – June 2021:

- a. 45 ports/freight hubs visits;
  - b. 68 fish receiver inspections;
  - c. 62 vessel inspections;
  - d. Joined our management team in 22 stakeholder / community meetings.
  - e. Regular monitoring of seafood movements throughout the Torres Strait and conducting further investigations in some cases;
  - f. 12 individuals were prosecuted for Torres Strait fisheries offences in 20 – 21, four of those involved the Beche De Mer fishery.
  - g. During the recent Black Teatfish fishery trial opening (30 April to 3 May 2021) a number of breaches of the TSFA were also identified and are subject to further investigation.
16. To better target priority risks in Torres Strait fisheries, AFMA have established a specialised multi-disciplinary Compliance Risk Management Team (CRMT). Priority risks specific to the Torres Strait include unlicensed fishing, unlicensed fish receiving and non-compliance with catch/landing reporting to AFMA. Failing to report catch or landings is considered quota evasion and results in the undermining of the ongoing sustainable management of the Torres Strait Fisheries.
17. Further details are contained in AFMA's National Compliance and Enforcement Program document accessible on the AFMA website at: <https://www.afma.gov.au/domestic-compliance>. This document explains AFMA's compliance program priorities and objectives for the 2021-2022 financial year.
18. All stakeholders are encouraged to report any suspicious or illegal fishing activity involving your fisheries to AFMA, either directly to our Torres Strait office or CRIMFISH (1800 274 634)

### ***Torres Strait Trochus Fishery update***

#### ***Management arrangements***

19. Many of the management arrangements applicable to the fishery are set out in *Fisheries Management Notice (FMN) No 76* and include:
- a. The taking of trochus is restricted to hand collection or by hand-held non-mechanical implements.
  - b. The use of underwater breathing apparatus is not permitted.
  - c. A minimum size limit of 80 millimetres and maximum size limit of 125 millimetres applies to all fishing (except traditional).
20. The total allowable catch for the Torres Strait Protected Zone (TSPZ) is 150 tonnes.

#### ***Strategic assessment***

21. On 12 April 2017, AFMA submitted an application on behalf of the Torres Strait Protected Zone Joint Authority (PZJA), for assessment of the Torres Strait Trochus Fishery under the EPBC Act as a WTO.
22. The then Department of the Environment and Energy (DOEE) assessed this application against the Australian Government 'Guidelines for the Ecologically Sustainable Management of Fisheries – 2nd Edition'. Public consultation on the application was undertaken between 26 April to 31 May 2017. No comments were received.

23. The Torres Strait Trochus Fishery targets a single trochus species, *Tectus niloticus*, using hand-collection and diving in the TSPZ. Historically this fishery has been declared as a WTO. However, there has been no commercial fishing activity in this fishery since 2010. While there is no effort in the fishery, it does not pose any ecological risks.
24. The DOEE recommended that the fishery be exempt from the export requirements of the EPBC Act and product derived from the fishery be included on the List of Exempt Native Specimens until 9 October 2026. Should fishing effort increase in the Torres Strait Trochus Fishery, the fishery will be reassessed.

*Commercial catch and number of licences*

25. AFMA understands the fishery to have little to no fishing activity in recent years, with no commercial catches reported since 2018 (41kg). As at 1 September 2020 and 2021, the following number of TIB licences had trochus (TR) fishery entries:

Year	Number of TIB licences with Trochus fishery entries	Number of TVH licences
2020	71	0
2021	92	0

**Torres Strait Pearl Shell Fishery update**

*Management arrangements*

26. The gold-lipped pearl shell (*Pinctada maxima*) and to a lesser extent the black-lipped pearl shell (*Pinctada margaritifera*) are the main species targeted in the Torres Strait, although five other species occur.
27. Pearl farms purchase product from fishers for use in seeding for the production of pearls and also for use in making other shell products such as jewellery.
28. There are a range of input controls that apply to the Pearl Shell fishery, including:
- Minimum shell size limits which are aimed at ensuring the most suitable shells are taken for farming and affording some protection to young shells and spawning stocks; and
    - Pinctada maxima* must be >130mm and <230mm;
    - Pinctada margaritifera* must be > 90mm
  - Gear restrictions; shell can only be harvested by diving or collected by hand.
  - Boat length restrictions; boats must not exceed 6m in length.
29. The fishery is regulated through Torres Strait *Fisheries Management Instrument No. 7 (Torres Strait Pearl Shell Fishery)*.

*Minimum size limit trial with developmental permits*

30. Following a recommendation from the HCWG in 2013, the PZJA agreed to issue developmental permits to existing licence holders for the taking of undersized pearl shell (*Pinctada maxima*). The objective of the permits was to support revitalisation of the Torres Strait pearl farming industry by developing a commercial trial to investigate whether using smaller shell for seeding and culture could increase the overall productivity of pearl farming.

At the time, industry considered that smaller shell enabled them to maximise their seeding cycle potential due to more cycles, with the later seeding cycles producing larger and more valuable products.

31. Eight existing licence holders were subsequently issued developmental permits in 2015 with a competitive total allowable catch set of no more than 2,000 undersize pearl shell size between 100-130 mm to be taken within the allocated period of one year. Mandatory catch reporting of harvested pearl shell was a condition of the permit. Only two of the eight permits issued were active during the trial.
32. In 2017, AFMA undertook a review of the developmental permit trial in an effort to understand the low uptake of developmental permits that were issued.
33. Through interviews with permit holders and buyers, AFMA understood that:
  - b. Approximately 800 pearl shell was reported to have been harvested during the permit period, with roughly 15-20% comprised of shell between 100-130 mm.
  - c. The pearl shells harvested were used for seeding in aquaculture but due to the low level of undersize pearl shell harvested, any benefits to the aquaculture sector in relation to any improvement in profitability could not be determined.
  - d. The primary reason as to why there is little interest in fishing the TSPSF by both TIB and TVH fishers is due to more lucrative opportunities in other Torres Strait fisheries (e.g. Tropical Rock Lobster).

*Commercial catch and number of licences*

34. AFMA understands the fishery to have little to no fishing activity in recent years, with no commercial catches reported since 1 December 2017. As at 1 September 2020 and 2021, the following number of TIB licences had pearl shell (PL) fishery entries:

Year	Number of TIB licences with Pearl shell fishery entries	Number of TVH licences
2020	67	4 primary/tender packages 3 individual licences 6 held in trust by the TSRA
2021	75	4 primary/tender packages 3 individual licences 6 held in trust by the TSRA



**Australian Government**  
**Department of Agriculture,  
Water and the Environment**

Ref: 002068366

Mr Wez Norris  
Chief Executive Officer  
Australian Fisheries Management Authority  
GPO Box 7051  
CANBERRA ACT 2610

Dear Mr Norris

I am writing to you as Delegate of the Minister for the Environment in relation to the assessment of the Torres Strait Bêche-de-mer Fishery (the fishery) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In October 2020 the Australian Fisheries Management Authority applied for export approval for the fishery under the EPBC Act.

The application has been assessed and I have declared the fishery an approved wildlife trade operation (WTO) under Part 13A of the EPBC Act until 30 November 2023. The list of exempt native specimens has also been amended to allow export of product from the fishery while the specimens are covered by the declaration as an approved wildlife trade operation.

The Part 13A declaration includes conditions that were agreed by officials from both departments as areas requiring ongoing attention. These are set out at Attachment 1. Conditions are to be implemented in the period of the wildlife trade operation approval, unless a date is otherwise specified. Further, in assessing the management arrangements in place for this fishery, the Department has identified a number of inconsistencies in the published material relevant to the management of this fishery. In order to ensure that there is no ambiguity to fishers and for the purpose of compliance and enforcement, we urge AFMA to rectify this matter.

Two species harvested in this fishery, White Teatfish (*Holothuria fuscogilva*) and Black Teatfish (*Holothuria whitmaei*), are now listed under Appendix II of the Convention on the International Trade of Endangered Species (CITES). As such, Australia's CITES Scientific Authority must make a non-detriment finding in relation to the harvest of these species in the fishery to ensure that continued trade in these species from Australian fisheries is not detrimental to the survival of the species in the wild. Measures should be in place to limit such export in order to maintain such species throughout their range at a level consistent with their role in the ecosystems and well above the level at which they would qualify for Appendix I listing. Further information on CITES non-detriment findings can be found at Attachment 2.

Australia's CITES Scientific Authority is located in the Wildlife Trade Office of the Department of Agriculture, Water and the Environment. As required under Part 13A of the EPBC Act, Australia's CITES Scientific Authority included its assessment for the purpose of a Non-detriment finding in the Part 13A assessment for this fishery. A positive non-detriment finding has been made for this fishery and conditions have been placed in the relevant WTO to ensure that Australian CITES requirements are met.

Please note that any person whose interests are affected by this decision may make an application to the Department for the reasons for the decision and may apply to the Administrative Appeals Tribunal to have this decision reviewed. I have enclosed further information on these processes at Attachment 3.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Laura Timmins', is written over the closing 'Yours sincerely'.

Laura Timmins  
Delegate of the Minister for the Environment

23 December 2020



**Part 13A conditions to the Torres Strait Protected Zone Joint Authority on the approved wildlife trade operation declaration for the Torres Strait Bêche-de-mer Fishery – December 2020**

**Condition 1:**

The Torres Strait Protected Zone Joint Authority must ensure that operation of the Torres Strait Bêche-de-mer is carried out in accordance with management arrangements defined in the *Torres Strait Fisheries Act 1984*, *Torres Strait Fisheries Regulations 1985*, *Torres Strait Fisheries Management Instrument No.15 (Torres Strait Sea Cucumber Fishery)*, licence conditions and the *Torres Strait Bêche-de-mer Fishery Harvest Strategy*.

**Condition 2:**

The Torres Strait Protected Zone Joint Authority must inform the Department of Agriculture, Water and the Environment of any intended material changes to the Torres Strait Bêche-de-mer Fishery management arrangements that may affect the assessment against which *Environment Protection and Biodiversity Conservation Act 1999* decisions are made.

**Condition 3:**

The Torres Strait Protected Zone Joint Authority must inform the Department of Agriculture, Water and the Environment of any intended changes to fisheries legislation that may affect the legislative instruments relevant to this approval.

**Condition 4:**

The Torres Strait Protected Zone Joint Authority must provide reports to the Department of Agriculture, Water and the Environment annually as per Appendix B of the *Guidelines for the Ecologically Sustainable Management of Fisheries - 2nd Edition*.

**Condition 5:**

The Protected Zone Joint Authority must complete an ecological risk assessment of the Torres Strait Bêche-de-mer Fishery by 1 January 2022 and develop an associated risk management strategy to address any risks identified in this assessment.

**Condition 6:**

The Torres Strait Protected Zone Joint Authority must ensure that there is a sufficient level of compliance measures in place to ensure the sustainable management of the Torres Strait Bêche-de-mer Fishery, in accordance with the management arrangements in place for the fishery.

**Condition 7:**

By 1 November 2023 the Protected Zone Joint Authority must provide the department with a revised population estimate for Black Teatfish (*Holothuria whitmaei*) and White Teatfish (*Holothuria fuscogilva*) in the Torres Strait that is based on new information for the fishery, including catch data and fishery-independent data or scientific expert advice and an assessment of the impact of harvest on the stocks.

**Condition 8:**

The Torres Strait Protected Zone Joint Authority must limit the seasonal take of the following species listed under the Convention on the International Trade of Endangered Species (CITES), from the Torres Strait Bêche-de-mer Fishery to no more than:



1) 15 tonnes of White Teatfish (*Holothuria fuscogilva*); and

2) 20 tonnes of Black Teatfish (*Holothuria whitmaei*).

The Torres Strait Protected Zone Joint Authority must report the amount of White Teatfish and Black Teatfish harvested by weight and where available, include the number of individuals, their lengths and locations of harvest, as part of the annual reporting referred to in Condition 4.

**Condition 9:**

The Protected Zone Joint Authority must address any over harvest of the Total Allowable Catch (TAC) for either Black Teatfish (*Holothuria whitmaei*) or White Teatfish (*Holothuria fuscogilva*) in one season and ensure that any over harvest of the species is properly accounted for in subsequent fishing seasons in line with the provisions in the Torres Strait Bêche-de-mer Fishery's Harvest Strategy.

## CITES Non-Detriment Findings in commercial fisheries

The Convention on International Trade in Endangered Species (CITES) is a binding international agreement, which was ratified by Australia in 1976. The purpose of CITES is to prevent international trade from driving unsustainable population decline in species listed on the Convention's three appendices.

There are three levels of CITES listing:

- Appendix I - for species threatened with extinction. CITES prohibits international trade of Appendix I species except for strictly controlled non-commercial purposes, such as scientific research.
- Appendix II - for species not currently threatened with extinction, but which may become so if harvest is not carefully controlled. CITES allows some limited international trade of these species under very tight rules and controls. CITES permits are required for all exports of Appendix II species.
- Appendix III - for species that may be threatened locally within certain countries. International trade in these species is only allowed with presentation of appropriate 'country of origin' certification. This assists countries with locally threatened populations to better manage trade of these species.

CITES requires the exporting Party's Scientific Authority to make a positive non-detriment finding (NDF) prior to export of CITES specimens listed in Appendix I and II. Australia's CITES Scientific Authority is in the Wildlife Trade Office.

A positive NDF is made when *"the sum of all harvests is sustainable in that it does not result in unplanned range reduction, or long term population decline, or otherwise change the population in a way that might be expected to lead to the species being eligible for inclusion in Appendix I"*.

To ensure that fisheries declared as approved Wildlife Trade Operations (WTO) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) continue to be able to trade internationally in CITES-listed marine species, NDFs need to be based on a level of information that meets international standards, consistent with guidance agreed by resolution by CITES Parties ([https://cites.org/sites/default/files/document/E-Res-16-07-R17\\_0.pdf](https://cites.org/sites/default/files/document/E-Res-16-07-R17_0.pdf)).

Consistent with Resolution Conf. 16.7 Rev CoP 17, Australia's CITES Scientific Authority has taken a risk-based approach to the information requirements for making NDFs. Under this approach, the level of information required to inform an NDF will vary depending on the biological vulnerability of the species, its global and national status, the risks posed to the species, and the degree of certainty associated with these factors. The standard information fields for NDFs include:

- species biology;
- species life history characteristics;
- species range – historic and current;
- population structure, status and trends (nationally and in the harvest area);
- threats;
- species specific (or in some instances genus specific<sup>1</sup>) levels of harvest/ mortality from the fishery (historic and current);
- estimates of species specific (or in some instances genus specific<sup>1</sup>) levels of harvest/mortality from *all sources* combined;
- results of population modelling;

<sup>1</sup> Genus-level reporting is acceptable for some coral species.

- management measures currently in place and proposed, including consideration of rates of compliance;
- a *scientific* assessment of the level of harvest that is considered sustainable under the management regime taking into account all sources of mortality;
- The ability of management measures to constrain harvest to the level assessed to be sustainable; and
- trade information relating to the species.

Where significant risks of species decline are identified (or credible scientific information about the species is limited), highly precautionary fishery management arrangements are likely to be required before non-detriment findings can be issued. A common requirement in this circumstance is for management arrangements to include prescriptive annual trigger limits on the harvest of each CITES listed species.

It is common practice for other countries receiving exports from Australia to monitor and review Australia's non-detriment findings. If an importing country is not satisfied with the quality or level of precaution applied in Australia's non-detriment finding, it can choose to reject an import on that basis and suspend future imports of that species from Australia.



**Australian Government**  
**Department of Agriculture,  
 Water and the Environment**

**Attachment 3**

**Notification of Reviewable Decisions and Rights of Review<sup>2</sup>**

There is a right of review to the Administrative Appeals Tribunal (AAT) in relation to certain decisions/declarations made by the Minister, the Minister's delegate or the Secretary under Part 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Section 303GJ(1) of the EPBC Act provides that applications may be made to the AAT for the review of the following decisions:

- (a) to issue or refuse a permit; or
- (b) to specify, vary or revoke a condition of a permit; or
- (c) to impose a further condition of a permit; or
- (d) to transfer or refuse to transfer a permit; or
- (e) to suspend or cancel a permit; or
- (f) to issue or refuse a certificate under subsection 303CC(5); or
- (g) of the Secretary under a determination in force under section 303EU; or
- (h) to make or refuse a declaration under section 303FN, 303FO or 303FP; or
- (i) to vary or revoke a declaration under section 303FN, 303FO or 303FP.

If you are dissatisfied with a decision of a type listed above you may:

- by notice, provided in writing, request that the Minister or the Minister's delegate give you a statement in writing setting out the reasons for the decision as per section 28 of the *Administrative Appeals Tribunal Act 1975*. The Minister, or Minister's delegate may refuse to give you a statement of reasons if your application is made more than 28 days after the day on which you received this notice.
- apply to the AAT for independent merits review of the decision. The AAT undertakes *de novo* merits review. This means they take a fresh look at the facts, law and policy relating to the decision and arrive at their own decision. They decide if the decision should stay the same or be changed. They are independent of the Department.

Application for review of a decision must be made to the AAT within **28 days** after the day on which you have received the reviewable decision. However an extension of time for lodging an application may be granted by the AAT under certain circumstances. Please visit the AAT's website at <http://www.aat.gov.au/> or telephone 1800 228 333 for further information. The role of the AAT is to provide a review mechanism that is fair, just, economical, informal and quick.

**Applications & Costs**

Applications to the AAT are made by lodging an Application Form (Form 1). This can be found on the AAT's website at <http://www.aat.gov.au/>.

There are no strict timelines in which the AAT must review the decision, however the first conference between the parties will usually be held within 6 to 10 weeks of the application

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<sup>2</sup> In accordance with the *Administrative Appeals Tribunal Act 1975* Code of Practice for Notification of Reviewable Decisions and Rights of Review

being lodged. The time frame for review of certain decisions can be expedited in some circumstances.

The cost of lodging an application for review is \$952 (as of 1 July 2020) (GST inclusive). You may be eligible to pay a reduced fee of \$100.00 if

- you are receiving legal aid for your application;
- you hold a health care card, a Commonwealth seniors health card or any other card issued by the Department of Social Services or the Department of Veteran's Affairs that entitles the holder to Commonwealth health concessions;
- you are in prison or lawfully detained in a public institution;
- you are under 18 years of age; or
- you are receiving youth allowance, Austudy or ABSTUDY.

You may also be eligible for a reduced fee if you can demonstrate to the AAT that paying the full fee would cause you financial hardship. Further information can be found on the AAT's website. Additionally, you can access information about legal assistance at <https://www.ag.gov.au/LegalSystem/Legalaidprogrammes/Commonwealthlegalfinancialassistance/Documents/LegalFinancialAssistanceInformationSheet.pdf>.

If you pay a standard application fee, most of it will be refunded if the case is resolved in your favour. The refund amount is the difference between the fee you paid and \$100. So, if you paid \$920, you get back \$820 and if you pay \$952, you get back \$852. There is no refund if you paid the lower application fee for certain taxation decisions or the reduced fee of \$100.

### Contact Details

Further information or enquiries relating to the decision should be directed to:

The Director  
Wildlife Trade Assessments Section  
Department of Agriculture, Water and the Environment  
GPO Box 858  
Canberra ACT 2601  
**Telephone:** +61 (0) 2 6274 1917  
**Email:** [sustainablefisheries@environment.gov.au](mailto:sustainablefisheries@environment.gov.au)

Alternatively you may contact the AAT at their Principal Registry or the Deputy Registrar, Administrative Appeals Tribunal in your Capital City or Territory.

Administrative Appeals Tribunal  
Street address: Level 6, 83 Clarence Street, Sydney  
Mailing address: GPO Box 9955, Sydney, NSW 2001  
T: 1800 228 333 and (02) 9276 5000  
F: (02) 9276 5599  
E: [generalreviews@aat.gov.au](mailto:generalreviews@aat.gov.au)  
W: <http://www.aat.gov.au>

### Freedom of Information Request

You may make an application under the *Freedom of Information Act 1982* (FOI Act) to access documents. Further information can be found at <http://www.environment.gov.au/foi/index.html>. Please contact the Freedom of Information Contact Officer at [foi@environment.gov.au](mailto:foi@environment.gov.au) for more information.



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**Communique 23 August 2021**

## Communique 23 August 2021

The Sea Cucumber Fishery working group met for the fifth time via videoconference on 23 August 2021.

The working group accepted the previous meeting minutes and noted the progress of the meeting action items.

Fisheries Queensland provided an update on the regulatory changes that were announced in September 2020 and will commence by 1 September 2021. The working group noted that these include reforming the administration framework (licensing, quota certificates and management arrangements and reporting) to ensure consistency with other quota managed fisheries. The working group further noted the publication of a finalised sea cucumber harvest strategy, which was updated with feedback received during consultation.

Industry noted that the current fishing season is the third year under the rotational zoning strategy and a new initiative is to allocate fishers to specific zones with specific species quota, so they are responsible for fishing the same zones every third year for additional stewardship.

Industry has contracted to seek MSC accreditation for four units of assessment (black teatfish, white teatfish, curryfish and burrowing blackfish). It is anticipated that this will take approximately 12 months. An environmental risk assessment will be one of the requirements. DAF will be involved in this process.

Industry also advised that market demand had reduced slightly due to COVID in the last couple of years although prices have remained relatively stable.

AFMA advised that the Torres Strait beche-de-mer fishery is operating for the second year under a harvest strategy. While most aspects of the new harvest strategy have been implemented, the 2022 fishing season will be the first application of the harvest strategy decision rules to set total allowable catches (TAC). A trial reopening of fishing for black teatfish commenced on 30 April 2021 with a 20 tonne competitive total allowable catch (TAC) and lasted for 4 days.

GBRMPA noted that black teatfish has been used as a case study for resilience in the last three versions of the GBR Outlook Report (2009, 2014 and 2019). The fourth report will be published in 2024. The working group will continue to be updated on progress.

Fisheries Queensland provided an update on the current status of the Commonwealth Wildlife Trade Operation (WTO) approval, which was issued subject to numerous conditions until 30 September 2021. The working group noted that Fisheries Queensland has applied for a new



WTO approval. This application is currently out for public consultation and some working group members have already provided submissions. Fisheries Queensland will continue to work closely with industry to consider any new developments. Industry meetings will be scheduled for mid September to discuss further.

The working group were updated with the 2020 status of Australian fish stocks report, in which white teatfish and burrowing blackfish were assessed as 'sustainable'. There is scope for adding additional species in the future.

Fisheries Queensland provided an outline of an ecological risk assessment (ERA) for the fishery. Despite assessing the situation prior to a harvest strategy or stock assessment being in place, the risk in the fishery is considered to be managed and Fisheries Queensland is not recommending the ERA be progressed to a level 2. The ERA will be a potentially important communication tool that formally documents the minimal impact of the fishery. Fisheries Queensland undertook to share the ERA with the working group as soon as it was finalised.

The working group noted that good progress has been made by the industry-funded research team Fishwell Consulting in completing black teatfish surveys and white teatfish feasibility studies, with lead scientist Ian Knuckey included in the DAF stock assessment team. The working group also noted that a GIS layer has been prepared for the rotational zoning scheme, allowing the effect of the rotational zoning scheme to be incorporated into quantitative models.

The working group were updated with preliminary results of the white teatfish stock assessment, based on a combination of fishing data and previous research, and the black teatfish stock assessment, which is informed by the recent black teatfish survey, fishing data (complicated by a long period closed to fishing), and previous research. Model inputs and assumptions were the subject of considerable discussion and the stock assessment team agreed to conduct additional investigations as a result of the working group feedback. The working group noted that the stock assessment models will continue to be refined once the deadlines for the WTO conditions have been met.

Fisheries Queensland advised the working group of a related research project funded through GBR Foundation, which has developed a project proposal for a three year monitoring program of sea cucumber in the Great Barrier Reef. This is expected to inform management needs for multiple agencies. Industry members emphasised that their focus is on sound, reliable data, and suggested research scientist Ian Knuckey be included as part of the project's technical advisory group. DAF will likely be represented on the project's steering committee and will act as liaison with industry. A presentation from the research team will be sought for the next working group meeting.

The working group heard a presentation on the social and economic data project being undertaken by BDO EconSearch for Fisheries Queensland. Currently there is no separate report for sea cucumber due to the difficulty in de-identifying individuals when there are low numbers of participants. However, the data team are hopeful that confidentiality can be managed so that participation increases.

Fisheries Queensland provided details of the new reporting requirements that will commence on 1 September 2021, the various fact sheets and contacts to support industry through these changes

(<https://www.daf.qld.gov.au/business-priorities/fisheries/commercial/commercial-fishing-rules>), and the development of the commercial fishing app. Clarification about the weight and catch disposal notice requirements, given the operational procedures in the industry, will be the subject of a separate meeting.

The next working group meeting is tentatively scheduled for December 2021 in order to discuss the results of the WTO application and the implications for industry going forward.

**The Sea Cucumber Fishery Working Group members are:** Fisheries Queensland (Chair - Michael Mikitis), commercial fishing (Rob Lowden, Chauncey Hammond, Ben Cochrane (apology), science (Nicole Murphy, CSIRO) and Great Barrier Reef Marine Park Authority (Jessica Stella).

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Queensland Government

<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting No.1 6-8 October 2021</b>
<b>NATIVE TITLE UPDATE</b>	<b>Agenda Item 2.4 For NOTING &amp; DISCUSSION</b>

## RECOMMENDATIONS

1. That the Resource Assessment Group (RAG) **NOTE** any updates on Native Title matters from members, including the representative from Malu Lamar (Torres Strait Islanders) Corporation RNTBC (Malu Lamar).

## BACKGROUND

2. On 7 August 2013 the High Court of Australia confirmed coexisting Native Title rights, including commercial fishing, in the claimed area (covering most of the Torres Strait Protected Zone). This decision gives judicial authority for Traditional Owners to access and take the resources of the sea for all purposes. Native Title rights in relation to commercial fishing must be exercisable in accordance with the *Torres Strait Fisheries Act 1984*.
3. Traditional Owners and Native Title representative bodies have an important role in the management of Torres Strait fisheries. It is important therefore that the RAG keep informed on any relevant Native Title issues arising.
4. AFMA has extended an invitation to Malu Lamar to attend this meeting as an observer and is investigating longer term arrangements for representation in consultation with PZJA agencies.

<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting No.1 6-8 October 2021</b>
<b>PAPUA NEW GUINEA NATIONAL FISHERIES AUTHORITY UPDATES</b>	<b>Agenda Item 2.5 For NOTING</b>

## RECOMMENDATIONS

1. That the Resource Assessment Group (RAG) **NOTE** the fishery update to be provided by representatives from the Papua New Guinea National Fisheries Authority if in attendance (via video conference).

## KEY ISSUES

2. AFMA has a standing invite for officials from the PNG National Fisheries Authority (NFA) to attend all PZJA consultative forums. If in attendance, NFA officials will provide an update on the PNG hand collectable fisheries at the meeting, including an update on the beche-de-mer fishery.
3. In 2010 PNG placed a moratorium on fishing for BDM. On 1 July 2017 the moratorium was lifted and the PNG beche-de-mer fishery has been opened three times since (2018, 2019 and 2020). AFMA understands that although the season open date usually falls on 1 July, it can vary from year to year depending on the progress of the stock biomass assessment surveys and analysis that is used to set the total allowable catches for each province. A notice issued by NFA in 2017 is provided at **Attachment A** for further background.

## BACKGROUND

4. The *Treaty between Australia and the Independent State of Papua New Guinea concerning Sovereignty and Maritime Boundaries in the area between the two Countries, including the area known as Torres Strait, and Related Matters* (the Treaty) was signed by both Parties at Sydney on 18 December 1978 and ratified by Australia on 15 February 1985. The Treaty defines the border between Australia and PNG and provides a management framework of the common border area. This area is defined by the Treaty and is known as the TSPZ.
5. Australia and PNG established the TSPZ with the principal purpose of acknowledging and protecting the traditional way of life and livelihood of the traditional inhabitants of both Parties, including their traditional fishing and free movement (Article 10(3)). A further purpose is to protect and preserve the marine environment and indigenous fauna and flora in, and in the vicinity of, the TSPZ (Article 10(4)). A range of subsidiary obligations and rights exist under the Treaty. Relevantly, Australia and PNG commit under the Treaty to co-operate in the conservation management and optimum utilisation of Protected Zone commercial fisheries (Article 21) insofar that the achievement of the purposes for the establishment of the TSPZ are not prejudiced in regard to traditional fishing (Article 20(1)).

6. The Treaty recognises the rights of both countries to Protected Zone commercial fisheries. This recognition is implemented through cooperative management and catch sharing provisions of Part 5 of the Treaty. Since the Treaty was ratified, Australia and PNG have entered into formal arrangements under Article 22 to cooperatively manage six fisheries, referred to as 'Article 22 fisheries'. These are the commercial fisheries for prawns, tropical rock lobster, Spanish mackerel, pearl shell, and traditional fisheries for turtles and dugong.
7. The BDM Fishery is not an Article 22 fishery and is, therefore, not managed under formal catch sharing arrangements with PNG. However, Australia and PNG recognise the importance of complimentary management arrangements, shared science and strong communication between both Parties given some sea cucumber stocks are shared (e.g. Sandfish) and beche-de-mer stocks are vulnerable to overfishing.
8. Updates on the status of the respective fisheries and agreements between PNG and Australia on catch sharing arrangements and related matters usually take place at annual fishery bilateral meetings and meetings of the Torres Strait Joint Advisory Council (JAC) established under Article 19 of the Treaty, but may occur intersessionally as required by the two Parties.

## **ATTACHMENT A – PNG NFA 2017 update on the lifting of the Beche-de-mer moratorium**

### **PNG BECHE-DE-MER FISHERY - GOLD OF THE SEA**

Coastal and Island Fishermen throughout the country are reaping the benefits of the 7-year closure of the beche-de-mer fishery. An estimated 13 million kina has been paid already directly to the coastal and island communities throughout PNG for the 6-week period that the fishery has been open in 2017. By the time all provincial Total Allowable Catch (TAC) have been reached and the open season ends this year, we estimate that a total of 18 to 36 million kina would have been earned by the coastal and island fishermen and fisherwomen. Whole families especially women have been the main beneficiaries. Disadvantaged and isolated island communities in the coastal provinces are earning a very high income from this fishery. The value quoted in above does not include the benefits accrued to the people who are indirectly engaged in this fishery especially those who are employed by licensed exporters.

The beche-de-mer fishery is projected to generate 40 to 53 million kina in foreign revenue in the 2017 fishing season because all the beche-de-mer are being exported to overseas markets, mainly to Hong Kong and China. This is a fishery where the coastal and island communities are directly involved to generate foreign revenue for PNG. About half a million people, from the coastal and island communities benefit from the fishery.

The fishery was closed for 7 years since 2010 because there was extensive overfishing and populations of sea cucumber were severely depleted. NFA has been monitoring the recovery of the sea cucumber populations through provincial sea cucumber annual stock assessments when the fishery has been closed. NFA also consulted extensively and revised the beche-de-mer fishery management plan. Results of the annual sea cucumber surveys indicated that full recovery of the sea cucumber populations has not been achieved yet. NFA wanted to give something back to the coastal and island fishermen for the 7-year investment of no fishing and test the revised plan. The NFA Board approved the plan in 2016 and the fishery was opened on the first of April in 2017. Copies of the Beche-de-mer Fisheries Management plan can be obtained from NFA.

### **GOVERNANCE AND MANAGEMENT**

The approved Beche-de-mer Fisheries Management Plan allows for the joint management by the National Fisheries Authority (NFA), Provincial Government, Local Level Government (NFA) and communities. Roles for NFA, provinces, LLG and communities are defined in the plan. This means the management of beche-de-mer is decentralized with the communities responsible for the day to day management of the fishery. To enable joint management, the plan establishes a National Management Advisory Committee (NMAC), Provincial Management Committees (PMAC) and Local Management Advisory Committees (LLGMAC) which is optional. Communities can also establish committees to manage the fishery at the community level. NMAC and PMAC are functional meaning that they have regular meetings and make decisions. PMACs have been involved in the decision making process to screen and approve export and buyers licenses for the 2017 open season.

Since the opening of the fishery some communities have formulated bylaws to help them manage the day to day management of the fishery under the jurisdiction of the community. Some example of community bylaws include controlling the days to harvest, the species to harvest and the areas where no fishing is allowed in order to protect undersizes or the spawning population. NFA is encouraging other communities to create community bylaws to help manage the fishery at the community level. During the course of the year and leading to the 2018 open season, NFA will work with the provinces, LLGs and communities to formulate provincial and community beche-de-mer fishery management plans especially for those communities who wish to apply such bylaws.



## SEASONAL OPENING AND CLOSURE

Under the new Beche-de-mer Fishery Management Plan the fishery is scheduled to open every year for six months from the 1<sup>st</sup> April to the 31<sup>st</sup> September 2017. However if the TAC for the province is reached early the fishery for the province must close. The fishery is closed from the 1<sup>st</sup> October to the 31<sup>st</sup> March for a compulsory 6 month closure. The 6 month closure is necessary to help protect the spawning population and help the sea cucumber population grow into adults before the fishery is opened.

The fishery in a specific province is closed early if the TAC for the province is reached. Three provinces, New Ireland (TAC=43 tonnes), West New Britain (TAC=15 tonnes) and AROB (TAC= 28 tonnes) have already reached their TAC after 6 weeks of harvest. Fishing for sea cucumbers in these provinces is now closed on Wednesday 17<sup>th</sup> May 2017. Selling and buying for the three provinces will cease on Monday 24<sup>nd</sup> May 2017. Fishermen in these three provinces are allowed to sell their dried products for 7 days between Wednesday 17<sup>th</sup> May and Wednesday 24<sup>nd</sup> May. This is to ensure that the dried products for the fishermen in isolated and distant coastal and island locations are sold.

Other provinces are also approaching their TAC. Milne Bay province has the highest TAC of 118 tonnes and has already reached 53% of its TAC. The current rate of production for Milne Bay is 10 tonnes per week and is projected to close in mid-June 2017. MOMASE provinces have low TAC and are expected to reach their TAC soon. The current rate of harvest for the provinces vary from province to province but indicate that the fishery will be closed for most of the provinces by July 2017.

## TOTAL ALLOWABLE CATCH

The beche-de-mer fishery is managed using a number of strategies including a minimum size limit to protect the immature individuals and allocation of Total Allowable Catch (TAC) for each maritime province to control how much sea cucumber can be harvested from each province. The TAC for each province are calculated for each year based on the harvestable sizes present on the waters and reefs of each province (see table). In order for the beche-de-mer fishery to be open every year so the coastal and island communities continue to earn an annual income, 30% of the estimated harvestable biomass (weight) is allowed to be harvested and forms the TAC for the province. Seventy percent of the biomass must remain on the reefs to repopulate and grow.

### *TAC for the Provinces*

PROVINCE	2017 TAC (tonnes)
Milne Bay	118
Central	58
Manus	53
New Ireland	43
AROB	28
West New Britain	15
Northern	15
Morobe	9

Western	7
East New Britain	7
Madang	5
East Sepik	2
Sandaun	2

NFA is appealing to the fishermen and fisherwomen not to harvest all the sea cucumbers on the reef especially on the reef flats and shallow areas. At the end of the open fishing season a lot of sea cucumbers must still be seen on the reef.

It has taken only 6 weeks for some provinces such as New Ireland, West New Britain and Bougainville to reach their TAC. The big rush to harvest sea cucumbers from the reefs was expected because most of the sea cucumbers live in shallow waters. Fishermen and fisherwomen only have to walk on the reefs to harvest the sea cucumbers.

To ensure that the TAC is not exceeded, NFA trained and placed Compliance Monitors in all the provinces to help monitor the TAC. NFA has established an information system to monitor the TAC in all the provinces. The information system is designed to monitor the TAC in near real time and involves collection of data from the buyers and exporters on a weekly basis, data is entered and data is analyzed and summarized immediately.

## SIZE LIMITS

Size limits have been set for 30 species of sea cucumbers to protect immature sea cucumbers and a portion of the recently mature young sea cucumbers. This is also the portion of the population that is harvested the following year as they grow into harvestable sizes. It is important that fishermen and fisherwomen don't take undersizes if they want to continue to earn an income from the fishery every year.

Because the largest portion of undersizes of sea cucumbers are located on the reef flat which is the shallow areas (see graph) they are easily targeted by the fishermen and fisherwomen. Harvesting of undersizes has been a major issue that was expected by NFA when the fishery opened. It was a major issue in the past leading up to the closure of the fishery in late 2009 when a large portion of the products was exported including as much as 100% undersizes for some species. NFA is appealing to the fishermen and fisherwomen not to harvest the undersizes as they are worth more if they are left for harvesting the following years.

Penalties apply to the Buyers and Exporters if they buy or export undersize beche-de-mer. The penalties include loss of the Buyers and Export licences. NFA is appealing to the Buyers and Exporters to comply with the size limits.

## LICENSING

A licence is required in order to participate in the buying, storage and export of Beche-de-mer. This is necessary in order to control the trade of beche-de-mer in the country. There are three main types of licences required, Buyers, Storage Facility and Export. A Buyers licence is issued to individuals, normally those working for a Beche-de-mer exporter company. The Buyers licence allows the individuals to buy sea cucumbers from the fishermen and fisherwomen. A Buyers licence is like a drivers licence. It cannot be transferred and the licensed Buyer must always have in his or her possession the licence. He or she must also be present at all times in the buying of the beche-de-mer products. A Beche-de-mer export company is allowed to have a maximum of 5 buyers licence.

A Storage Facility licence is issued to the company for the use of a Storage Facility to store and process beche-de-mer. Before the Storage Facility licence is issued it must be inspected by NFA staff to ensure that it meets requirements for the storage of beche-de-mer which is a perishable food product.

An Export licence is issued to the company to allow it to export beche-de-mer to overseas markets. Companies must meet export requirements as specified in the beche-de-mer fisheries management plan before the company is allowed to export.

## **REVIEW OF THE BECHE-DE-MER FISHERY MANAGEMENT PLAN**

NFA is committed to ensuring the Beche-de-mer Fishery benefits the coastal and island Communities, Buyers and Exporters as key stakeholders in the long term. This will be achieved through the effective implementation of the beche-de-mer fishery management plan. The plan must maintain the sustainable of the sea cucumber populations through effective control measures of the fishery. At the moment there are no examples of a tropical beche-de-mer fishery that is effectively managed around the world. NFA is challenged but is fully committed to be effective in the management of the PNG Beche-de-mer fishery and is therefore initiating the review of the current plan.

As part of the management plan review process NFA is identifying key issues affecting the implementation of the management plan including elements of the plan that are working and those that are not are not working. NFA will consult stakeholders initially in the provinces that have reached their TAC and are closing the fishery, to identify areas of the plan that can be improved. An intensive consultation workshop to review the plan will be conducted in October 2017. NFA is confident that revision of the beche-de-mer fishery management plan will significantly improve implementation in the 2018 open season.

**For further information, please contact Mr Leban Gisawa, Executive Manager, Fisheries Management Unit on Phone: 3090444 or Email: [lgisawa@fisheries.gov.pg](mailto:lgisawa@fisheries.gov.pg)**

Authorized by:  
**Mr. John Kasu**  
**Managing Director**

<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting No.1</b> <b>6-8 October 2021</b>
<b>Final results of the Torres Strait Beche-de-mer Stock Survey (CSIRO)</b>	<b>Agenda Item 3</b> <b>For NOTING &amp; DISCUSSION</b>

## RECOMMENDATIONS

That the Resource Assessment Group (RAG):

1. **CONSIDER and DISCUSS** the results of the eastern Torres Strait Beche-de-mer stock survey conducted between December 2019-January 2020 to be presented by the CSIRO Project Team;
2. **NOTE** the Hand Collectables Working Group (HCWG) considered preliminary results in August 2020 and were satisfied that it did not raise immediate sustainability concerns that needed to be urgently addressed before the 2021 fishing season.
3. **NOTE** the final survey results will be a relevant consideration for the RAG when discussing future black teatfish openings (Agenda item 4), implications for the implementation of the BDM Harvest Strategy and recommending the biological catch and total allowable catches for the 2022 fishing season (Agenda item 5) and when considering future research priorities for the fishery (Agenda item 8).

## KEY ISSUES

4. CSIRO conducted underwater dive surveys of beche-de-mer species between 25 November - 5 December 2019, and 10 – 23 January 2020, as part of the project '*Stock survey of Torres Strait Beche-de-mer species*', (AFMA Project No. 2019/0826), led by CSIRO and funded by the Torres Strait Regional Authority (TSRA). The surveys examined:
  - a. the eastern Torres Strait fishery with the focus on prickly redfish, curryfish species, black teatfish and surf redfish;
  - b. a limited exploration of deep water habitats to extend our knowledge of the full extent of the white teatfish resource in east Torres Strait, and
  - c. additional opportunistic habitat surveys of Ugar Island to support a related project involving Traditional Inhabitant Fishers from Ugar and CSIRO researcher Dr Leo Dutra, for the enhancement of beche-de-mer stocks; and
  - d. additional habitat surveys of Ugar Island and deep water surveys of white teatfish stocks.
5. To support the Hand Collectables Working Group's (HCWG) consideration of options for having a black teatfish opening, the Project team provided an overview of the preliminary results of the survey and a subsequent draft report to the HCWG meetings on 21 February and 7 August 2020 respectively.
6. At the HCWG 's August meeting, the Project team also presented a further report that solely focused on the status of the black teatfish stock and the results of supplementary modelling analyses undertaken by Dr Eva Plaganyi that built on the survey results, to support setting a starting total allowable catch (TAC) that is higher than that recommended by the harvest strategy.
7. Following their consideration of the preliminary survey results at the August 2020 meeting, the HCWG were satisfied that they didn't raise immediate sustainability concerns that needed to be urgently addressed before the 2021 fishing season. The

HCWG agreed to consider the final survey results and their implication for future management across all sea cucumber species surveyed at their meeting in 2021.

8. The project team has now submitted the final project reports for the stock survey (Attachment A) and the survey and sampling of Ugar Island and Campbell reefs to inform future enhancement of beche-de-mer stocks (Attachment B). These will be presented to HCRAAG by the Project team at the meeting.
9. The HCRAAG is being asked to consider the final survey results and have regard for it when discussing future black teatfish openings (Agenda item 4), implications for the implementation of the BDM Harvest Strategy and recommending the biological catch and total allowable catches for the 2022 fishing season (Agenda item 5) and when considering future research priorities for the fishery (Agenda item 8).

## BACKGROUND

10. In June 2019, the Torres Strait Scientific Advisory Committee (TSSAC) agreed to endorse the research proposal to undertake a stock survey of Torres Strait beche-de-mer species. The last surveys on east Torres Strait was undertaken in 2009.
11. The project addresses an essential priority in the fishery's Five Year Research Plan which was originally identified by HCWG14 at their meeting on 24 October 2018 on Erub originally aimed at understanding the stock status of sandfish at Warrior Reef.
12. Due to objections raised by Traditional Owners of Iama and Tudu immediately prior to the survey commencing, the sandfish Warrior Reef survey, this segment of the survey was not carried out and survey effort was reallocated to eastern areas of the survey. As such, the survey results do not address sandfish abundance on Warrior Reef which has been a longstanding research priority.
13. Dr Nicole Murphy from CSIRO is the Principle Investigator on the project with both Mr Tim Skewes and Dr Eva Plaganyi as co-investigators.





# Ugar Island sea cucumber survey

## Field survey and results

Nicole Murphy, Tim Skewes, Eva Plaganyi, Steven Edgar and Kinam Salee

July 2020

AFMA Project 2019/0826





## Multi-Use Ecosystems

### OCEANS & ATMOSPHERE

#### Citation

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Thank you to Leo Dutra for comments on the report.

Thank you to all Torres Strait Traditional Owners for regularly hosting us on their land and supporting this research.



## Summary

Scientific surveys of Torres Strait sea cucumbers were conducted during December 2019 and January 2020. This report summarises the findings of intensive sampling of Ugar Island and Campbell reefs to investigate sea cucumber populations and their habitats, in order to identify suitable species and locations for reseeding research.

A number of high value commercial sea cucumber species including Teatfish, Curryfish, Sandfish, Redfish, Blackfish and Prickly redfish were found at Ugar and Campbell reefs, and the sizes of animals was generally large. The survey data also show there are suitable habitats to release hatchery-produced sea cucumbers, which supports the development of future aquaculture prospects for the Ugar community. The survey also provided information for clam species, in particular the Giant clam, a species of interest to the Ugar community.

# 1 Ugar Island habitat survey

Surveys of Ugar Island and Campbell Reef to map habitats and quantify populations of sea cucumbers and giant clams were undertaken in order to provide information to the community, and for support of a sea cucumber reseedling proposal currently being developed by Mr Rocky Stephens and CSIRO researcher Leo Dutra. This work will help improve sea cucumber stocks for the benefit of local communities in Torres Strait.

This survey received approval from Mr Sereako Stephen, Chair of the Ugar RNTBC, Councillor Rocky Stephen and had community support following survey consultation (see Appendix A.1).

## 1.1 Objective

The objective of the sea cucumber survey was to map the reef and quantify habitats and sea cucumber populations of Ugar home reef, to support the potential sea cucumber re-seeding proposal (see Figure 1-1).

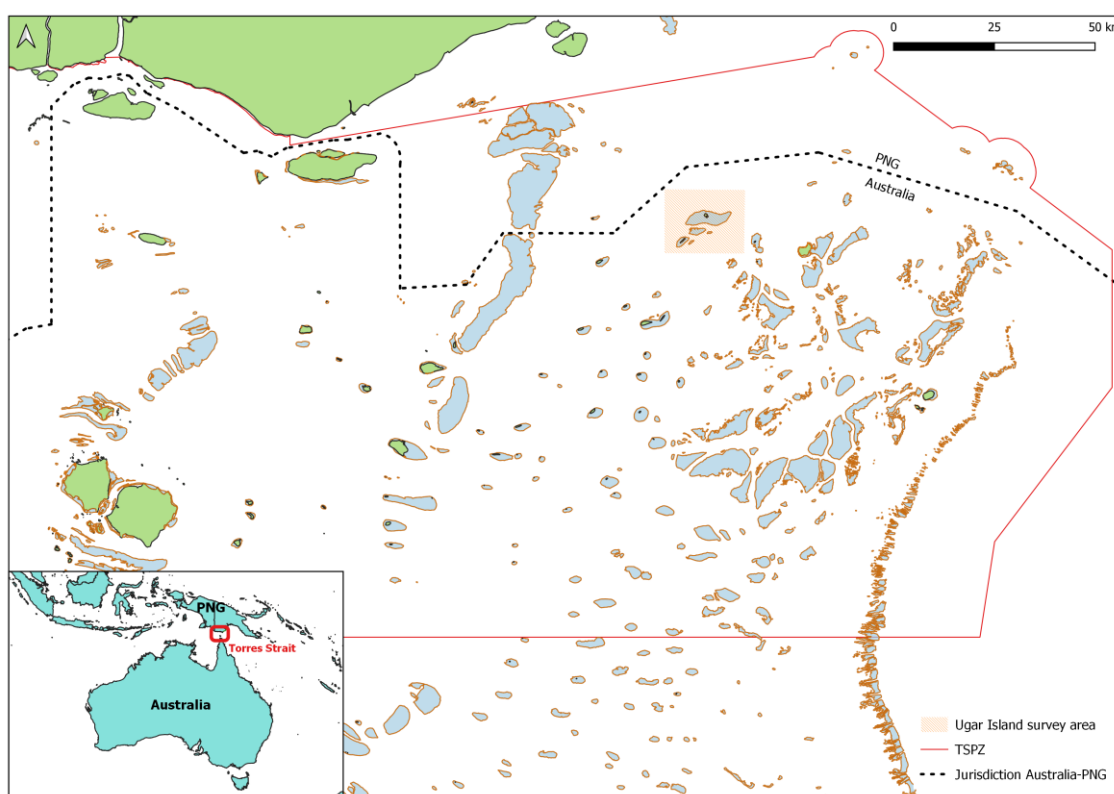


Figure 1-1. Map of Torres Strait showing location of Ugar Island and the survey area.

## 1.2 Sample design

The survey involved intensive sampling of Ugar Island and Campbell reefs to investigate sea cucumber populations and their habitats, in order to identify suitable species and locations for the re-seeding research.

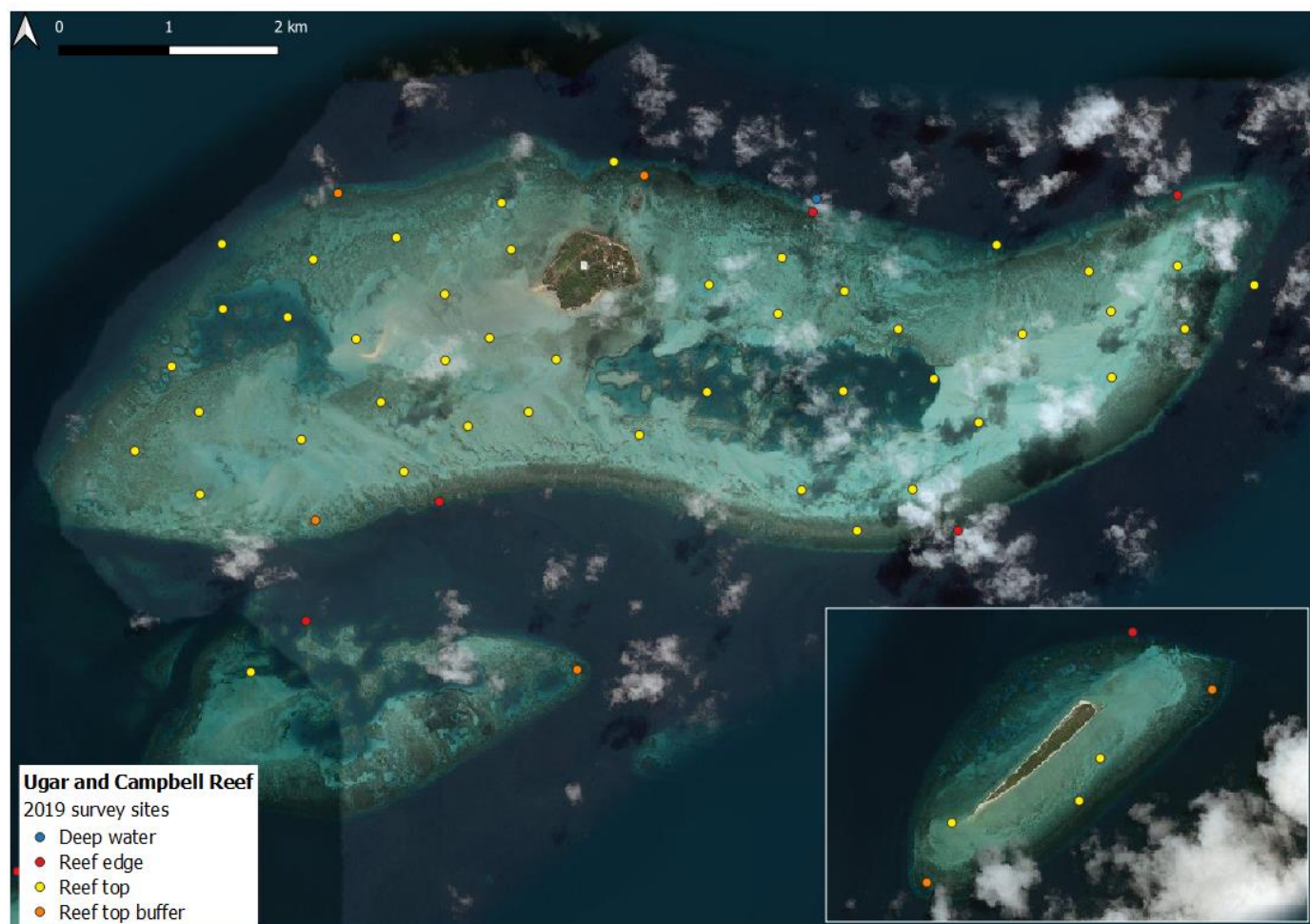


### 1.2.1 Ugar Island survey

Sixty snorkel and dive transects were undertaken as part of the surveys carried out in December 2019 and January 2020. Of the sites sampled, 38 were previously surveyed in one or more surveys carried out in 1995/96, 2002, 2005, 2009 (repeated measures), with 22 new sites that included reef top, reef top buffer and representative reef edge sites to inform on sea cucumber species, distribution and habitat (Table 1-1; Figure 1-2).

**Table 1-1. Survey sites for survey year.**

Survey year	Site number
1995/96 & 2019/20	23
1995/96, 2002, 2019/20	1
2002, 2005, 2019/20	2
2002, 2009, 2019/20	3
2002, 2019/20	9
2019/20	22



**Figure 1-2. Survey sites at Ugar Island and Campbell Reef for the 2019/20 field survey, Torres Strait.**

### 1.3 Survey Methods

A marine habitat map that delineated shallow reefs was used as the basis for the survey. This was imported into a Geographical Information System (GIS) software (QGIS) and the area surveyed superimposed onto the map. The area was further divided into the following three habitat strata:

- the reef edge,
- the reef top, and
- a reef top buffer stratum, being a 200 m wide buffer around the inside of the reef margin.

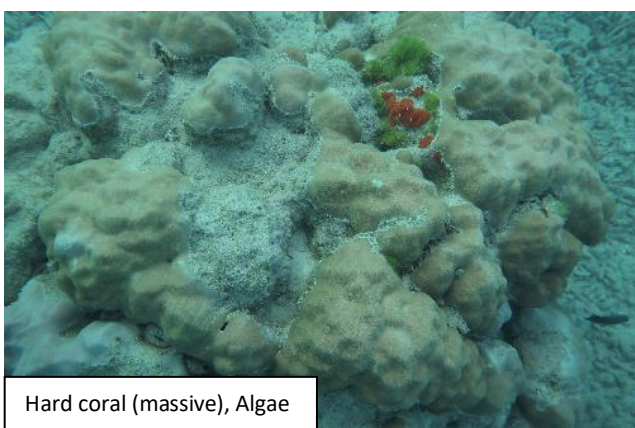
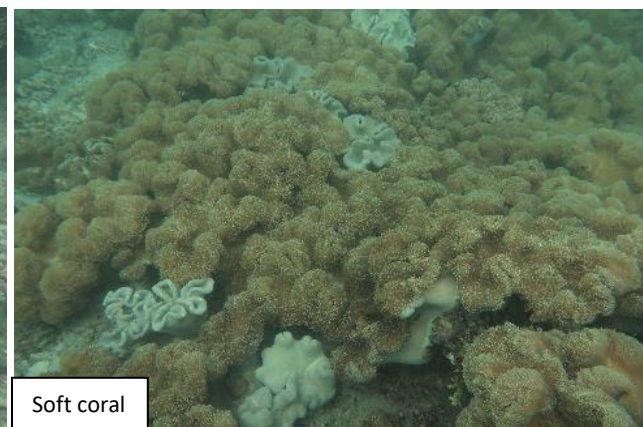
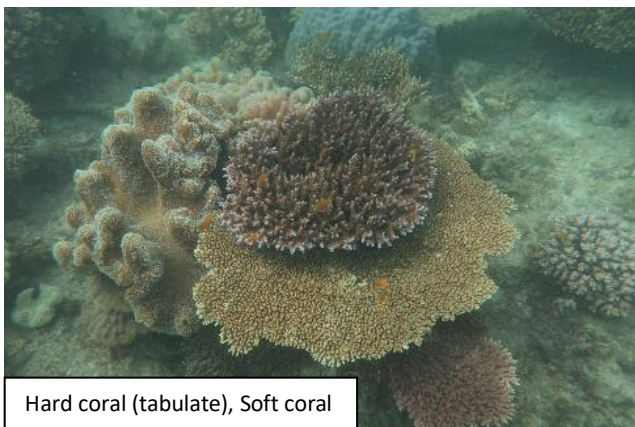
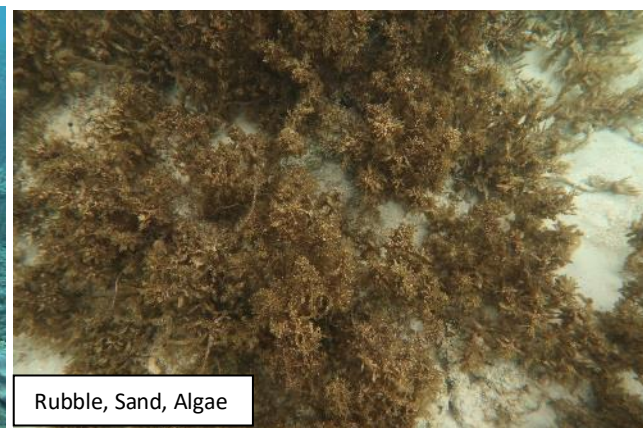
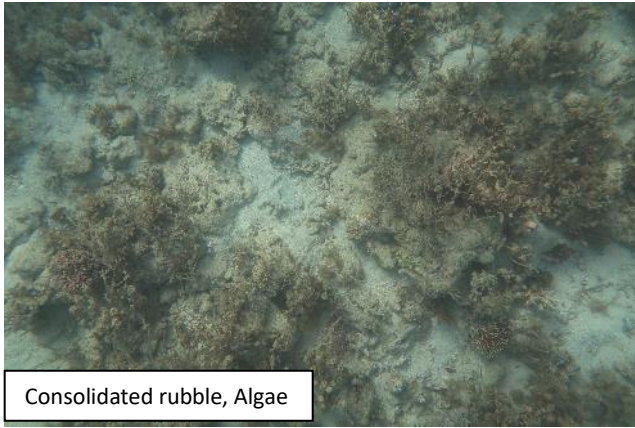
The survey was conducted using rapid marine assessment techniques consistent with previous Torres Strait beche-de-mer surveys undertaken in 1995-96, 2002, 2005 and 2009 (Skewes et al., 1999; Skewes et al., 2004; Skewes et al., 2010). Two of the survey staff - Nicole Murphy and Tim Skewes, have led or participated on all previous sea cucumber surveys.

The survey was undertaken by a team of divers operating from a dinghy and locating sample sites using hand-held GPS. On the reef top, divers swam along a 40m-100m transect line recording resource and habitat data from the line out to 1-2m either side. On the reef edge, a diver swam along a measured length transect between 1m and 15m water depth. Sea cucumbers, and other benthic fauna of commercial or ecological interest (e.g. clams and pearl oysters) were counted. Where possible, sea cucumbers were collected for total length and weight measurements taken in the dinghy and subsequently returned to the water, at or near the site collected.

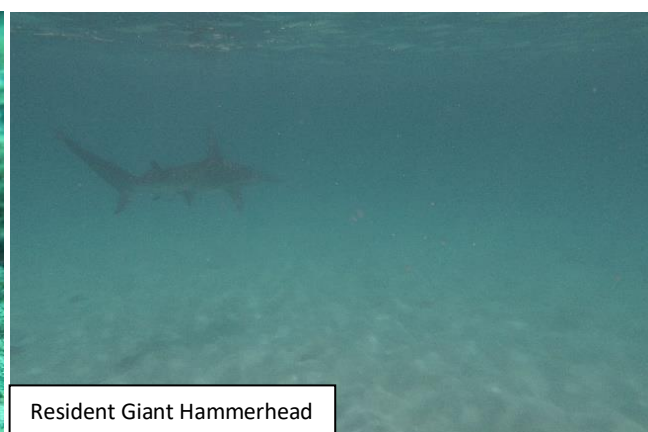
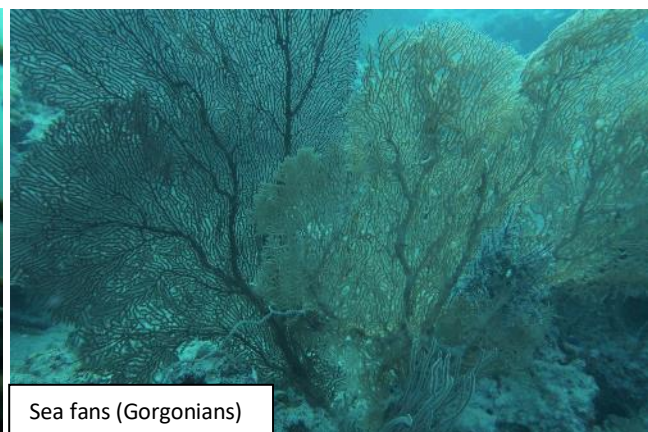
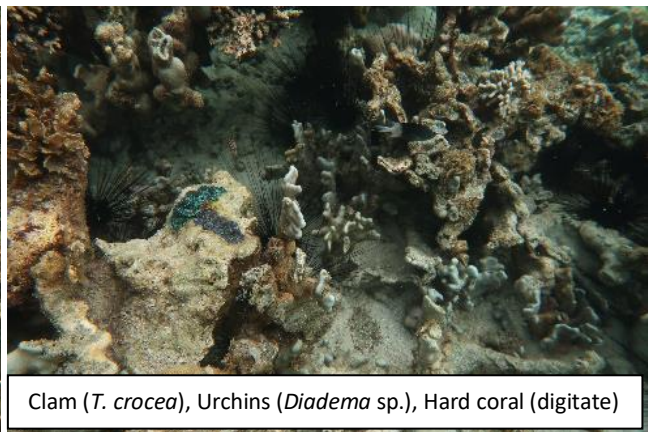
For each site, substrate was described in terms of the percentage of unconsolidated (sand, rubble) and consolidated (consolidated rubble, pavement and live coral) substrate. The growth forms and dominant taxa of the live coral component and the percentage cover of all other conspicuous biota such as seagrass and algae were also recorded (see Figure 1-3).

The timing of the survey was planned to coincide with the seasonal timing of previous surveys to reduce biases related to differences in survey observer, resulting from changes in sea cucumber burrowing behaviour, caused by seasonal and tidal factors.









**Figure 1-3. Substrate and biota examples.**

## 1.4 Data Analyses

Transect and sample data collected during the field survey have been entered into an Access database and imported into a centralised Oracle database for long-term storage. The data have also been used as input into statistical and GIS software for analysis.

### 1.4.1 Maps

Estimates of mean density (count per hectare) were derived using a stratified analysis of transect counts based on reef strata. This calculation takes into account heterogeneity in the variance of observed counts and is representative of the physical size differences of the varying habitats in the survey. Mean densities for sea cucumber species, dominant substrate and biota cover, and species of interest were represented in maps using coloured composition (see Figure 2-1; Figure 2-2; Figure 2-3).

### 1.4.2 Data outputs

Size frequency estimates were produced for combined sea cucumber species and for species groups (see Figure 2-4; Figure 2-5; Figure 2-6; Figure 2-7).

Stratified estimates for sea cucumber species for reef strata (reef top, reef top buffer and reef edge) were represented using plots of sea cucumber species mean density (see Figure 2-8; Figure 2-9; Figure 2-10).

Representation of dominant habitat and biota used average mean percent estimates of count data shown on *Lollipop* plot for substrate (see Figure 2-11), represented as substrate categories on the y axis and percentage cover on the x-axis, with hierarchical biota data represented as proportionate triangles (*Treemap* plot in RStudio) (see Figure 2-12).

A further finer representation of seagrass, algae and clam species used donut plot showing proportional break down of substrate and biota for reef strata - reef top, reef top buffer and reef edge (see Figure 2-13; Figure 2-14; Figure 2-15).

## 2 Results

### 2.1 Sea cucumber species

Nineteen species were recorded during the Ugar and Campbell reefs survey (Figure 1-2; Table 2-1). Twenty-three commercial sea cucumber species occur in Torres Strait, with fifteen recorded from Ugar and Campbell reefs.

**Table 2-1. Species list of recorded sea cucumbers.**

Species	Common name	Erub-mer Language
<i>Actinopyga echinites</i>	Deepwater redfish	‘Mamam Aber’
<i>Actinopyga miliaris</i>	Hairy blackfish	Musmus Aber’
<i>Actinopyga palauensis</i>	Deepwater blackfish	‘Goleh-Goleh Aber’
<i>Bohadschia argus</i>	Leopardfish	‘Kepkep Aber’
<i>Bohadschia ocellata</i>	Polka-dotted or Ocellated sea cucumber	
<i>Bohadschia vitiensis</i>	Brown sandfish	‘Parak Aber’
<i>Holothuria edulis</i>	Pinkfish	
<i>Holothuria fuscogilva</i>	White teatfish	‘Zarzer Pauraber’
<i>Holothuria fuscopunctata</i>	Elephant trunkfish	“Berber Aber’
<i>Holothuria lessoni</i>	Golden sandfish	‘Susus Aber’
<i>Holothuria scabra</i>	Sandfish	‘Burbur Aber’
<i>Holothuria whitmaei</i>	Black teatfish	‘Pauraber or Goleh-Goleh Pauraber’
<i>Pearsonothuria graeffei</i>	Black-spotted or Graeffe’s sea cucumber	
<i>Stichopus chloronotus</i>	Greenfish	Kerir Aber’
<i>Stichopus herrmanni</i>	Curryfish (common/yellow)	‘Bambam Aber’
<i>Stichopus vastus</i>	Curryfish (vastus/green)	‘Warwarr Aber’
<i>Thelonota ananas</i>	Prickly redfish	‘Seker Aber’
<i>Thelonota anax</i>	Amberfish	
<i>Holothuria atra</i>	Lollyfish	“Wehwehsor Aber’



## 2.2 Mapping of species composition

### 2.2.1 Main outcomes

- ❖ The most common species (found for most sites) for the survey was Lollyfish (*H. atra*) (Section 2.2.2; Figure 2-1).
- ❖ The least abundant species was Graeffe's sea cucumber (*P. graeffei*) (Section 2.2.2; Figure 2-1).
- ❖ Most of the sites surveyed had predominantly soft sediment (Section 2.2.3; Figure 2-2).
- ❖ Lollyfish (*H. atra*) had the smallest size class for length frequency distribution, with Prickly redfish (*T. ananas*) having the largest (Section 2.3.1; Figure 2-7).
- ❖ A mix of juveniles and adults of Golden sandfish (*H. lessoni*) was found at one particular area of the reef top (Figure 2-1), close to the east side of Ugar island - predominantly dominated by sand (Figure 2-2) (see details for implications to re-seeding in Section 3).
- ❖ One adult sandfish (*H. scabra*) was found off transect where Golden sandfish (*H. lessoni*) were observed (Figure 2-1) (see details for implications to reseedling in Section 3).
- ❖ Lollyfish (*H. atra*) was the most abundant species for the reef top buffer and reef top strata (Figure 2-8; Figure 2-10).
- ❖ Pinkfish (*H. edulis*) was the most abundant species for the reef edge strata (Figure 2-9).
- ❖ Soft (sandy) substrate was the most common substrate for all strata for sites surveyed, followed by 'consolidated rubble' for the reef top buffer, 'hard' for the reef edge, and 'rubble' for the reef top (Figure 2-11), suggesting a relative high energy.
- ❖ Soft coral was the dominant biota for both reef edge and reef top strata, where the reef top buffer was equally dominated by sea urchins, soft corals and Fungiid corals (Figure 2-12).
- ❖ *Thalassia empirchi* was the dominant seagrass species for reef top and reef top buffer strata, followed by *Halophila ovalis* (Figure 2-13).
- ❖ The reef top, reef top buffer and reef edge strata were dominated by algae *Sargassum* spp. (Figure 2-14).
- ❖ *T. crossea* was the most frequent clam species. Most sites surveyed had one species of clam, but three species of clam were found at one site at Campbell reef (Section 2.2.4; Figure 2-3; Figure 2-15).

## 2.2.2 Sea cucumber species

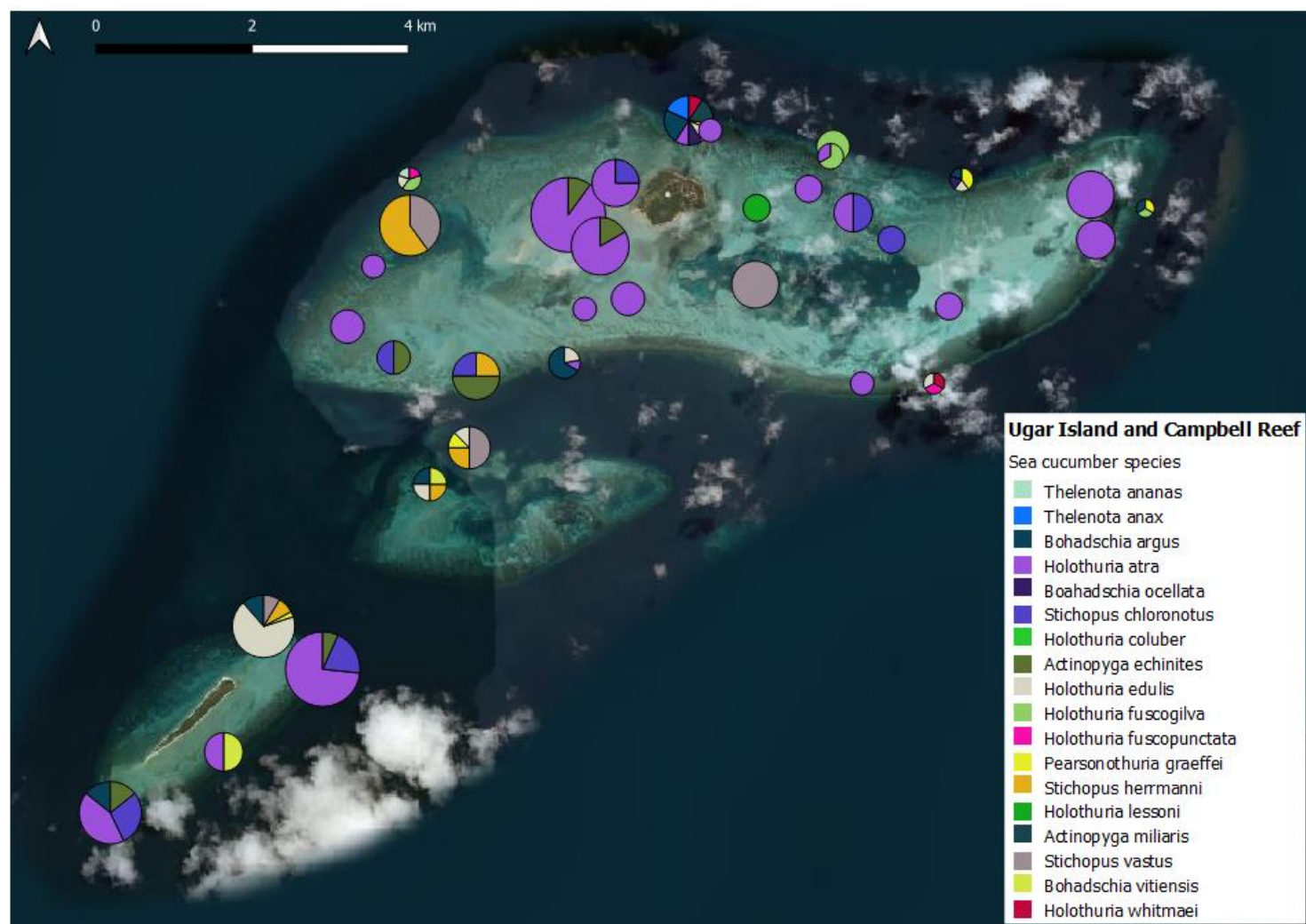


Figure 2-1. Relative abundance of sea cucumber species for survey sites.

### 2.2.3 Substrate and biota

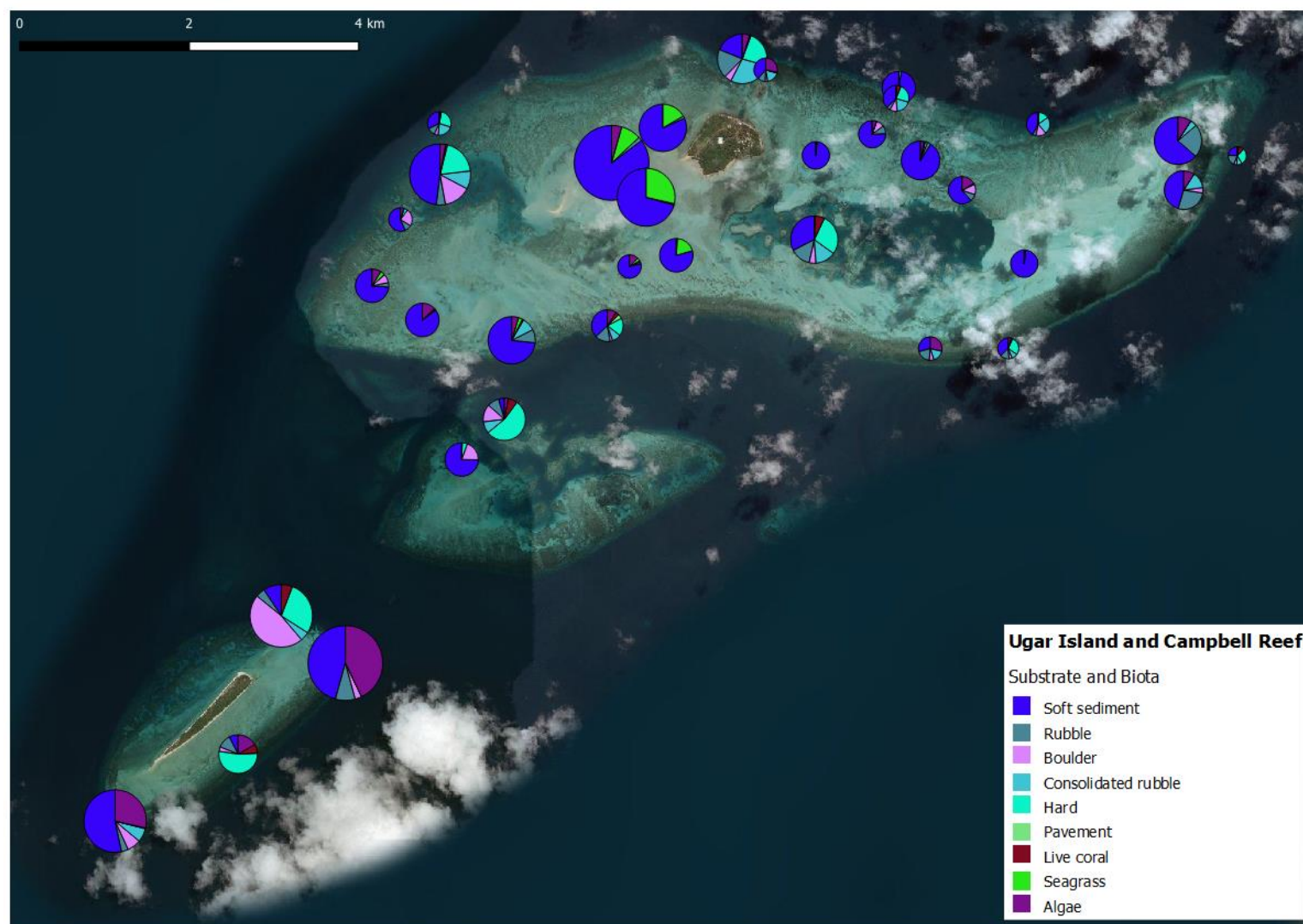


Figure 2-2. Percentage cover of substrate and biota for survey sites.

## 2.2.4 Clam species

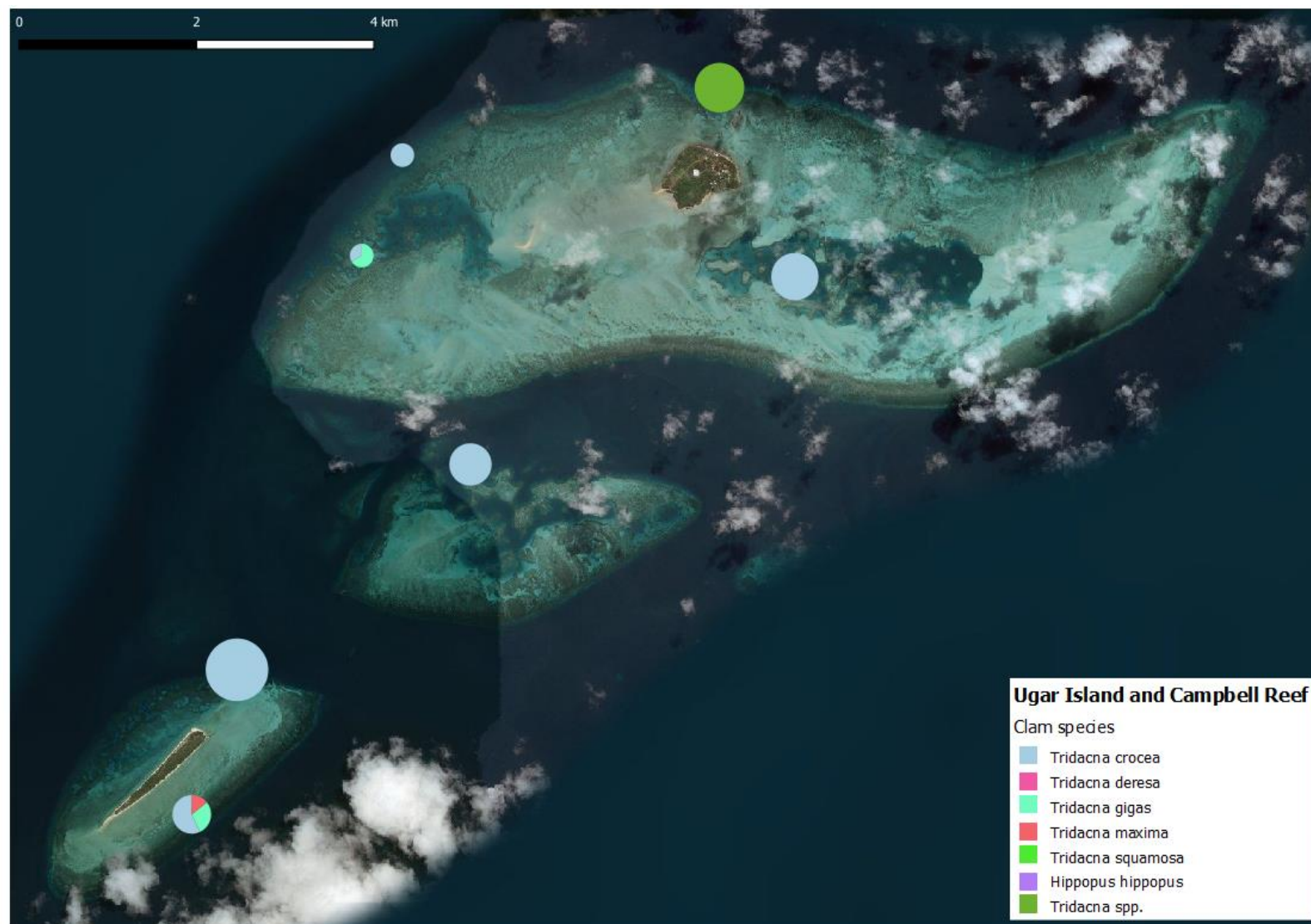


Figure 2-3. Percentage cover of clam species for survey sites.

## 2.3 Data outputs

### 2.3.1 Length frequency for grouped sea cucumber species

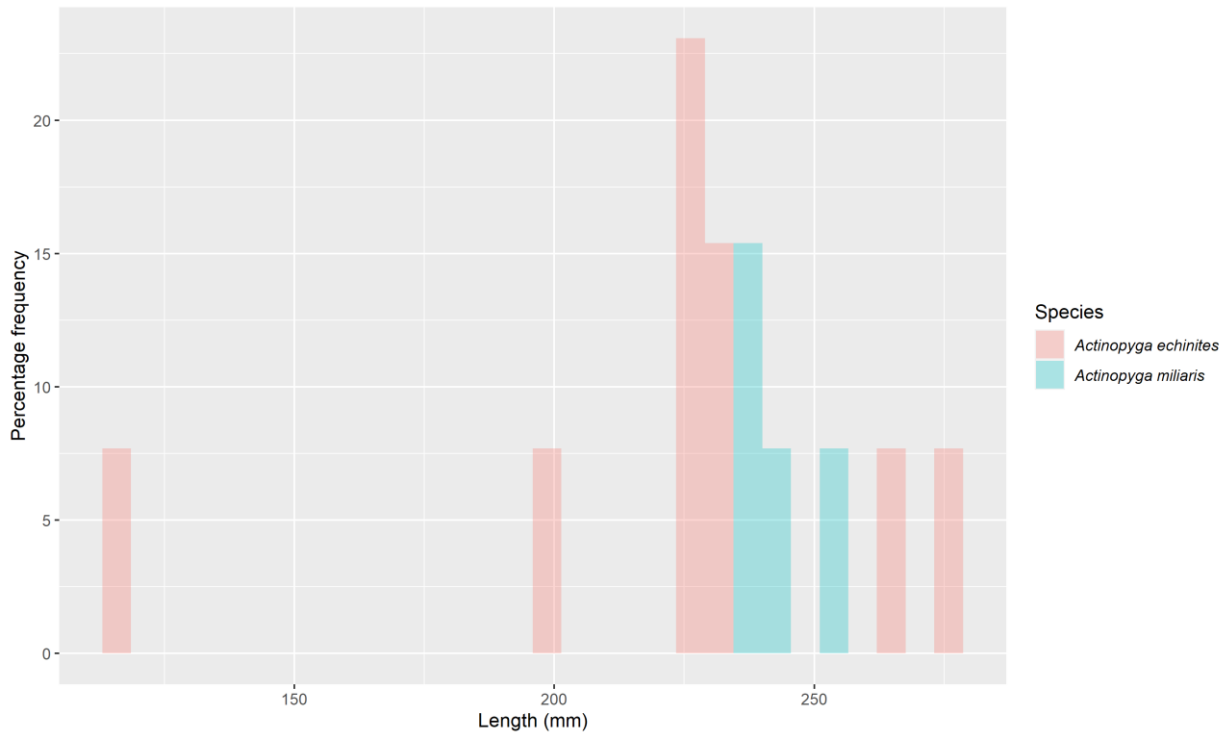


Figure 2-4. Length frequency for *A. echinites* and *A. miliaris*.

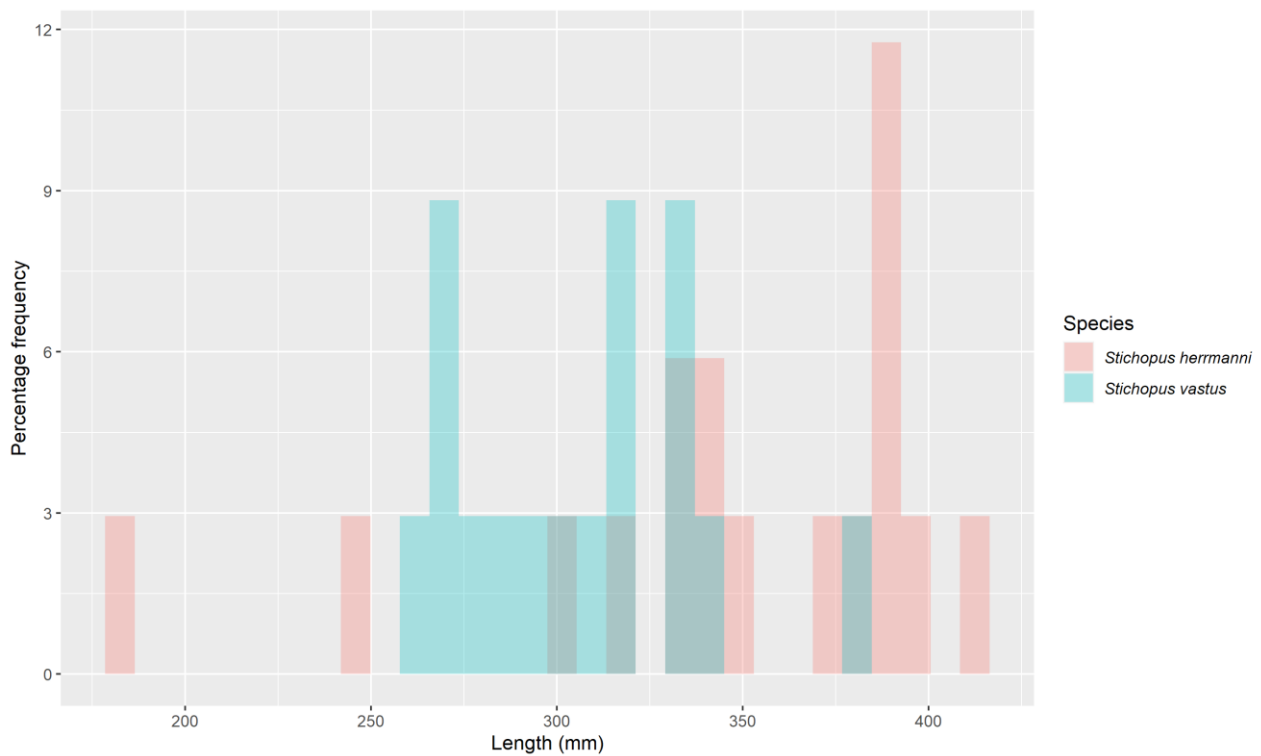


Figure 2-5. Length frequency for *S. herrmanni* and *S. vastus*.



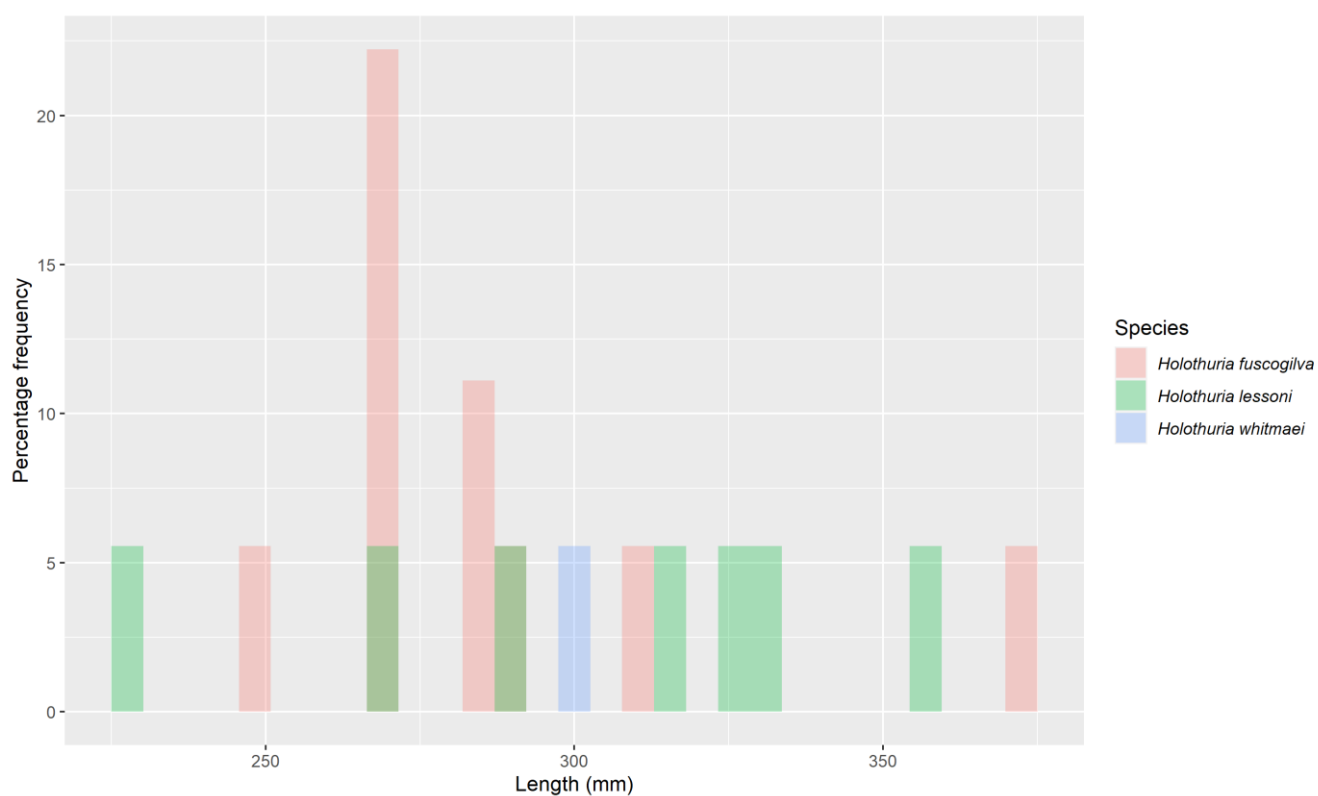


Figure 2-6. Length frequency for *H. fuscogilva*, *H. whitmaei* and *H. lessoni*.

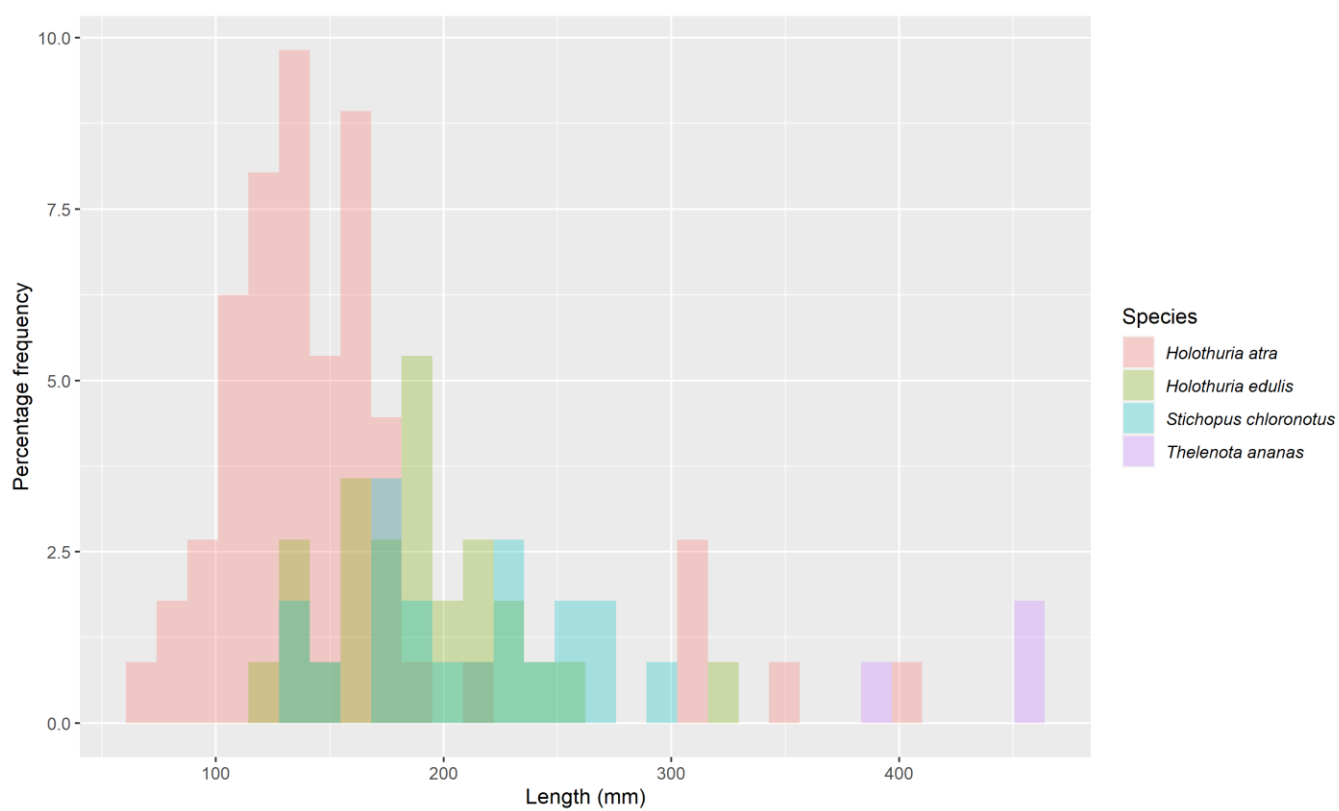


Figure 2-7. Length frequency for *H. atra*, *H. edulis*, *S. chloronotus* and *T. ananas*.



### 2.3.2 Stratified density - strata

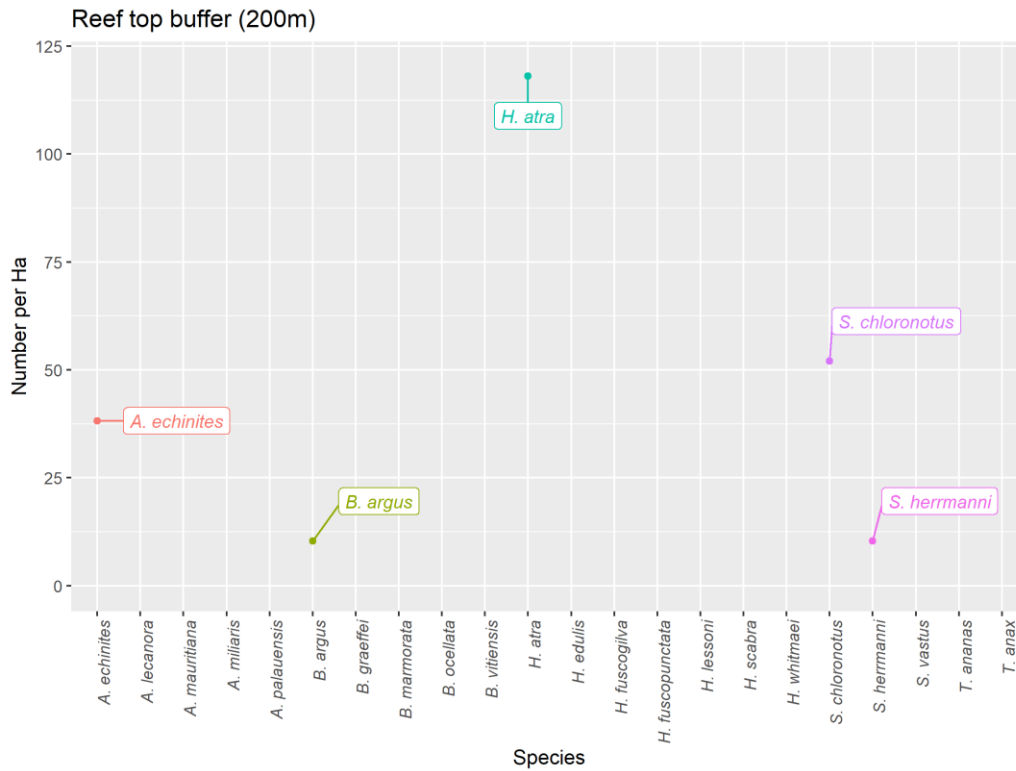


Figure 2-8. Stratified density for reef top buffer.

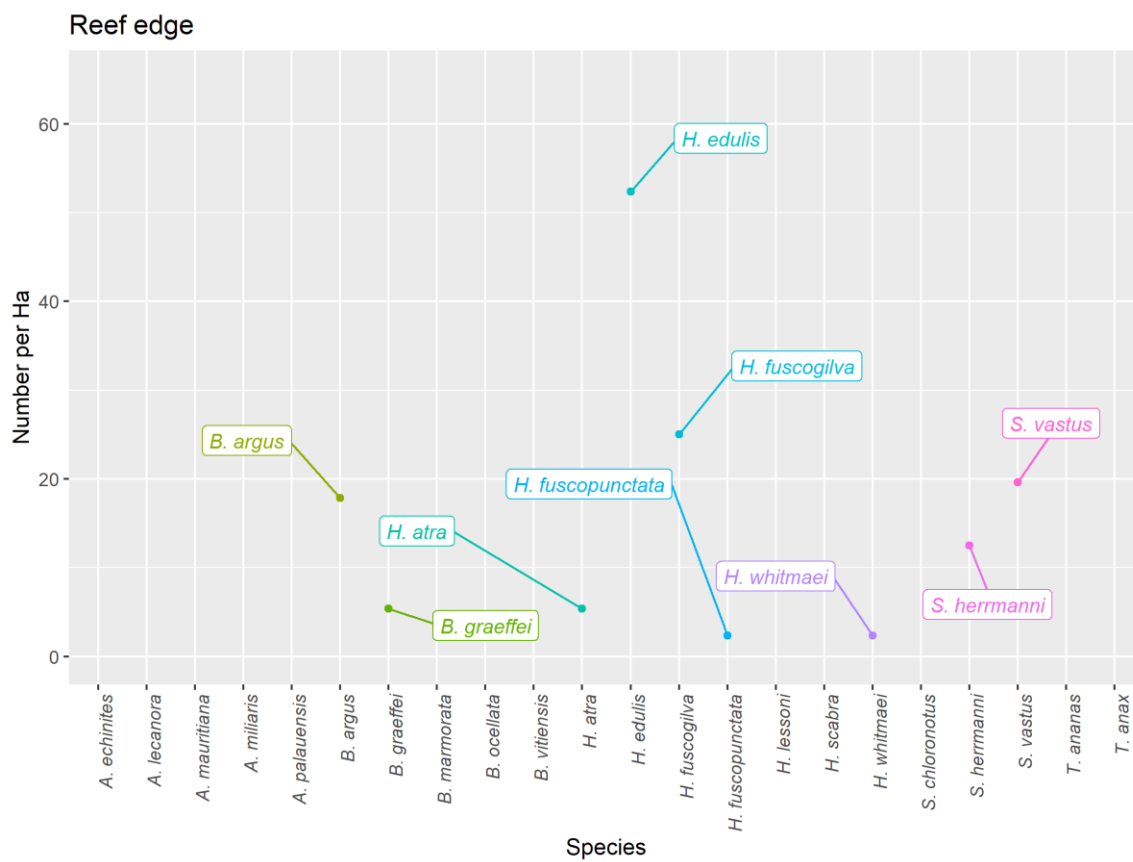


Figure 2-9. Stratified density for reef edge.

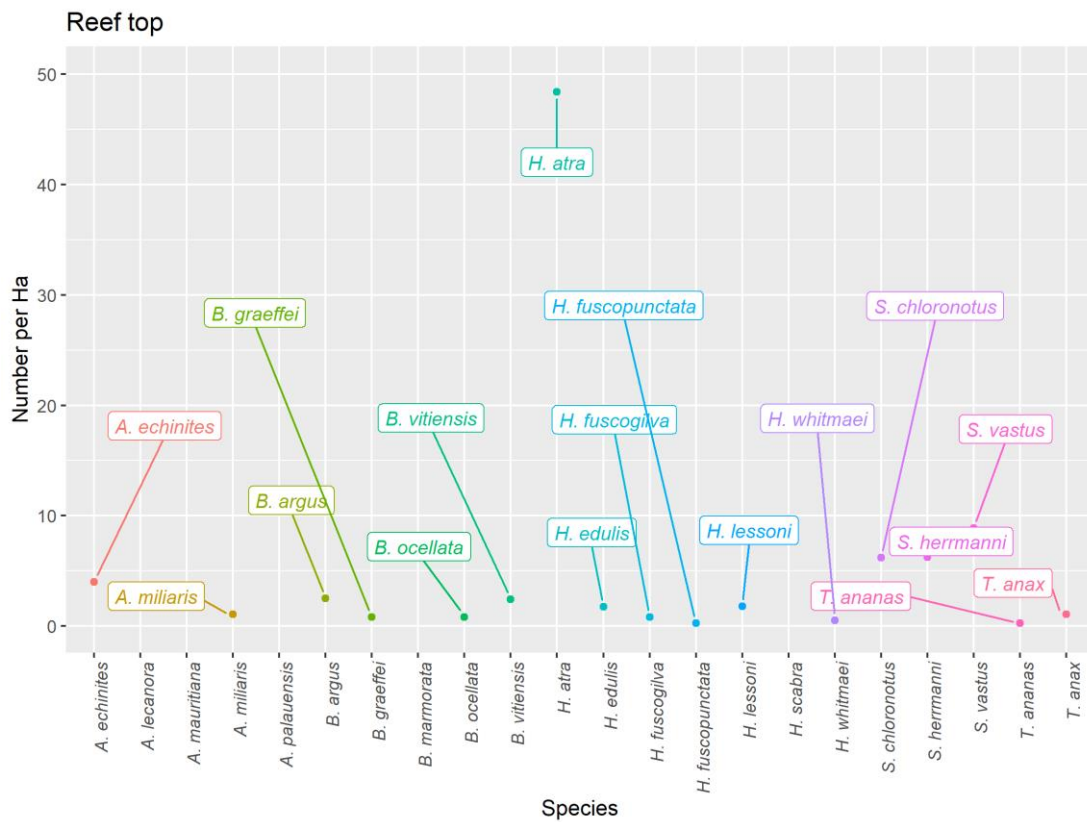


Figure 2-10. Stratified density for reef top.

### 2.3.3 Substrate

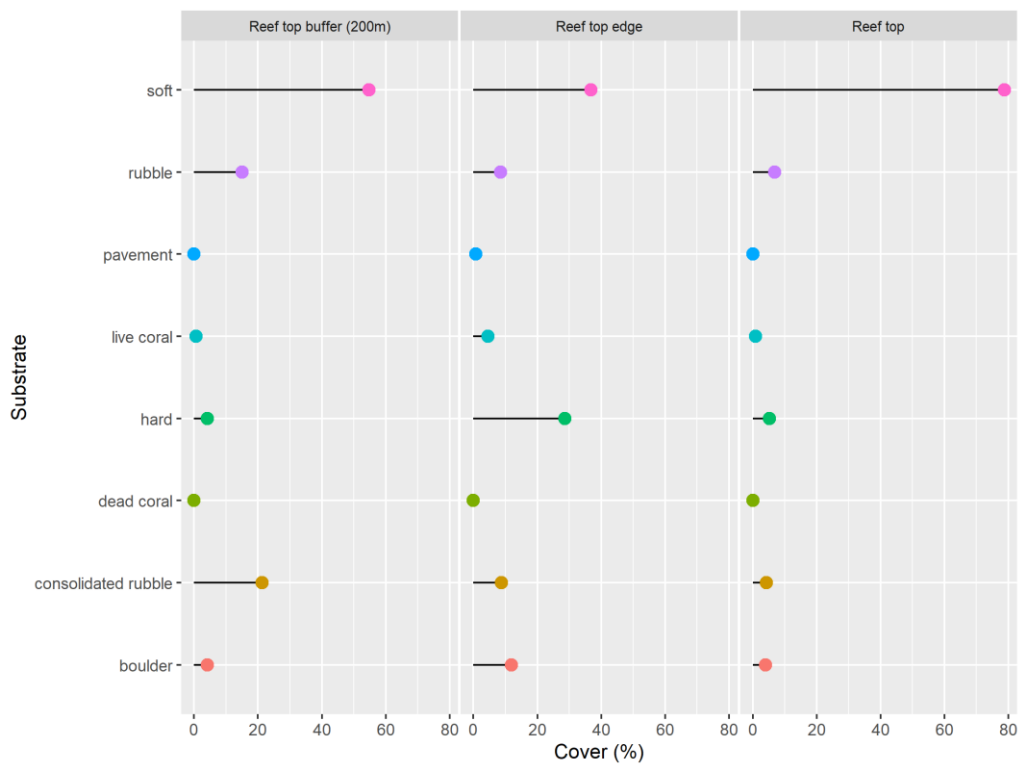


Figure 2-11. Mean percentage cover of substrate for strata.

2.3.4 Biota



Figure 2-12. Proportion of dominant biota for strata.

2.3.5 Seagrass

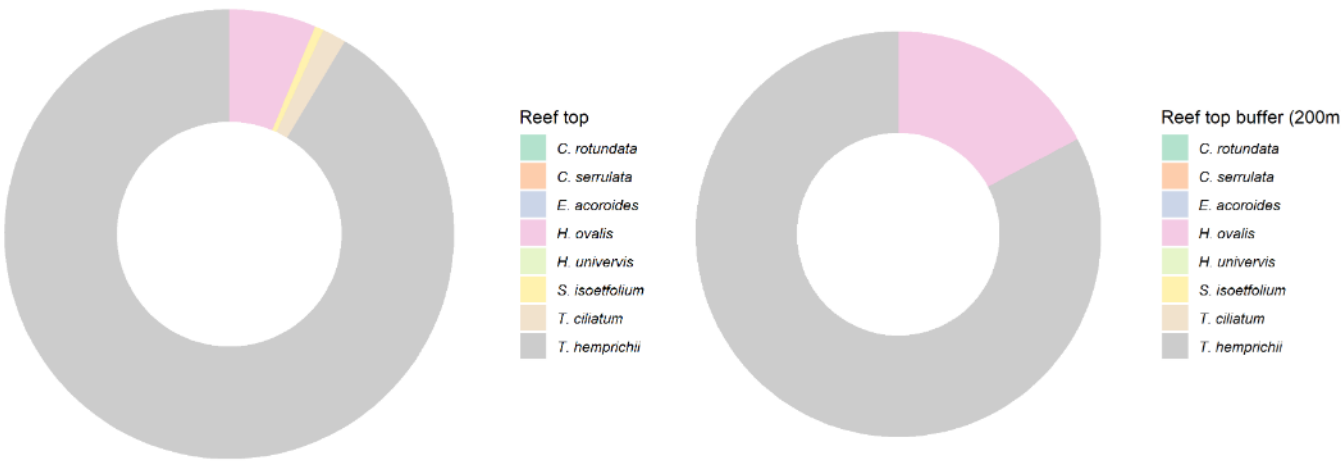


Figure 2-13. Composition of seagrass species for strata.

### 2.3.6 Algae

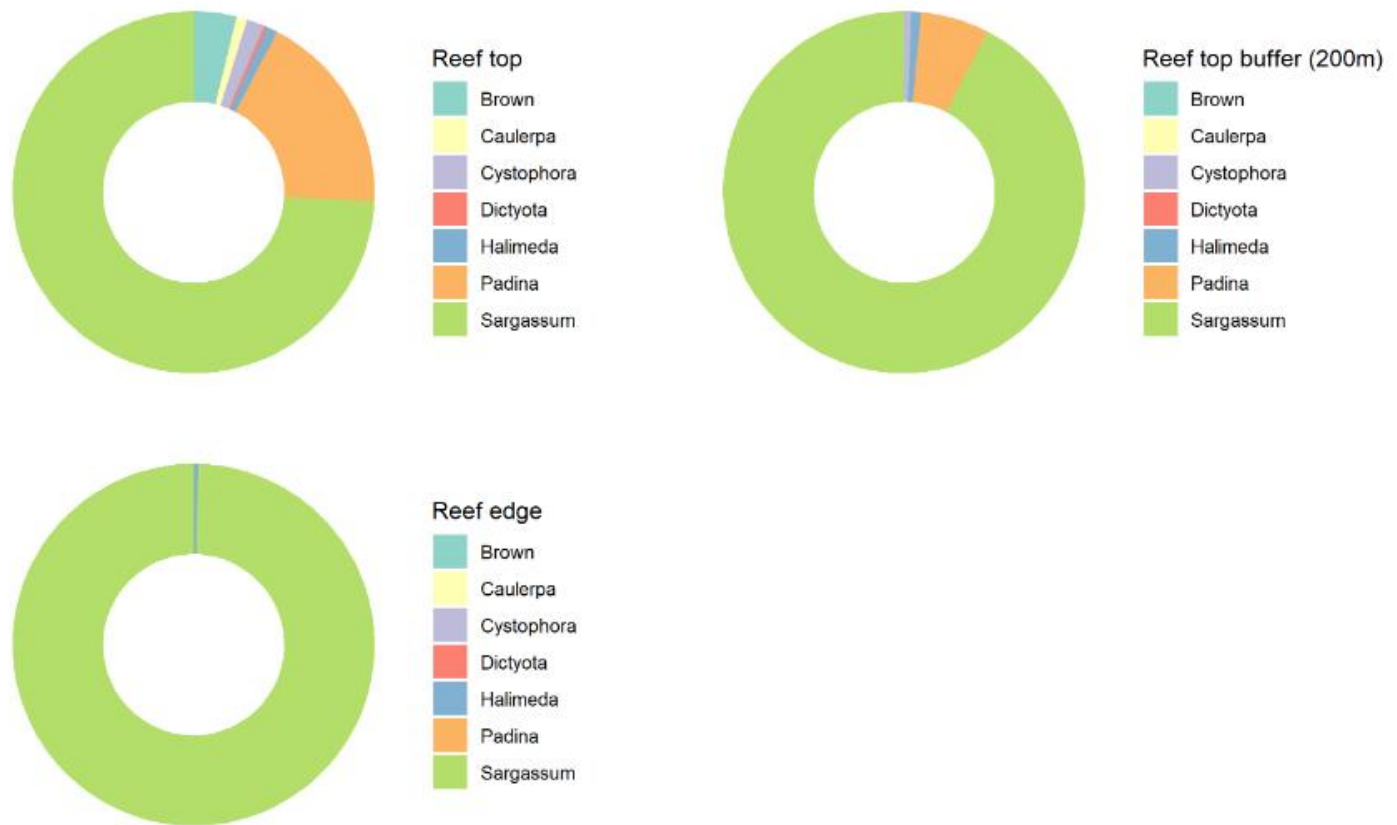


Figure 2-14. Composition of algae species for strata.

### 2.3.7 Clam

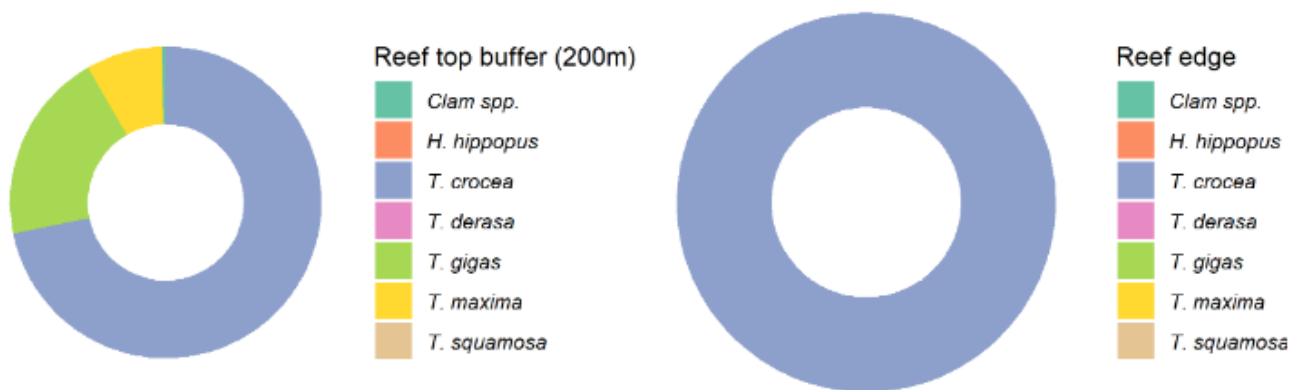


Figure 2-15. Composition of clam species for strata.

### 3 Key findings – reseedling

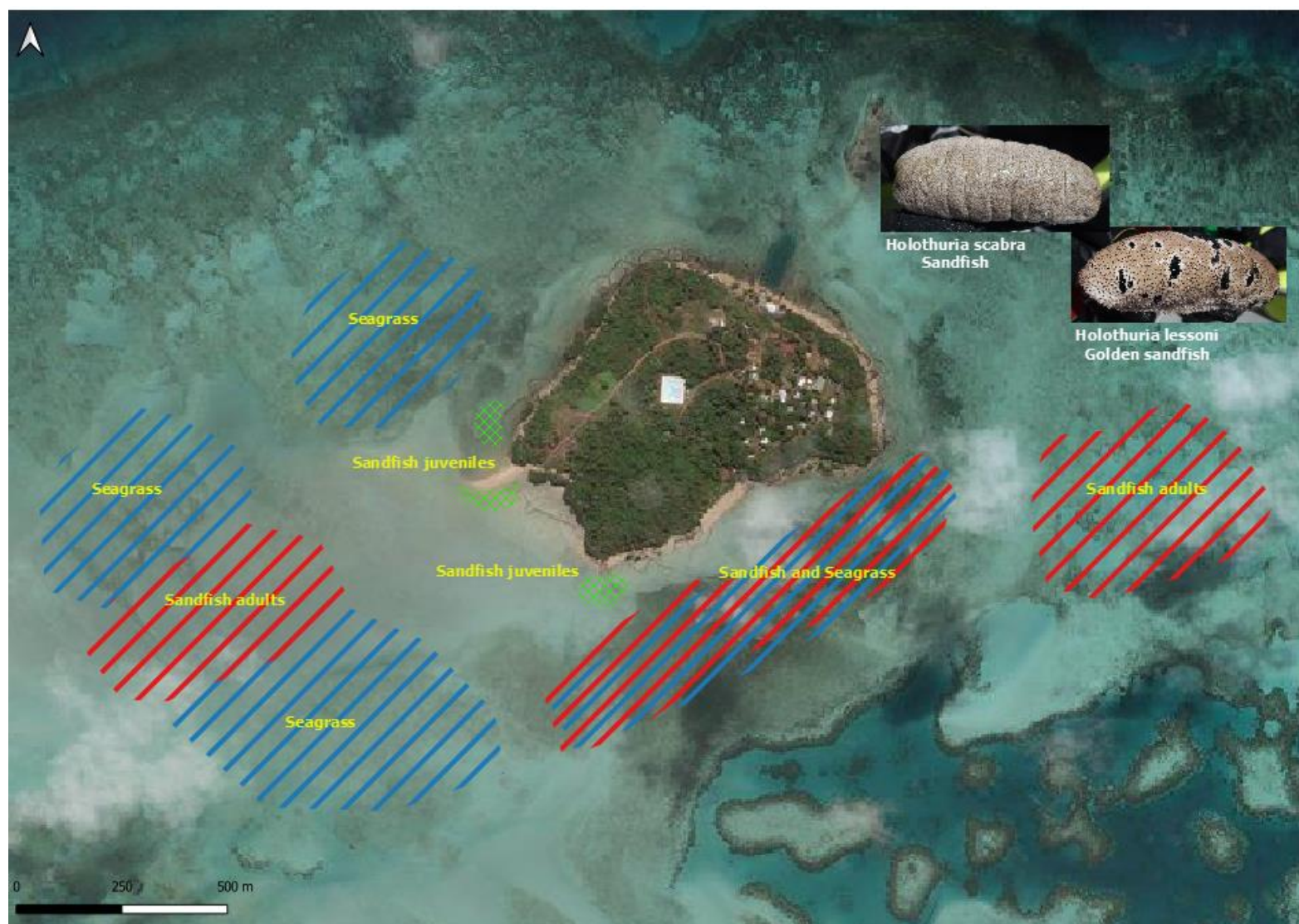


Figure 3-1. Sandfish locations and seagrass areas of interest for Ugar Island.

### 3.1 Survey notes

- ❖ A number of high value commercial sea cucumber species including Teatfish, Curryfish, Sandfish, Redfish, Blackfish and Prickly redfish were found at Ugar and Campbell reefs. Length frequency ranges for species showed sea cucumber populations to be above fishery size limits (Table 3-1).

**Table 3-1. Sea cucumber species length frequency range and fishery limits.**

Species	Common name	Length frequency (mm)	Size limit (mm)
<i>Holothuria fuscogilva</i>	White teatfish	250-425	320
<i>Holothuria whitmaei</i>	Black teatfish	250-300	250
<i>Stichopus herrmanni</i>	Common Curryfish	185-415	200
<i>Stichopus vastus</i>	Curryfish (vastus)	265-380	200
<i>Holothuria lessoni</i>	Golden sandfish	225-355	220
<i>Holothuria scabra</i>	Sandfish	240	200
<i>Thelenota ananas</i>	Prickly redfish	390-460	350

\*Size limits set in The Torres Strait Beche-de-mer Harvest Strategy.

- ❖ Adults and juveniles of Sandfish species were identified from the current survey and from discussions with fishers providing photos (Figure 3-1).
- ❖ A number of Golden sandfish (*H. lessoni*) were located at an area to the East of Ugar island and were either almost fully or partially buried (Figure 3-1; Figure 3-2).
- ❖ One adult Sandfish (*H. scabra*) was found (off transect) at the same location as Golden sandfish (Figure 3-1).
- ❖ Golden sandfish (*H. lessoni*) measured during the survey were from various class sizes, suggesting the area provides suitable habitats for both adults and juveniles (Table 3-1).
- ❖ The Sandfish site was re-visited at different times of the day to account for sea cucumber burying behaviour, with more observed past early morning.





Figure 3-2. Golden sandfish (*Holothuria lessoni*), partially or almost fully buried.

- ❖ A remarkable clam garden was found at Campbell reef with three species of clam recorded - *Tridacna crocea*, *T. maxima* and *T. gigas*. Of note for the Giant clam (*T. gigas*) was the presence of a number of juveniles and adults (Figure 2-3).
- ❖ Two Crown-of-thorn seastars (*Acanthaster planci*) were found.
- ❖ Live coral looked healthy – no bleaching or disease was seen.
- ❖ Larger amounts of soft coral at sites may have resulted from recovery of a previous mortality event (Norstrom et al., 2009) eg. mass bleaching event recorded in 2017; or from elevated inorganic nutrient concentrations (Bednarz et al., 2012), from the possible influence of Fly River waters in the south-east trade wind season every few years for Torres Strait (Waterhouse et al. 2018).

## 3.2 Conclusions

The field survey of Ugar Island and Campbell Reef quantified the abundance of sea cucumber species and identified a number of habitats supporting high value sea cucumber species. The survey also provided information for clam species, in particular the Giant clam (*T. gigas*), a species of interest to the Ugar community.

The survey data provides essential information for the development of the re-seeding initiative for Ugar island. The data provides evidence of the occurrence of Sandfish species (*H. lessoni* and *H. scabra*) of different class sizes at Ugar, suggesting the habitat is suitable and hence they reproduce and grow in the area. Consequently, there is a strong potential to reproduce and rear these naturally occurring species in a local hatchery. The survey data also show there are suitable habitats to release hatchery-produced sea cucumbers, which supports the development of future aquaculture prospects for the Ugar community.

New understanding for species occurrence and knowledge of ecological systems is also of community benefit for future fishing and for safe-guarding important habitat area.

## References

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## A.1 Community consultation



CSIRO  
Queensland BioSciences Precinct  
306 Carmody Road St Lucia QLD 4072  
csiro.au | ABN 41 687 119 230

19<sup>th</sup> December 2019

### HABITAT SURVEY OF UGAR ISLAND

Mr Sereako Stephen  
Chairperson Ugar RNTBC  
Ugar Island

Dear Mr Stephen

CSIRO is currently engaged to carry out a survey of Beche-de-mer (sea cucumber) in Torres Strait. We will be undertaking the second part of the survey from 9<sup>th</sup> – 22<sup>nd</sup> January 2020.

As part of this work, we seek permission please to undertake a habitat survey of Ugar Island to support the re-seeding proposal that Mr Rocky Stephens and CSIRO researcher Dr Leo Dutra are developing.

The habitat survey will involve a number of measured transects from 40m to 100m long, that a SCUBA diver or Snorkeller will swim along and record the following:

- Water depth
- Transect length
- Substrate type - sand, rubble, rock
- Coral
- Seagrass
- Algae
- Sponges
- Sea cucumbers
- Urchins
- Trochus

These transects will be undertaken around the perimeter of Ugar and will include sand and reef top areas, as well as reef edges. This information will be of high value to the re-seeding proposal as it will provide important data on zonation of habitat types. We are also happy to include any locations that may be of interest to the community and ask you to please let us know.

We are planning to undertake the habitat survey over one day around the 10<sup>th</sup> or 11<sup>th</sup> of January 2020, with timing dependent on weather and sea conditions. We are also more than happy for anyone to come and see what we are doing and to answer any questions.

At the completion of the survey a map will be produced displaying habitat information surrounding Ugar Island, which will be provided to the community as well as to Mr Rocky Stephens and Dr Leo Dutra.

Kind Regards

Nicole Murphy  
Experimental Scientist  
07 3398 4958  
nicole.murphy@csiro.au





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**Contact us**

1300 363 400  
+61 3 9545 2176  
[csiroenquiries@csiro.au](mailto:csiroenquiries@csiro.au)  
[csiro.au](http://csiro.au)

**For further information**

Oceans & Atmosphere  
Nicole Murphy  
+61 07 3833 5948  
[nicole.murphy@csiro.au](mailto:nicole.murphy@csiro.au)  
[csiro.au/oceans&atmosphere](http://csiro.au/oceans&atmosphere)

<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting No.1 6-8 October 2021</b>
<b>BLACK TEATFISH TRIAL OPENING 30 APRIL 3 MAY 2021 AND FUTURE OPENINGS</b>	<b>Agenda Item 4 FOR DISCUSSION &amp; ADVICE</b>

## RECOMMENDATIONS

1. That the Resource Assessment Group (RAG) **NOTE** the update on the outcomes of the black teatfish trial opening on 30 April – 3 May 2021, including an overview of catch and effort reporting by licenced fish receivers (**Attachment A**) and information from fishers that participated in the opening who will be in attendance at the meeting.
2. That the RAG, in accordance with Condition 5, 6 and 7 of the Re-opening Decision Rule in the Torres Strait Beche-de-mer Fishery Harvest Strategy (Section 2.11.4, page 34-35):
  - a. **NOTE** that the trial opening Total Allowable Catch (TAC) was not exceeded meaning the harvest strategy recommendation that the fishery be automatically paused for the following year if the TAC is exceeded by more than 5 percent does not apply (Condition 5)
  - b. **REVIEW** and **DISCUSS** the data collected for the opening and advise whether the level of data collection during the trial opening was conducted satisfactorily (condition 6).
  - c. **REVIEW** the CSIRO analysis of data from the opening (**Attachment B**) to review the TAC and potential for the fishery to stay open in the future, or be re-opened periodically after a pre-specified interval (Condition 7).
3. That the RAG, having considered the above, **DISCUSS** and **PROVIDE ADVICE** on the potential for the fishery to stay open in future, or be re-opened periodically after a pre-specified interval (Condition 7) and under what conditions including:
  - a. an appropriate TAC; and
  - b. any additional data that should be collected during future openings, noting an ongoing condition of the fishery remaining open is that reliable data collection continues, and preferably includes additional data such as CPUE, spatial footprint and size composition (Condition 8).

## KEY ISSUES

4. The re-opening decision rule in the BDM Harvest Strategy (Section 2.11.4) sets out the conditions that need to be met when considering the potential for a previously closed fishery to stay open in future, following a successful trial opening. These are outlined below to guide the RAG's discussion:
  - i. **STEP 1 - Was data collection during the trial conducted satisfactorily (condition 6)**

AFMA believes that reported catches accurately reflect the total amount of black teatfish that was caught and landed during the season due to the high level of industry compliance with the daily catch landing and reporting requirements that applied. AFMA had a significant compliance presence throughout the region during the opening, including land-



based officers on some of the key islands which were able to support and assist industry meet the licencing and reporting requirements.

**ii. STEP 2 - Noting the TAC was not exceeded and reliable data were collected (RAG to comment on this assessment), the data need to be analysed to review the TAC and potential for the fishery to stay open in the future, or be re-opened periodically after a pre-specified interval (Condition 7)**

- CSIRO have undertaken a analysis of the catch and effort data from the opening including an analysis of catch rates to the extent that the available reported effort information allows (**Attachment B**).
- CSIRO will present the analysis at the meeting.

**iii. STEP 3 - Future TAC**

- The rationale for the 20 tonne opening TAC is outlined in the Background section below.
- The RAG is now asked to provide advice on a TAC for a future black teatfish opening that is set at a demonstrably conservative level taking into account the outcomes of the trial opening outlined in Steps 1 and 2.

**iv. STEP 4 - Additional data to be collected during future openings**

- AFMA broached the possibility of doing logbook reporting and some length sampling with industry at the start of consultation with industry and communities on the timing of the opening. Initial feedback from industry was positive however had concern that it may not be feasible given the realities of sea cucumber fishing operations. AFMA did not pursue these initiatives further with industry, recognising the need to first focus on some of the more fundamental aspects of the opening such as daily reporting and empowering industry to agreeing on an appropriate timing for the opening.
- An ongoing condition of the fishery remaining open is that reliable data collection continues, and preferably includes additional data such as CPUE, spatial footprint and size composition. AFMA considers that industry is broadly interested in pursuing logbook reporting and, as is the case for Spanish Mackerel Fishery, would be willing to assist with sampling. Guidance is needed however from industry and scientific members on how best to structure such programs ensuring sufficient support and meaningful sampling. For example, training for fishers to take length measurements, complete logbooks and having data collection officers at key landing areas to support industry sampling.

## **BACKGROUND**

5. The black teatfish opening commenced on 30 April 2021. In line with decisions of the PZJA, the TAC was set at 20 tonnes and it was mandatory for fishers to report catches to a fish receiver daily and for fish receivers to report landings to AFMA daily. Aside from data provided by fish receivers, no other data was collected, for example size or detailed effort information (for example reef location or hours fished).
6. The fishery went for four (4) days resulting in 17.62 t of the 20 t TAC being caught. The daily black teatfish catches are summarised in Table 1 below.

**Table 1.** Summary of daily black teatfish catches during the opening 30 April – 3 May 2021

Fishing Day	Daily catch (kg)	Cumulative catch (kg)
30-Apr	4,016.62	4,016.62
1-May	4,905.24	8,921.86
2-May	1,722.52	10,644.38
3-May	6,971.08	<b>17,615.47</b>

7. The total catch across all sea cucumber species caught during the black teatfish opening was 20.34t, 86.6% of which was black teatfish (17.62t). A summary of the data collected during the black teatfish opening is provided in **Attachment A**.

### Industry experience of the black teatfish opening

- AFMA has invited a number of fishers and fish receivers that participated during the opening to attend part of the HCRAAG's inaugural meeting to discuss their experiences fishing for black teatfish. In the absence of logbook reporting in the sector, it will be especially valuable to get:
  - an insight into fishing operations to better understand and interpret the catch and effort data reported.
  - ground truth the results of the data analysis with industry members' experiences and observations during fishing operations
  - data collection and sampling strategies for future openings that are most likely to be successful
  - general industry feedback on the opening.
- Starting the industry engagement and consultation process now will ensure that management, monitoring and reporting measures for future openings are well considered, should the PZJA agree to allow fishing for black teatfish in 2022 and beyond.

### TAC rationale

- At its meeting on 21 February 2020, the Hand collectable Working Group (HCWG) considered very preliminary outcomes of the fishery independent sea cucumber dive survey conducted in November 2019 and January 2020 and recommended a trial reopening of the fishery for black teatfish, subject to a 15 tonnes TAC and daily reporting to AFMA (meeting record is at **Attachment C**). The PZJA's consideration in April 2020 of the HCWG's recommendation was delayed on TSRA's request to allow for a more complete CSIRO report on the stock status of black teatfish, and provide time for TSRA to consider options for filling the vacant position on the HCWG for a traditional inhabitant member for Maluialgal (inner western cluster).
- Members of the HCWG met again on 7 August 2020. Due to unexpected changes in the availability of some traditional inhabitant members, the quorum requirements for the meeting<sup>1</sup> were not met.

<sup>1</sup> PZJA Fisheries Management Paper No. 1. Management Advisory Committees, Scientific Advisory Committees, Working Groups and Resource Assessment Group.

5. To support members advice on possible arrangements for a black teatfish opening the following was presented:
  - a. Preliminary<sup>2</sup> outcomes of the fishery independent dive survey which included: i) recorded densities across locations and within habitats; ii) standing stock population estimates; iii) length distributions; and iv) a comparison of results with previous surveys; and
  - b. Preliminary population modelling together with estimates of standing stock biomass above the legal-size limit (generally known as the available biomass).
6. All members reaffirmed previous HCWG advice that based on all available information, the black teatfish stock is likely to be well above the biomass limit reference (a pre-requisite under the harvest strategy for reopening a species closed to fishing). Advice from members is detailed in the meeting record at **Attachment D** with advice on a recommended reopening TAC summarised below.
  - a. The two traditional inhabitant members, AFMA and one scientific member (also a co-investigator on the current stock survey project), recommended a re-opening TAC of 20 tonnes. This recommendation was also supported by the TSRA Fisheries Portfolio Board member who is a Permanent Observer on the HCWG;
  - b. The TSRA member recommended a reopening TAC of 21 tonnes; and
  - c. A Scientific Member and the QDAF member recommended a reopening TAC of 15 tonnes.
7. Having consider the advice of the HCWG, the PZJA agreed to an opening TAC of 20 tonnes on the basis that the preliminary modelling work undertaken by CSIRO, although preliminary, found that across all model versions and sensitivity tests, 20 tonnes was shown to be sustainable. Although 20 tonnes (or 20.8t) is the estimated Maximum Sustainable Yield (MSY) for the preferred model, the MSY estimate was considered conservative due to the inputs used in the preliminary model.
8. The default reopening TAC for black teatfish prescribed in the harvest strategy is 15 tonnes. AFMA considered there was sufficient basis to depart from this default setting. The new modelling, albeit preliminary, gave insight into the productivity of the stock and importantly how it might respond to different levels of fishing exploitation. The preliminary modelling used the newly collected survey data and reported catch data. For these reasons, AFMA considered 20 tonnes to be consistent with the Harvest Strategy requirement for the starting TAC to be demonstrably conservative.
9. In the absence of other data or analysis the application of generally assumed conservative harvest rates of standing stock biomass estimates for sea cucumbers has been used. The standing stock biomass estimate derived from the recent survey was 818 tonnes. If applied, the rule of thumb harvest control rule of harvesting 5% of the total biomass estimate (818t) would have resulted in a TAC recommendation of 41 tonnes. The preliminary modelling indicated that catches above 30 tonnes would not be sustainable and would lead to a decline in the biomass after the first year of fishing.

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<sup>2</sup> The results are still considered preliminary as the final report for the project is not due until December 2020 with further work on interpreting the results across the range of species surveyed to be undertaken.

**TORRES STRAIT HAND COLLECTABLES RESOURCE  
ASSESSMENT GROUP****Meeting No.1  
6-8 October 2021****Summary of Black teatfish opening catch data 30 April -3 May 2021**

1. The black teatfish trial opening lasted for four days, resulting in a total catch of 20.35t of sea cucumber, 86.46% of which was black teatfish (17.62t). A summary of all sea cucumber catches during the black teatfish opening is provided in Table 1.

**Table 1. Summary provides a summary of all sea cucumber catches during the opening 30 April – 3 May**

Species	Catch (wet, gutted) (kg)
Black Teatfish (Sea Cucumber)	17,615.47
Blackfish (Sea Cucumber)	224.46
Deepwater Blackfish (Sea Cucumber)	46.63
Lollyfish (Sea Cucumber)	21.67
Prickly redfish	1,962.98
Deepwater redfish	17.06
White Teatfish (Sea Cucumber)	460.48
<b>Total</b>	<b>20,348.73</b>

2. Apart from the third day, catches increased during the opening. Catches for 2 May were significantly low as many fishers and fish receivers observed the cultural and religious protocol of not working on Sunday (Sabbath). Table 1 provides a summary of daily black teatfish catches during the opening.
3. A total of 13 fish receivers reported black teatfish during the opening from five different locations (Mer, Erub, Ugar, Bourke and Dugong Islands). Bourke and Dugong Islands are uninhabited islands from which some fish receivers were permitted to operate during the black teatfish opening to help facilitate the daily catch landing and reporting requirements. One hundred and twenty-two (123) catch disposal record pages were submitted.
4. Of the 17.62 t of black teatfish caught, 56.5% (9.96t) was landed at Mer Island, 25.9% (4.56t) at Bourke Island and 13.7% (2.41t) at Erub Island.
5. 90.8% (16t) of the landed black teatfish catch was reported as being salted and 9.1% (1.61t) as live. For catch monitoring purposes, all reported catch was converted to wet gutted weight using the conversion ratios available for these processing methods.
6. The majority of the total catch (91.4%) was landed to eight (8) fish receivers, with over half of the catch (50.1%) landed to three (3) fish receivers.

***Effort information (number of fishers and area)***

7. Of the 123 CDR pages submitted for black teatfish 61% (75) also provided some voluntary effort information from the fishers on the number of fishers/crew per boat and/or the areas

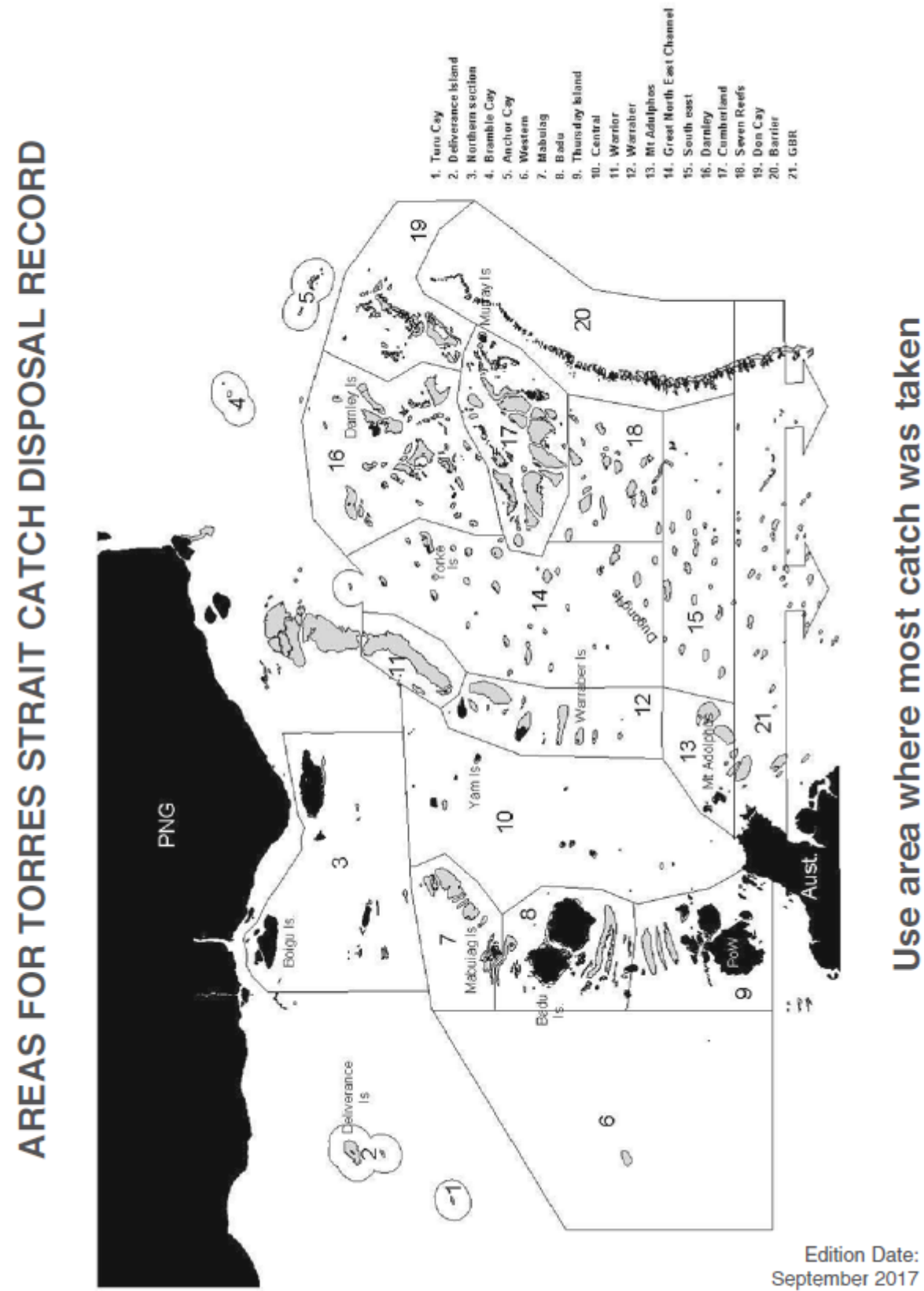
fished, covering 60.9% of the catch reported. Seventy eight percent (78.6%) of those that reported effort reported both number of fishers and areas fished, 20% reported number of fishers only and 1.7% reported areas fished only.

8. Fishers reported as having fished in areas 11 (Warrior), 14 (Great North East Channel), 16 (Darnley), 17 (Cumberland) and 19 (Don Cay). A map of the reporting areas used in the catch disposal record is provided in Figure 1.
9. A total of 41 fishing licences participated in the opening. Although the effort information is somewhat limited, AFMA estimates that an average of 50.5 fishers and crew participated in the opening per day, with 41 licenced fishers having landed catch. Fifteen licences landed 73.4% of the total catch with four (4) licences accounting for 40.4% of the total landed catch. It should be noted that individual licences or boats with high catch levels against them are for multiple boats that the fishers/fish receivers did not specify in the CDR page.
10. Based on the reporting and discussions with industry before and during the opening, AFMA believes that fishers mainly originated from the eastern and central region of the Torres Strait with some fishers travelling over from Mua Island (St Paul's), Bamaga (Northern Peninsula Area), Badu Island and Dauan Island.
11. In addition to the Islands mentioned at paragraph 10 above, some fishers were also based at Memey (Mimi Island) which is an uninhabited island on the eastern edge of central Torres Strait.

#### **Price information**

12. Some of the fishers/fish receivers and some of the buyers that AFMA has had the opportunity to talk to advised that black teatfish prices during the opening range from approximately AUD26 to approximately AUD 30 or potentially even AUD 40 depending on the quality and the level of processing. More accurate price information would assist the PZJA in getting a better understanding of the value of the fishery.

Figure 1. Map of areas for Torres Strait Catch Disposal Reporting (TDB02)





## Data analyses pertaining to the Black teatfish trial opening 30<sup>th</sup> April 2021

Nicole Murphy, Eva Plaganyi and Tim Skewes



### Catch data

A summary of the total catch per area and per day is shown in Table 1. Recorded weights have all been converted to standard units using the agreed conversion factors. The total Black teatfish catch was 17.4 tonnes and hence below the TAC (Total Allowable Catch) limit of 20t, confirming that the trial opening was successfully managed. Whereas the total catch amounts were reliably reported, the majority (55%) of the catch did not include details such as the area caught, which limits the usefulness of the data to support additional analyses related to the sustainability and productivity of the stock.

\*A slight dating error exists that has implication for the total catch for Black teatfish to date – a catch entry was entered for the 2<sup>nd</sup> of April due to a dating error on the CDR. This resulted in the record not being captured in the data extract for the opening period (30<sup>th</sup> April – 3<sup>rd</sup> May 2021). The record amount was 181.95kg and brings the total catch of Black teatfish to 17,615.47 kg.

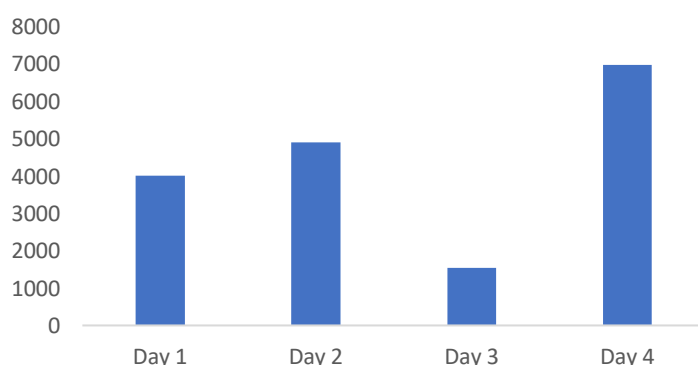
**Table 1. Sum of converted weight (kg) for catch taken for areas fished for each fishing day.**

Weight (kg)	Warrior	GNE Channel	Darnley	Cumberland	Don Cay	Blank*	Grand total
<b>April total</b>	-	<b>119.78</b>	<b>41.24</b>	<b>468.95</b>	<b>311.13</b>	<b>3257.46</b>	<b>4198.57</b>
30-Apr	-	119.78	41.24	468.95	311.13	3075.51	4016.62
<b>May total</b>	<b>50.95</b>	<b>208.33</b>	<b>1837.69</b>	<b>4634.13</b>	<b>145.56</b>	<b>6358.28</b>	<b>13234.94</b>
1-May	-	141.19	551.31	1392.45	-	2820.29	4905.24
2-May	-	67.15	276.20	1030.81	-	166.42	1540.57
3-May	50.95	-	1010.19	2210.87	145.56	3553.51	6971.08
<b>Grand total</b>	<b>50.95</b>	<b>328.12</b>	<b>1878.94</b>	<b>5103.08</b>	<b>456.69</b>	<b>9615.74</b>	<b>17433.51</b>

\*Blank – (issue): Fished area left blank in reporting

### Catch per day

The largest catch was taken on day 4 and the least on day 3 (Figure 1).



**Figure 1. Total catch (converted weight - kg).**

The temporal pattern in catches as shown in Table 2 and Figure 2 suggest the following:

- No evidence of stockpiling
- No evidence of declining catch after a few days, which would indicate depletion
- Low catch on day 3 due to falling on the Sabbath
- Cumulative catches tracked and adhered to management cap
- Number of fishers participating controlled eg. Good organisation

### *Area fished*

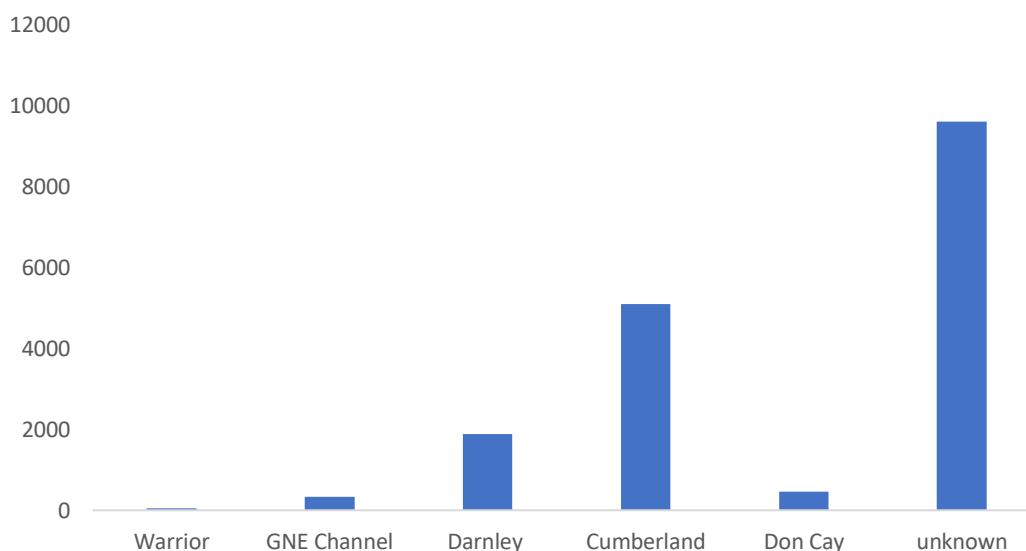
**Table 2. Total sum of converted weight (kg) for catch taken for areas fished for each fishing day.**

Day	Warrior	GNE Channel	Darnley	Cumberland	Don Cay	Unknown area
<b>1</b>	-	119.8	41.2	468.9	311.1	3075.5
<b>2</b>	-	141.2	551.3	1392.5	-	2820.3
<b>3</b>	-	67.1	276.2	1030.8	-	166.4
<b>4</b>	50.9	-	1010.2	2210.9	145.6	3553.5

Largest catch taken from 'unknown' area recorded in catch data (Figure 2).

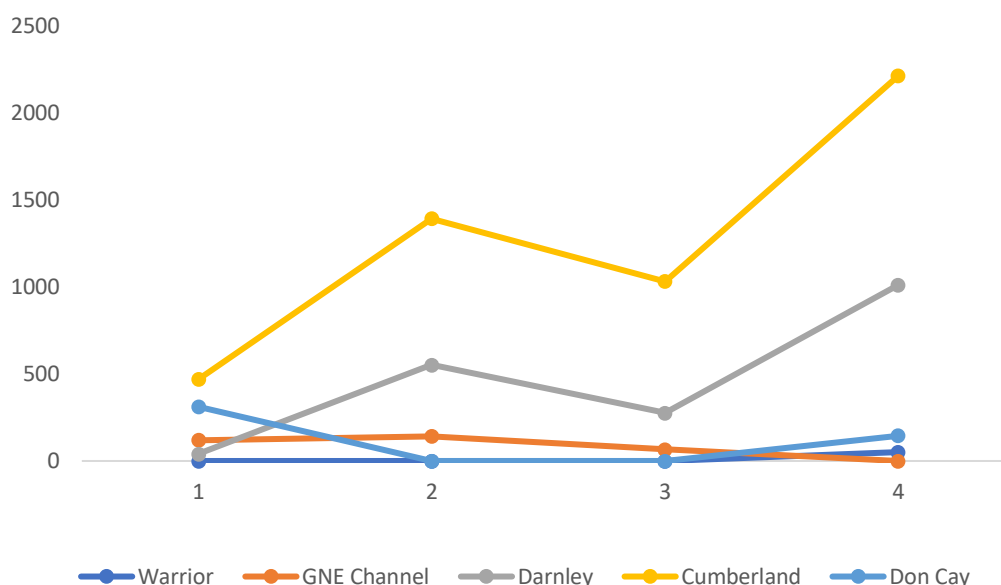
It is important to improve communication for future fishing around the need to record location, as this limits the usefulness of the data.

Information as to why Warrior Reef was only fished on day 4 – or whether this is the only day for which area was recorded – would also help scientific understanding of the information content of the data.



**Figure 2. Total catch (converted weight - kg) for fishing areas.**

Most of the fishing effort was in the areas of Darnley and Cumberland (Figure 3).



**Figure 3. Total catch (converted weight - kg) for areas fished for each fishing day.**

Fishing effort for the trial opening was focused on two zones – these were Don Cay and Seven Reefs. These were not the highest density zones from the survey.

\*Travelling and processor location likely played a role in areas fished

#### *BDM Survey 2019/20*

The zone with highest average densities were found in the Barrier and Don Cay zones, which is consistent with earlier surveys, and is consistent with surveys in other regions (e.g. GBR has highest population density in outer shelf and barrier reef (Benzie and Uthicke, 2003; Knuckey and Koopman, 2016).

Cumberland zone density in 2019/20 was lower than in 2009 but still higher than historic surveys, and Seven reefs had the highest density since surveys have been undertaken.

Darnley has the lowest density ever observed (though never a high-density zone in any year) and no Black teatfish were observed at the Great North East Channel zone (Figure 4 - Murphy et al., 2021).

#### *Survey vs Catch*

Survey estimates of biomass and catch comparison for areas fished showed no indication of stock depletion (Figure 5).

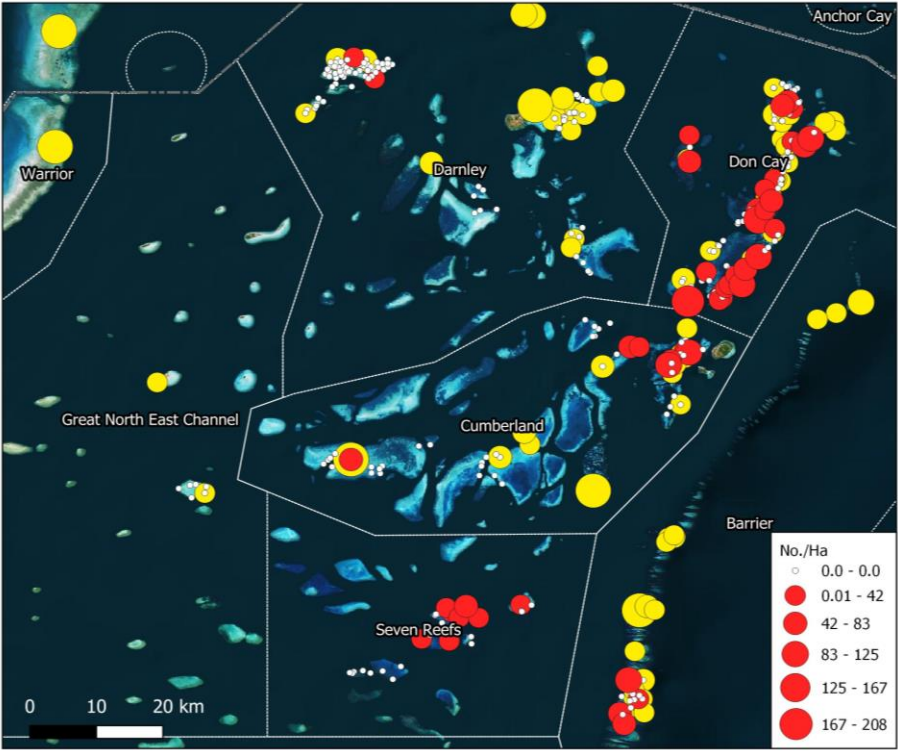


Figure 4. Density of Black teatfish (*H. whitmaei*) at individual survey sites during surveys in East Torres Strait from 1995 to 2009 (yellow) and 2019 (red).

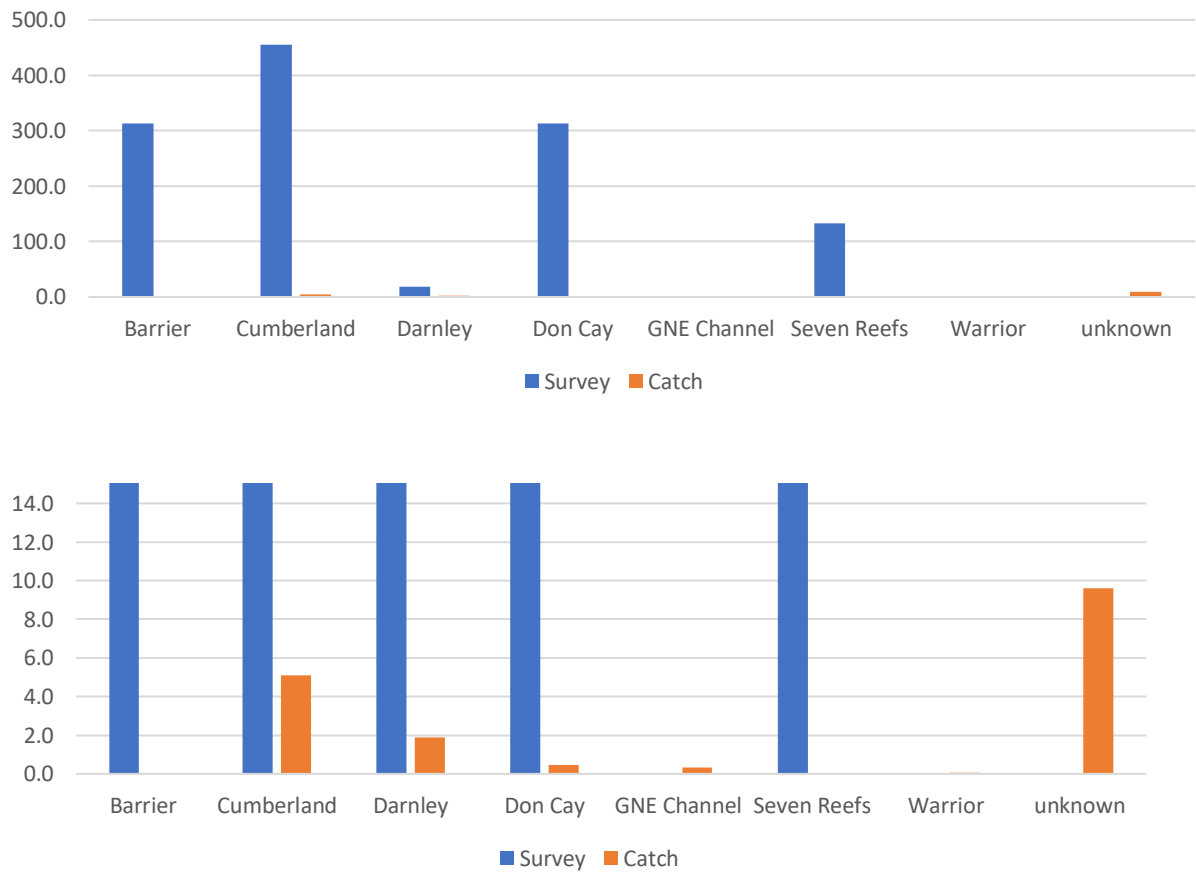
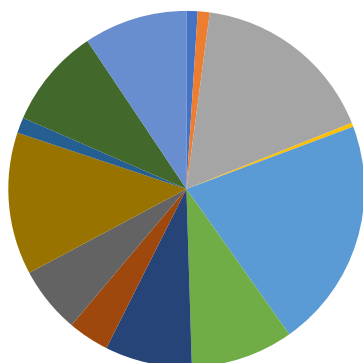


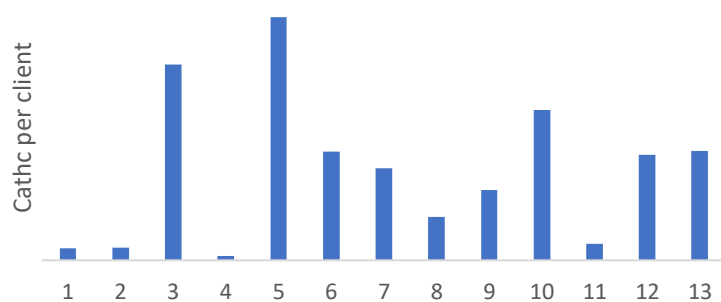
Figure 5. Survey estimates (tonne) and catch (converted weight - kg: converted to tonne) for areas fished.

### *Catch landed at fish receivers*

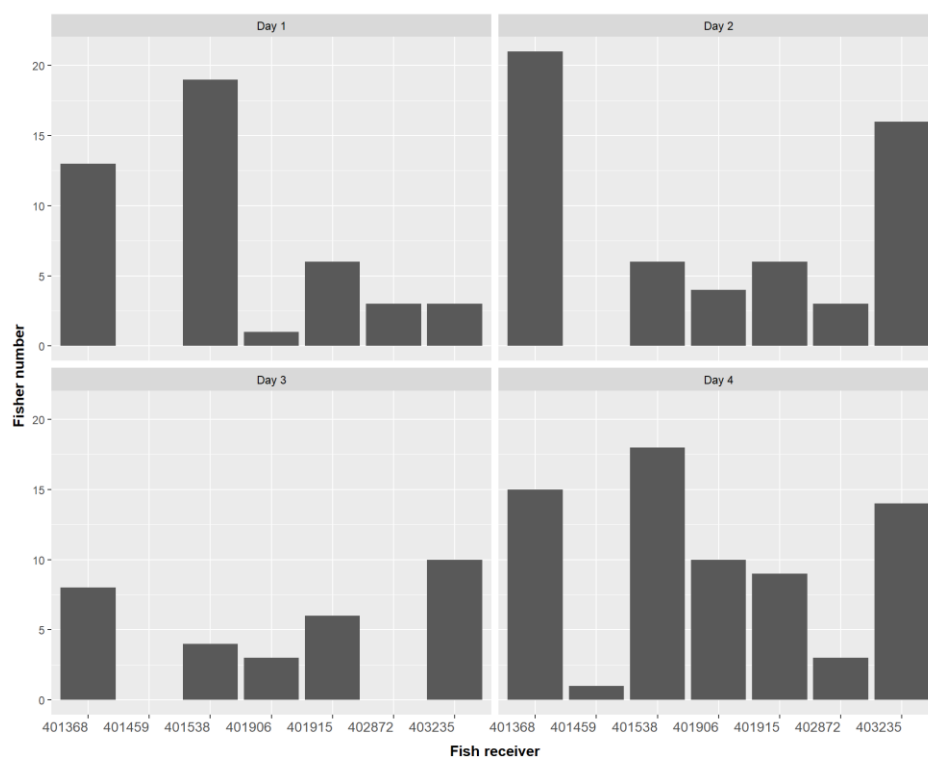
There was a fairly good spread of the catch amongst fish receivers, although three fish receivers landed ~half catch between them (Figure 6, Figure 7 and Figure 8).



**Figure 6. Distribution of total catch (converted weight – kg) landed at fish receiver across for all days.**



**Figure 7. Total catch (converted weight – kg) landed at each fish receiver across all fishing days.**



**Figure 8. Sum of fisher numbers landing to fish receivers across days fished.**

### *Catch landed at fish receivers*

Catch landed to fish receivers across days fished, was fairly constant (Figure 9).

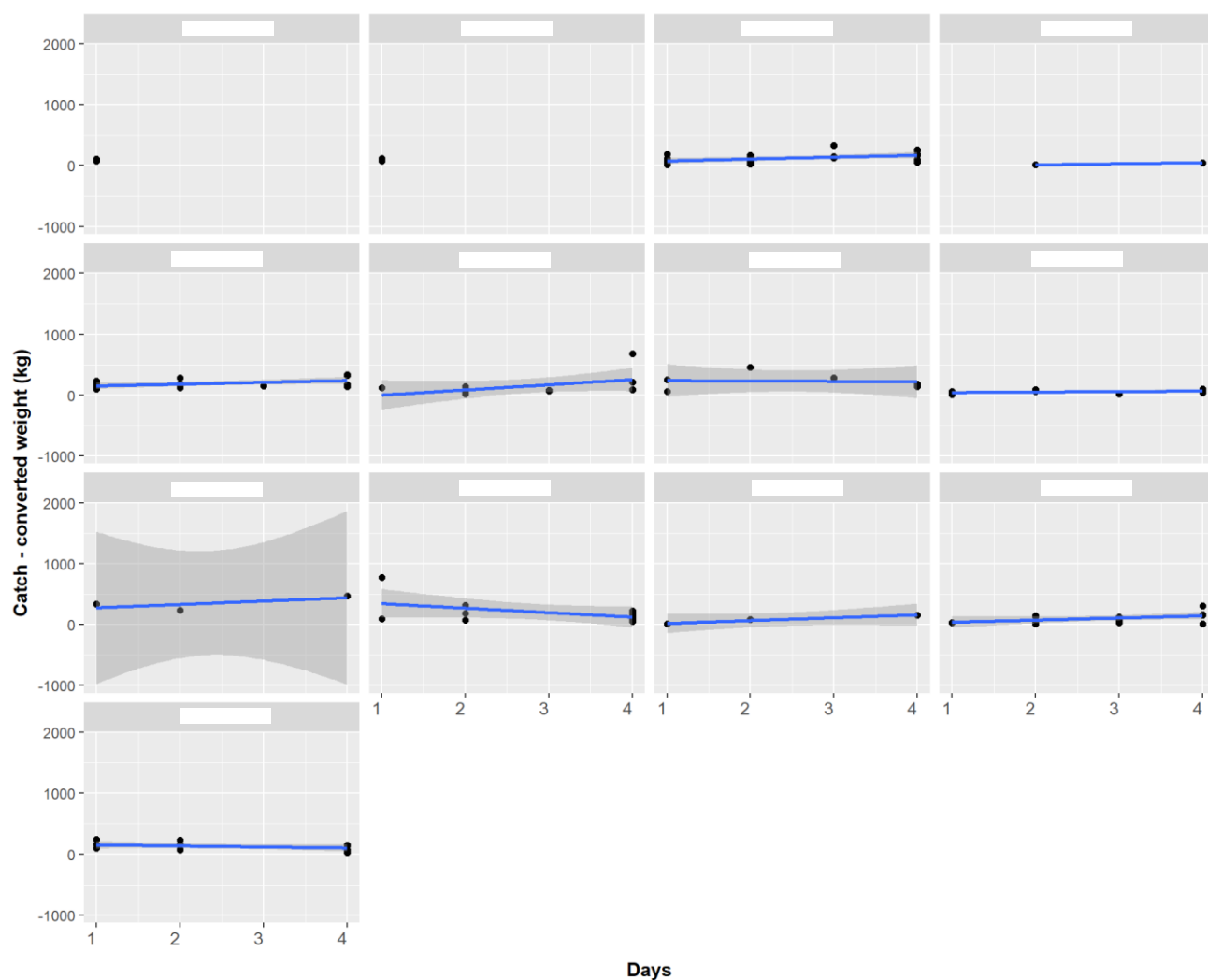


Figure 9. Catch (converted weight - kg) landed at fish receivers across days fished.



Most fish receivers had two or four fishers landing catch (from a vessel), with one receiver having six fishers (Figure 10).

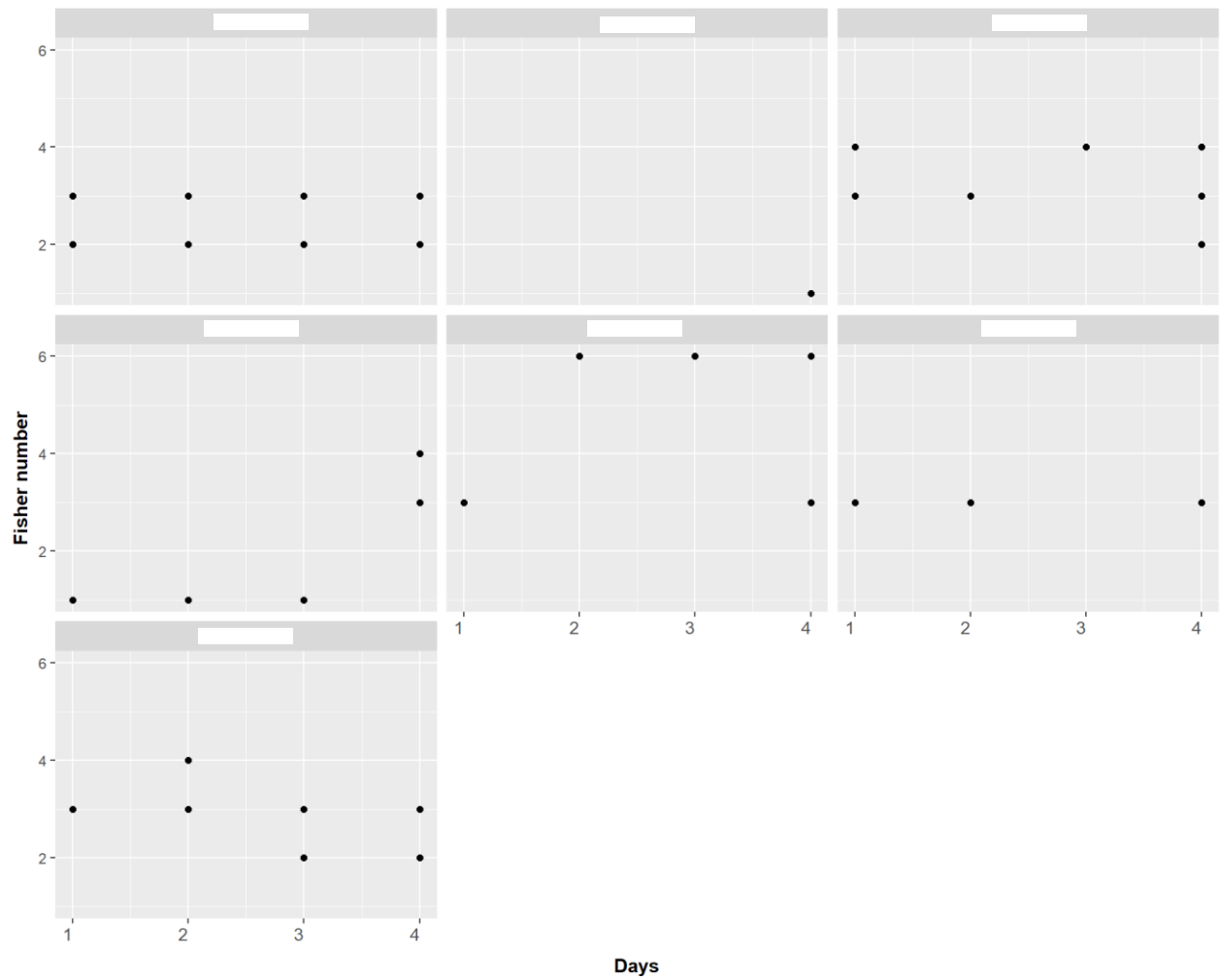


Figure 10. Number of fishers landing catch to each fish receiver across days fished.

### Cumulative catch

The area noted 'blank' in catch records showed consistent catch effort over days fished, with Cumberland also fished consistently (Figure 11).

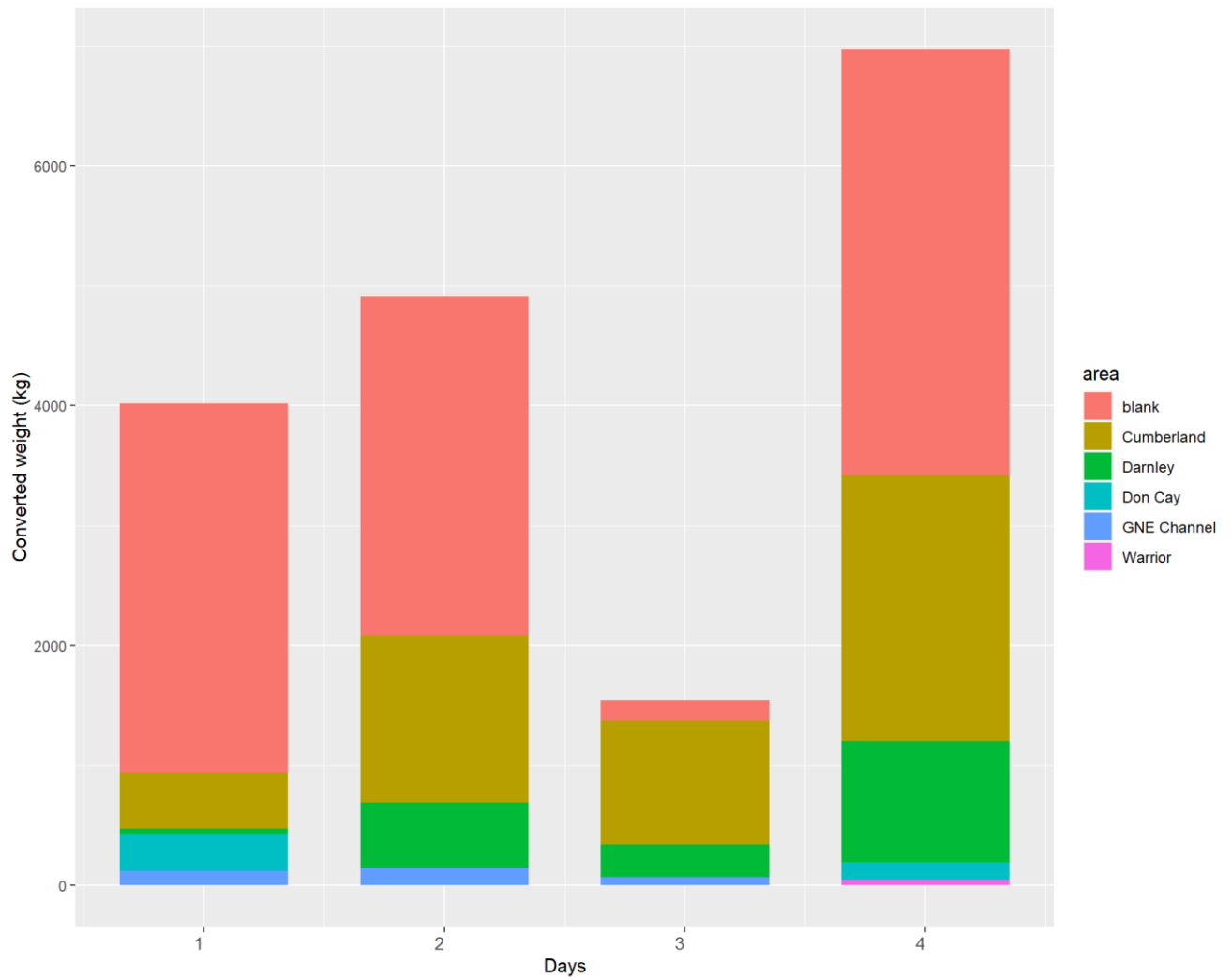
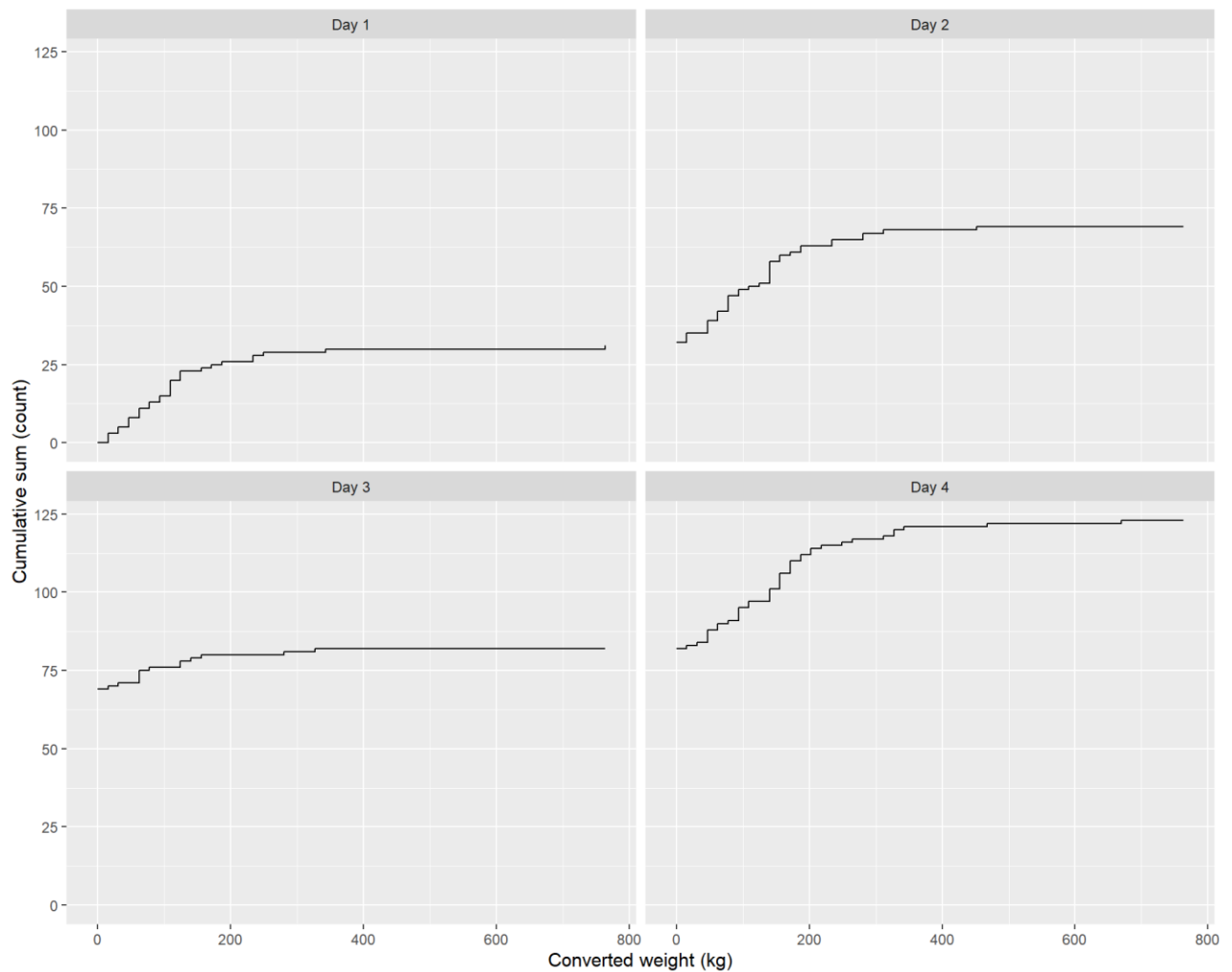


Figure 11. Cumulative catch (converted weight – kg) across fishing areas for days fished.

More catch was taken on day four, with more fishing effort (number of fishers involved), however this catch was taken in a similar time to day two (second highest fishing effort) and shows no declining catch rates in stock fished (Figure 12).



**Figure 12. Cumulative catch (converted weight – kg) for days fished.**

### Standardised catch

(number of fishers per catch)

No trends or local depletion was seen for catch and areas fished. The high variance for the Great North East Channel results from the area not being fished on day 4 (Figure 13).

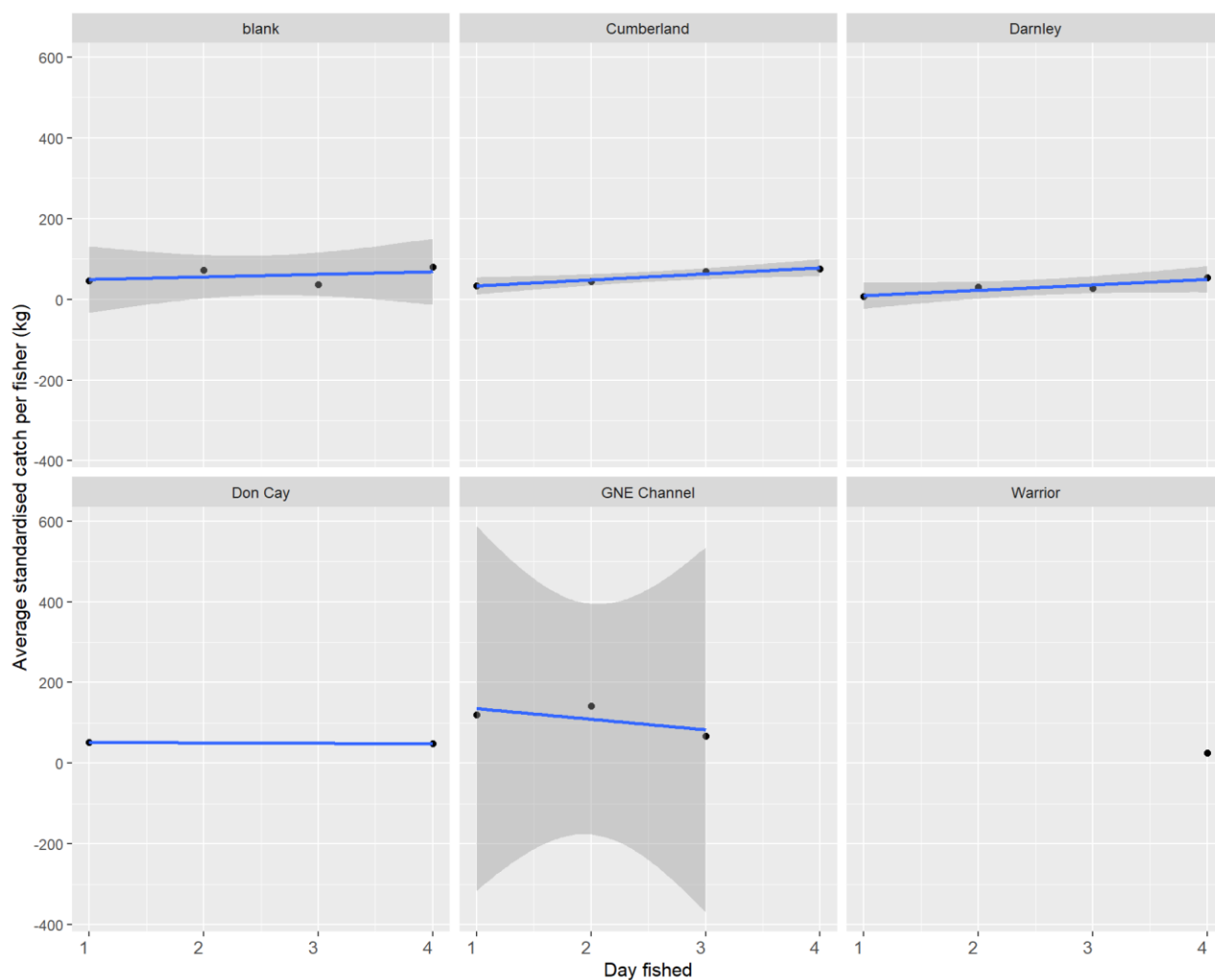
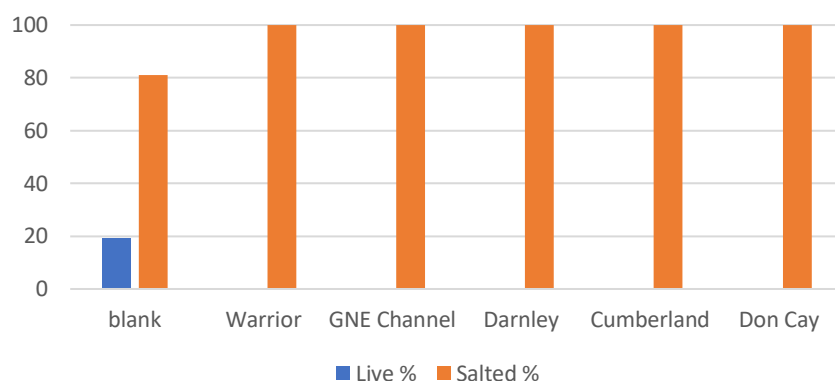


Figure 13. Average standardised catch per area (converted weight - kg) for fished areas across days fished.

The majority of product landed at fish receivers was salted, with ~20% live landed for one category (no area) only (Figure 14).

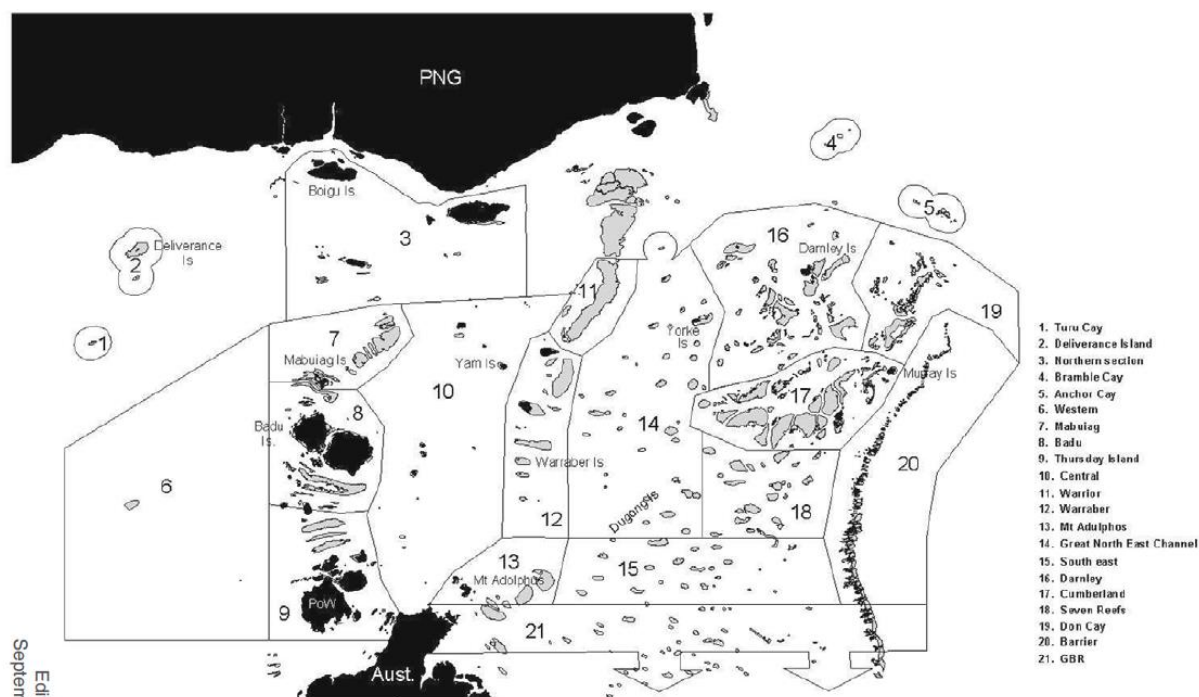


**Figure 14. Percent product form of catch landed at fish receivers, also showing area fished.**

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## AREAS FOR TORRES STRAIT CATCH DISPOSAL RECORD



Use area where most catch was taken

Edition Date:  
September 2017



Australian Government

Australian Fisheries Management Authority

## **16<sup>th</sup> Meeting of the Torres Strait Hand Collectables Working Group**

**21 Feb 2020, Thursday Island**

### **Meeting Record**

Note all meeting papers and minutes  
are available on the PZJA webpage:

[www.pzja.gov.au](http://www.pzja.gov.au)



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# 1 Preliminaries

## 1.1 Acknowledgement of Traditional Owners, welcome and apologies

1. Sereako Stephen opened the meeting in prayer around 9:00 am.
2. The Chair welcomed attendees to the 16th meeting of the Torres Strait Hand Collectables Working Group (HCWG 16) at the Torres Strait Regional Authority (TSRA) Board Room on Thursday Island. The Chair acknowledged the Traditional Owners of the land on which the meeting was held and paid respect to Elders past, present and future.
3. The Chair further acknowledged the role of the HCWG under the PZJA Fisheries Management Paper 1 and reminded members of Working Group of their responsibilities and respectful nature in which to abide by during the two days of meeting.
4. The Chair thanked the TSRA and Traditional Inhabitants for supporting the cultural awareness training held the day before the HCWG meeting. In speaking with other members following the training, the Chair reported that members found the training extremely helpful in building insight into the local culture and the experiences of Torres Strait Islander people. This was considered invaluable in better understanding the aspirations and values of Torres Strait Islander people and how they might relate to fisheries. The Chair thanked all members for their willingness to share their personal advice and experiences
5. Attendees at the Working Group are detailed in **Table 1** below.

**Table 1. List of attendees at the HCWG15.**

Members	
Anne Clarke	Chair
Tim Skewes	Scientific member
Michael Passi	Traditional Inhabitant member, Kemer Kemer Meriam
Maluwap Nona	Traditional Inhabitant member, Gudumalulgal
Frank Loban	Traditional Inhabitant member, Maluialgal
Patrick Bonner*	Traditional Inhabitant member, Kulkalgal
Tony Salam	Traditional inhabitant member, Kaiwalagal
Selina Stoute	Australian Fisheries Management Authority (AFMA) member
Mark Anderson	Torres Strait Regional Authority (TSRA) member
Danait Ghebregabhier	HCWG Executive Officer, AFMA
Casual Observers	
Sereako Stephen	Malu Lamar (torres Strait Islanders) Corporation RNTBC
Keith Brightman	TSRA
Kalya Yamashita	AFMA
Lyndon Peddell**	AFMA, Compliance

\* Mr Bonner left the meeting at 0930 and did not return.

\*\* In attendance for agenda items 1,2, 5 and 6.

6. Apologies received are detailed in the **Table 2** below.

**Table 2. List of apologies for HCWG15.**

Apologies	
Steve Purcell	Scientific Member
Yen Loban	TSRA Fisheries Portfolio Board Member
Ian Liviko	PNG National Fisheries Authority (NFA) Invited Participant
Danielle Stewart	Queensland Department of Agriculture and Fisheries (QDAF) member

## 1.2 Adoption of agenda

7. The Working Group accepted AFMA's recommendation to discuss agenda item 4 before item 3 and adopted the agenda.
8. The Working Group agreed to break for lunch early noting the Malu lamar representative had a short commitment outside the meeting at 1130. The Working Group wanted to ensure the Malu Lamar representative was included in all business.

## 1.3 Declarations of interest

9. The Chair advised members and observers, that as provided in PZJA Fisheries Management Paper No. 1 (FMP1), all members of the Working Group must declare all real or potential conflicts of interest in Torres Strait TRL Fishery at the commencement of the meeting. Where it is determined that a direct conflict of interest exists, the Working Group may allow the member to continue to participate in the discussions relating to the matter but may also determine that, having made their contribution to the discussions, the member should retire from the meeting for the remainder of the discussions on that issue.
10. Declarations of interests were provided by each meeting participant. These are detailed in the **Table 3** below.
11. The Working Group followed a process whereby each group of members with similar interests were asked to leave the room to enable the remaining members to:
  - a) Freely comment on the declared interests;
  - b) Discuss if the interests precluded the members from participating in any discussions; and
  - c) Agree on any actions to manage declared conflicts of interests (e.g. the member may be allowed to participate in the discussions relating to the matter but not in the formulation of final advice).
12. The scientific member was also asked to leave the room. The AFMA member noted by way of example, that when discussing potential research projects (for example under agenda item 7 on providing advice on research pre-proposals) scientific members may have real or perceived conflicts of interest. However it is their relevant expertise in fisheries research relevant to the fishery that is highly valued in the development of Working Group advice. Having regard for the declarations made by the Scientific Member and the importance of having relevant scientific expertise, it was agreed that the scientific member be permitted to participate in discussions under all agenda items and the formulation of Working Group recommendations.
13. Those members and observers holding a fishing licence, including the TSRA officers were asked to leave the room. The remaining members agreed that although the excused members may have real or perceived conflicts of interest, their expertise is critical in the development of advice that impacts industries and traditional inhabitants more generally. It was also noted that potential conflicts can arise when specific members or communities from which the members are from are

likely to benefit directly from particular management decisions. In these situations members must be sure to consider the fishery as a whole rather than one particular operator or community over the other. Noting the importance of having traditional inhabitant industry advice and reminding members to act in the best interest of the Fishery at all times, it was agreed that the excused members be permitted to participate in discussions under all agenda items in the formulation of Working Group recommendations.

14. Government members were asked to leave the room. The remaining members noted that TSRA hold a BDM licence in trust on behalf of Traditional Inhabitants but considered the potential risk for a perceived of real conflict of interest to be manageable within the meeting and again recognised the importance of having TSRA contribute to the meeting discussions and advice.

**Table 3. Declared interests from each attendee.**

Name	Position	Declaration of interest
Anne Clarke	Chair	Board member of the Wet Tropics Management Authority Previously contracted with Regional Development Australia Far North Queensland and Torres Strait No pecuniary interests or otherwise.
Tim Skewes	Scientific Member	CSIRO/Independent Consultant. Previous principal scientist for Torres Strait Scientific Advisory Committee (TSSAC) project to develop a harvest strategy for the TSBDMF. Previous CSIRO researcher for TSSAC project investigating traditional take of finfish in Torres Strait.
Michael Passi	Traditional Inhabitant Member, Kemer Kemer Meriam	TIB licence holder. Has been a member of HCWG for the last 6 years. Has interest in the BDM, Trochus and Pearl Shell Fisheries.
Maluwap Nona	Traditional Inhabitant Member, Gudumalulgal	TIB licence holder, Chairperson of Malu Lamar, Traditional Inhabitant member on TSSAC
Frank Loban	Traditional Inhabitant Member, Maluialgal	TIB licence holder; Traditional Inhabitant Member on TSSAC and Finfish Working Group.
Patrick Bonner	Traditional Inhabitant member, Kulkalgal	Kulkalgal representative, Chair of Mura Porumalgal Fisheries Coproation
Tony Salam	Traditional inhabitant member, Kaiwalagal	TIB licence holder covering all fisheries. Member for kaiwalagal.
Selina Stoute	AFMA Member	Employed by AFMA, no pecuniary interests or otherwise
Mark Anderson	TSRA Member	Employed by TSRA, no pecuniary interests as an individual, TSRA holds fishing licences on behalf of traditional inhabitants.
Danait Ghebregabhier	Executive Officer HCWG (AFMA)	Employed by AFMA, no pecuniary interests or otherwise
Sereako Stephen	Casual Observer	TIB licence holder, Director of Malu Lamar and GBK, Chair of the Ugar RNTBC.

Name	Position	Declaration of interest
Keith Brightman	Casual Observer	Employed by TSRA, no pecuniary interests or otherwise
Kayla Yamashita	Casual Observer	Employed by AFMA, no pecuniary interests or otherwise
Lyndon Peddell	Casual Observer	Employed by AFMA, no pecuniary interests or otherwise

## 1.4 Action items from HCWG15 and previous meetings

15. The Working Group noted the report provided by the Executive Officer on the progress against actions arising from previous meetings, including those that are now complete (Table 4) and noted the following additional comments in relation to some of the action items:

- a. Action Item 4 – As detailed in the agenda paper, while a formal MOU has not been developed AFMA has worked directly with fishers to make significant improvements in reporting. AFMA recommended that this process continue and the action item be removed. AFMA however advised that it remained opened to suggestions from Malu Lamar and stakeholders more generally on improved processes. The TSRA Member advised that TSRA was working with Malu Lamar to agree a service level MOU. The details of the MOU were yet to be worked through however there may be scope to include programs aimed at improving reporting. The Malu Lamar Chairperson expressed preference to maintain the development of the MOU to ensure it remains an option if needed. Having regard for views tabled the Working Group agreed for the following action:

**Action item 1.1** - Malu Lamar to make recommendations to AFMA and TSRA on an as needs basis to establish an MOU to assist in improved data collection in the Fishery.

- b. Action Item 5 – While Mr Frank Loban has expressed interest in presenting at a scientific conference, he called upon the other more senior members of the Working Group to also attend and present. Mr Michael Passi, Mr Simon Naawi and Mr Maluwap Nona to be put forward to the CSIRO and the TSRA as nominees for the opportunity to attend and present on the BDM Harvest Strategy at upcoming scientific conferences. This is in recognition of their extensive effort in the development of the Harvest Strategy and the level of goodwill placed upon them by their respective communities. The Working Group noted that this is a very exciting opportunity to share the work that has happened in the BDM Fishery to date.
- c. Action item 9 – PZJA Traditional Inhabitants could not attend the last Queensland Sea Cucumber Fishery Working Group meeting due to confidentiality considerations of the agenda items being discussed. However they are supportive of HCWG Traditional Inhabitants attending their future meetings. The status update for the action item will be revised to reflect this sentiment.

16. The Working Group noted the final meeting record for HCWG 15, which was finalised out of session and published on 16 September 2019.

## 1.5 Out of session correspondence

17. The Working Group noted the correspondence circulated out of session since HCWG15 held on 1-2 August 2019.

## 2 Working Group Updates

### 2.1 Industry member update

18. The Working Group noted updates provided by Traditional Inhabitant industry members and observers on the recent performance and strategic issues relating to hand collectable fisheries, including economic trends, affecting the management and development of these fisheries.
19. Traditional Inhabitant members of the PZJA advisory committees recently led community and industry consultations, organised by the TSRA and supported by AFMA, to report on activities related to the PZJA fisheries over the last 12 months and seek input on key issues for the management of the fisheries in the Torres Strait. With regards to the BDM Fishery, Traditional Inhabitant members sought industry and community feedback on the proposed black teatfish trial opening, and the current prohibition on hookah. The key discussions points, feedback and recommendations relevant to the HCWG from the consultations are provided at **Attachment B**.
20. In addition to the attached consultation summary, Traditional Inhabitant members on the HCWG provided the following updates on their respective cluster consultations, strategic issues affecting the management and development of Torres Strait Fisheries and on-water industry updates.
21. The Traditional Inhabitant member for Gudumalulgal led the consultation at Gudumalulgal on 21-14 October 2019 and Kaiwalagal (on behalf of the Traditional Inhabitant member for that cluster) on 21 January 2020 and added that:
- The implementation of the new BDM HS was discussed at the community level and reiterated its value as a tool that will ensure the sustainable management of the resource to build intergenerational wealth.
  - Issues relating to the Tropical Rock Lobster and Finfish (re the impacts of the western line closure on the Saibai and Duan communities) Fisheries were also touched on.
  - It was recognised that the use of hookah is an issue for the Eastern Nations and would need to be undertaken under Meriam protocols, if the hookah prohibition is removed.
  - Fishing has been ok and efforts are being made to encourage other TIB operators to actively participate in the fishery.
  - Operators are facing safety risks by traveling long distances with large loads of product and salt or free diving up to 20m for more catch, sometimes in inclement weather. Permitting access to deep water BDM species closer to home (i.e. white teatfish) would alleviate this safety risk and take pressure off the shallow water fishing grounds.
  - There is concern that reef walkers may not be adhering to the minimum size limits and may be depleting local resources.
  - Reiterated that even within nations one community cannot speak for another with regards to the use of hookah. Harvest for white teatfish using hookah should be permitted on a trial basis to create better income opportunities and as a safer option to how operators are currently fishing for white teatfish in deep waters.
22. The Traditional Inhabitant member for Kemer Kemer Meriam added that:
- The Chinese ban on the live seafood import due to the Coronavirus outbreak has affected the Tropical Rock Lobster industry but not the export of BDM to the Asian market.



- Curryfish catches dropped significantly in the 2019 fishing season as operators on Erub and Masig Islands have been focused on live TRL but efforts may now shift back to sea cucumbers given the Coronavirus impacts.
- There was general lack of support from Ugar for the use of hookah due to sustainability concerns, however, not all on Ugar are opposed the use of hookah.
- Erub supported the recommendations from Mer to use hookah for harvesting white teatfish.
- Industry is pursuing the establishment of processing facilities on Mer.
- It was good to have an AFMA Compliance officer attend the cluster visit and assist with talking to operators about permits and also the catch disposal system to encourage improvement on data collection.

23. The Traditional Inhabitant member for Kemer Kemer Meriam read the summary of consultations for the Kulkalgal cluster on behalf of the Traditional Inhabitant member for that cluster. The Traditional Inhabitant member noted that a lot of the TIB operators' opposition to hookah for white teatfish may also be due to lack of understanding as most fishers on Masig and Poruma Islands have never fished for white teatfish. White teatfish fishing occurs mostly off Mer Island
24. The Traditional Inhabitant member for Kaiwalagal provided the industry update below and deferred to the Traditional Inhabitant member for Gudumalulgal for the update on the cluster consultation as he did not attend the meeting:
- Coronavirus has affected TRL business. It is a nature of fishing and industry need to weather through it but are positive that the BDM market is still active.
  - He is currently familiarising himself with the ecological and business aspects of the BDM industry with a view to redirecting his effort into the industry, noting that it is currently harder and riskier to target high value BDM species.
25. The Traditional Inhabitant member for Gudumalulgal noted that the interest of operators in this cluster is mainly on TRL due to their distance from the BDM fishing grounds. While willing to listen to BDM and finfish related matters, they indicated they would take advice on the use of hookah from those that actively target the resource.
26. The Traditional Inhabitant member for Maluialgal advised the Working Group that he can only speak on behalf of the fishers that live in his region and not those that live away from the region. He drew the Working Group's attention to the cluster summaries provided, adding that the majority are TRL operators and the eastern grounds are too far away from them to fish. Nevertheless, they were supportive of improved reporting and timely provision of the data to AFMA to inform management.

## 2.2 Scientific member update

27. The Scientific member advised that he was involved in the stock survey in late 2019 and early 2020 for which he will be presenting the preliminary results under Agenda Item 4. A survey of Warrior Reef was initially included in the project. However, the scientific member was informed during the first leg of the survey that he had been banned from Warrior Reef by Malu Lamar due to a complaint from an Iama Island Traditional Owner regarding an incident that occurred in 2012 – though no formal advice on the grounds for the exclusion has been provided. As it was too late to find a replacement, and given the uncertainty regards the safety of the survey team, the Warrior Reef survey leg was cancelled. The scientific member sought clarity from Working Group members whether they objected to him presenting those results given he was excluded from Warrior Reef.

28. The Traditional Inhabitant member for Gudumalulgal, in his capacity as the Chair of Malu Lamar, advised the Working Group that specific details about the previous incident was not provided when Malu Lamar was called upon to ban the Scientific member from undertaking the Warrior Reef BdM survey. The Chair of Malu Lamar stated the organisation had acted on behalf of the people whose interests it represents to exclude the Scientific Member from the said area to avoid the issue escalating. Malu Lamar is of the view that the issue needs to be resolved by the research team and the CSIRO, AFMA, the Chair of Magani Lagaugal and the relevant individuals from Tudualgal that made the complaint and provide advice back to the Malu Lamar Board. The Malu Lamar Chair and the Malu Lamar Board member Mr Sereako Stephen offered to assist with the resolution of this matter.
29. The AFMA member acknowledged Malu Lamar's position on the matter and commented that it was unfortunate that the Traditional Owner's complaint came in very late and did not provide formal advice on the allegations so that AFMA could better understand the nature of the concerns held by Traditional Owners and as far as possible have them addressed. In the absence of having these concerns raised in detail and in a timely and formal fashion with it, AFMA had no basis on which to formally substantiate and/or investigate the concerns. Having respect for the views of the traditional owners of Iama and Tudu and noting potential safety risks, AFMA and TSRA agreed at the time to discontinue the Sandfish component of the survey. It would not have been appropriate to run the survey with a different group of scientists. CSIRO was commissioned to undertake the research based on an evaluation of their proposal and importantly their demonstrated expertise to deliver such a project. In the absence of formal advice to substantiate the claims, AFMA fully supports the Scientific member and the project team.
30. The concern raised by Traditional Owners was not anticipated by any of the agencies involved as there had been long standing support provided by stakeholders through the HCWG for this research to be undertaken. The HCWG and TSSAC still strongly supported the project proposal. It was noted that specific to the current research project and prior to the project being funded, comment on the funding proposal was sought from every PBC Chair and relevant fisher association and no concerns or complaints were raised through that consultation process. Concerns were also not raised by traditional owners who attended the PZJA traditional inhabitant member cluster consultation held on Iama on 6 November 2019.
31. The Malu Lamar Chair further commented that matters such as this place Malu Lamar in a difficult position when representing people that operate under two laws and given the angst that still exists amongst individuals regarding past events. He agreed that there needs to be a mechanism and process in place to identify, address and resolve such issues in the future in a timely manner and suggested that a Memorandum of Understanding would provide the framework through which such situations can be mitigated and resolved in the future.
32. The TSRA member reiterated that the TSRA, as the funding body of that project, undertook all formal recognitions and notifications on the scientific activity to communities and relevant bodies. From a process perspective it is very difficult and disempowering to the HCWG for the project to be impacted given the process that was gone through to put the project up on, what seems to be, the view of one individual.
33. Some Traditional Inhabitant members on the Working Group commented that they had not been aware of the issue but understood the need to discontinue the Sandfish component of the

survey due to safety concerns. Following this discussion, the Working Group welcomed the Scientific Member to continue presenting the preliminary survey results.

34. The Chair reiterated that such complaints need to be formalised in writing in a timely fashion in the future as a matter of proper procedure.

## 2.3 Government updates

### 2.3.1 AFMA update

35. The Working Group noted the update provided by the AFMA member regarding management issues relevant to Torres Strait hand collectable fisheries as detailed in the Agenda paper, in particular:

- a. The BDM Harvest strategy was adopted by the PZJA at their meeting on 19 November 2019, and came into effect on 1 January 2020 in time for the start of the 2020 fishing season. New TACs for individual and basket species and the conversion ratios were implemented through licence conditions but the old minimum size limits are still in place pending the review of the Fisheries Management Instrument 15 which is currently underway and due to be completed in time for the 2021 fishing season.
- b. The implications for listing commercially fished beche-de-mer species on Appendix II of CITES;
  - i. The species may still be traded internationally provided the trade, or a specified level of trade, has been determined to be non-detrimental to the survival of the species in the wild.
  - ii. The Department of Agriculture, Water and Environment (formerly the Department of Environment and Energy) is responsible for assessing the sustainability of international trade in Australian species listed on Appendix II and undertakes this assessment based on the information provided to it by the exporting proponent.
  - iii. The Commonwealth (AFMA), Queensland, Northern Territory and Western Australia have agreed to support a national approach being funded by the Queensland Sea Cucumber Industry Association (the Association) in seeking a non-detriment finding (NDF) for both black teatfish and white teatfish. Fishwell Consulting has been engaged by the Association to collate all required information for the DoEE's consideration of a non-detriment finding which must be submitted to the Department by early April 2020. AFMA will support the process for the Torres Strait and Coral Sea fisheries.
  - iv. Once the take for trade is considered to be sustainable (i.e. a non-detriment finding is approved), trade is generally regulated through permits authorising export of the specimen and exporters will require a permit from the DOEE.

36. The Working Group also noted a range of other AFMA updates relating to:

- a. the latest Fishery Status Reports from the Australian Bureau of Agriculture and Resource Economics (ABARES) were released in September 2019. All BDM species are classified as not being subject to overfishing, with Sandfish being the only species in the Torres Strait that continues to be classified as overfished. The fishing mortality and stock status for two species taken in 2018 remains uncertain mainly due to the lack of more recent survey data
- b. updates on the progression of legislative amendments to the *Torres Strait Fisheries Act 1984* and *Torres Strait Fisheries Regulations 1985*; and

### 2.3.2 AFMA Compliance update

37. A verbal compliance update was provided by the AFMA Fisheries Officer Mr Lyndon Peddell as follows:

- Current staffing is three Fisheries compliance officers on Thursday Island with further operational support provided from other AFMA officers.
- Adherence with reporting requirements has generally been good. Officers continue to detect and report noncompliance, in most cases these matters have been dealt with through education.
- AFMA has two matters before CDPP for consideration.
- AFMA undertook at sea and aerial surveillance in partnership with Queensland Police based on specific intelligence received on addressing Tropical Rock Lobster stockpiling in the lead up to the TRL fishery opening. Compliance was good and no stockpiling was detected.
- At sea patrols have been conducted with focus on enforcing the hookah closure.
- AFMA is also working with Border Force to utilise their platforms to undertake on-water patrols and surveillance.
- Fisheries Officers have attended some community engagement visits alongside TSRA and Fisheries Management Officers and further assisted community members with compliance related matters.
- Foreign – incursions have been low in the TSPZ, some activity has been detected in the north and Deliverance island areas. No apprehensions have been made but some activities were observed in the calm weather and inclement weather may see this lessen.
- Traditional Inhabitant members requested that they be informed when operators are likely to appear in court so they can be provided with the appropriate legal assistance and representation. Mr Peddell advised that he is not at liberty to discuss details of an ongoing investigation however, each person has the right to engage legal representation.
- Industry members advised that they will be submitting information on illegal fishing activity to AFMA for further investigation.

### 2.3.3 TSRA Update

38. The Working Group noted the update below provided by the TSRA member:

39. TSRA response to the Corona Virus and impacts on fishers:

- Immediate response has been to offer a loan pause for home and business loan clients affected by the virus
- Coxswain training courses have been put on for fishers that have opted to not continue fishing due to the down turn in the market
- A Seafood trade advisory website has been set up to provide the fishing industry with updates on what is happening at the national level to respond to Coronavirus impacts.
- Considerations include not leasing TSRA held permits to non-traditional fishers to alleviate some of the pressure due to dislocation of effort from one fishery to another.
- Developing a Recovery Action Plan (RAP) to better equip the region to emerge from the impacts
- Working with the State Govt on developing the Grant Guidelines

40. Fisheries Regional Ownership Framework:

- Steering committee continues to work towards the creation of the entity by 1 July
- Summit dates have been locked in for 27 – 29 April at Stadium on TI

41. Warpil – Fishing for our futures

- 60 jobs and 180 trainees over the next two years
- Programme is focussed on the fisheries infrastructure

- Commenced at Erub with Boigu, Saibai and Mer commencing in coming months

#### 42. Torres Strait Marine Safety Programme TSMSP

- 470 TIB licences
- 330 to 350 coxswains have been trained
- 250 TIB fishers traded in fishing
- 60 TIB vessels currently hold a certificate of operation which is required by AMSA to operate as a commercial fishing vessel. exemption to operate without a coxswain certification expires on 30 June 2020.
- Industry members noted that recreational operators are opting to get a TIB licence as it is cheaper than getting a recreational one and provides ease of identification and recognition to be able to access areas and this may be inflating the number of actual commercial TIB fishers in the region.

#### 43. Nationally accredited training

- The TSRA is working with TAFE to develop a Fishing qualification that would be nationally accredited under the AQF

#### 44. TSRA is continuing to work on the enhanced TIB representative model.

- TSRA wished to acknowledge the work and commitment of the reps
- All island visits had now been completed with the TIB reps leading the presentation

### 2.3.4 QDAF Update

45. In the absence of the Fisheries Queensland representative, the Working Group members noted the written update provided on the changes to fishing rules in Queensland that came into effect on 1 September 2019. Of note for the HCWG are the doubling of the recreational boat limit for sea cucumbers and the introduction of no take rules for white teatfish, the requirement for vessel tracking on all commercial vessels and stricter licensing requirements.

## 2.4 Native Title update

46. The Malu Lamar representative updated the Working Group as follows:

- Malu Lamar continues to seek full membership status for it and GBK on various fishery advisory groups as the cultural voice of traditional communities and an acknowledgement of Malu Lamar's importance as a stakeholder.
- With regards to the previous discussion on the outcomes of the cluster consultations, the Malu Lamar representative raised concern that not all TIB operators were represented to contribute to the discussions on the use of hookah to catch white teatfish.

47. The AFMA member acknowledged Malu Lamar's request for membership on the PZJA advisory committees has been a long standing issue. To assist in having Malu Lamar's request processed the AFMA member requested that if possible, Malu Lamar formally write to AFMA and in doing so, give guidance on their proposed role on the advisory committees having regard for FMP 1. In particular how Malu Lamar would participate in recommendation making.

48. Malu Lamar welcomed this opportunity and advised that it would seek legal advice on the roles and responsibilities that such membership confers on the organisation and whether a formal Malu Lamar member on a fishery advisory group will be seen to be acting on behalf of the whole of Malu Lamar when it comes to supporting decisions and/or making recommendations.

## 2.5 PNG National Fisheries Authority update

49. An update was not available due to the unavailability of NFA officers.



### 3 Catch and effort Summary

50. The Working Group noted the catch summary for the 2019 fishing season for the BDM Fishery provided under Agenda Item 3 and noted the following highlights from the Executive Officer:
- The catch report for the 2019 fishing season has been updated to include more up to date figures as catch disposal recorders have continued to be submitted and entered in the database. As at 18 February 2020, the total reported catch was 36 tonne.
  - The summary of changes in key reported metrics from the 2018 to the 2019 fishing seasons has been slightly amended to reflect the significant improvement in the timelines of reporting. Average CDR receipt time in the 2019 season was half that in 2018.
  - Species level identification has also improved with no 'unidentified sea cucumbers' reported in 2019.
  - Total catch reported has dropped by 46% from 2018, mainly due to the significant drop in curryfish catches. This is consistent with Industry's update that operators known to catch large amounts of curryfish on Darnley and Yorke have shifted their attention to live TRL.
  - Catch reports in 2019 have slightly decreased by 7% (20 CDRs)
  - Spatial and effort reporting has also improved with 69% of the CDRs submitted reporting the 'Area fished' and 70% reporting the 'Number of days fished'.
51. The AFMA member congratulated industry on their concerted effort within their respective communities to improve reporting in the fishery. AFMA will continue to ascertain the level of participation in the fishery through the number of active licences until such time a more reliable measure is available.
52. The Traditional Inhabitant member for Kemer Kemer Meriam reiterated that reporting by part-time fishers could be improved and noted this as a concern that needs to be addressed. This comment was supported by other industry members and a suggestion was made to find a way to engage part time operators to impress upon them the importance of reporting catch data or come up with a way to limit the amount of catch that they can land without infringing on their right to fish as TIB licence holders.
53. This is also an issue in the TRL fishery and a better approach may be to address the issue across the entire TIB licencing process.

### 4 Preliminary results of the Beche-de-mer stock survey

54. The Scientific member, Mr Tim Skewes, presented the preliminary results of the Beche-de-mer underwater dive surveys undertaken in eastern Torres Strait between November 2019-January 2020 as part of the TSRA funded and CSIRO led project 'Stock survey of Torres Strait Beche-de-mer species' (AFMA Project No. 2019/0826). As well as assessing the distribution and stock status of beche-de-mer species in the Torres Strait, the survey also undertook some exploration and mapping of deep water habitats to help inform better environmental management and ground truth reef mapping from previous projects. Sandfish populations at Warrior Reef were not surveyed as planned due to the banning of a project scientist by the Malu Lamar based on objections raised by Traditional Owners of lama and Tudu.
55. A total of 297 sites, in 6 zones and a range of strata in East Torres Strait were surveyed, most of which had also been done in the 2002-2009 surveys. 53 new deep water sites were surveyed to investigate potential deep water populations species such as white teatfish. The deep water surveys covered 20m-50m depths and a TSRA camera system recorded underwater footage during 10 minute drifts of transects (40m – 675m long). The outputs of the survey include relative density estimates over time, and estimates of stock size. The results for the Barrier zone are excluded from the comparative density estimates as it was not surveyed every time. It is still used in the stock estimate. The project also carried out detailed sampling of sea cucumbers and habitats on Ugar reefs to support a potential reseedling project there. The



results for the Ugar mapping will be provided once they have been finalised and presented to the community.

56. The preliminary results of the survey are summarised below:

**a. Black teatfish (*Holothuria whitmaei*)**

- i. Black teatfish density across all zones and strata surveyed averaged 7.4 per hectare (Ha) – with the average density in the reef-top buffer strata, its preferred habitat, of about 12 per Ha. None were seen in the deep water strata (>20m). The Barrier and Don Cay zones had the highest average density of black teatfish (>17/Ha) which is well above the 12.5/Ha indicative natural carrying capacity for Black teatfish from a FAO global review. The Darnley, Great North East Channel (GNEC) zones had the lowest density of black teatfish as expected but the results of this survey show a decrease from previous surveys. The results of the Seven Reefs zone on the other hand show an increase in density from previous surveys.
- ii. The preliminary analysis indicates that the virgin population biomass is likely to be at approximately 10/Ha ( $B_0$ ) for all zones and strata combined, which would place the limit reference level ( $B_{LIM}$ ) at about 4/Ha (40%  $B_0$ ). While this is slightly less than the indicative natural carrying capacity for black teatfish of 12.5/Ha, 10/Ha is acceptable for the Torres Strait given the large area of the fishery surveyed, which also includes areas that are not suitable Black teatfish habitat. The 2019/20 survey density estimate was 7.7/Ha, well above the limit reference point.
- iii. The 2019/20 density is only slightly less than the 2009 density which was considered to have recovered to close to  $B_0$  levels. Together with the very high density observed in the Barrier zone in 2019/20 (not included in 4 zone average density estimate), this indicates that the black teatfish population is currently in a healthy state.
- iv. The fishery biomass for black teatfish was estimated to be 830 t (lower 90<sup>th</sup> percentile as gutted weight) pending further assessment to finalise the analysis.

**b. White teatfish (*Holothuria fuscogilva*)**

- i. Preliminary analysis of the survey results indicates that the deep water strata (20 m - 50 m) (where sampled) in 2019/20 had the highest densities of white teatfish of any strata, with an average density of 15 per Ha. This high density was consistent in all zones sampled. They were also in high density on the reef top in the Barrier and Don Cay zones, especially on the deeper reef top habitats. Don Cay had the higher overall density of any zone at over 10 per Ha.
- ii. White teatfish average (stratified) density in east Torres Strait reef zones was very variable over the years. Don Cay zone again had the highest density of White teatfish in the east Torres Strait area, and the Barrier zone had the highest ever observed.
- iii. The highest overall (4-zone) average stratified average for white teatfish (shallow reefs only) observed was in 2002 at 2.5 per Ha. While the 2019/20 estimate of 1.83 per Ha was not as high as 2002, the observed density coupled with the substantial population in deeper water that is likely unfished, indicates that the white teatfish population was still in a healthy state.
- iv. The preliminary fishery biomass population estimate (lower 90<sup>th</sup> percentile as gutted weight) for white teatfish in 2019/20 was 668 t, with almost half of that found in the deep water strata, but none found beyond 36m (deep water strata area is assumed to be the same as the reef edge area – more analysis will be required to better estimate the area of this habitat). The highest density occurs between the depths of 20m-36m and the species seems to prefer sandy bottom habitat.

- v. Additional work is required to advise on carrying capacity and the limit reference point for this species

**c. Prickly teatfish (*Thelenota ananas*)**

- i. Preliminary analysis of the survey results indicates that the highest density was in the Barrier edge strata, and this was true overall as well, with the reef edge having an average density of 16 per Ha. There were few prickly teatfish seen in deep water (>20 m). The Barrier zone also had the highest overall density at 18 per Ha.
- ii. Overall (4-zone) density was the lowest ever observed for prickly teatfish at 1.5 per Ha, being only 63% of the 2005 estimate, and continues a downward trend for this species since 2005. This trend is concerning and will need to be further investigated through analysis of the size data collected.
- iii. The Cumberland zone, which has a large area and is an important habitat for this species, had a relatively low density, especially when compared to the Barrier zone, which likely does not see high levels of fishing.
- iv. The preliminary fishery biomass population estimate (lower 90<sup>th</sup> percentile as gutted weight) for prickly teatfish in 2019/20 is 336 t.
- v. The low prickly redfish densities observed at Darnley were not surprising and seemed consistent with fishers' observations to that effect. It was noted that the Darnley fishing grounds are usually better known for their curryfish assemblages.

**d. Curryfish (common) (*Stichopus hermanni*)**

- i. Preliminary analysis of the survey results indicates that the highest common curryfish density was on the reef top buffer strata, particularly in the Darnley zone, at 38 per Ha. They were also seen on the reef edge and, to a lesser extent, on the reef top strata. Some were even observed in the deep water strata, but in low densities. The Darnley zone had the highest overall density. Cumberland and Don Cay zones also had significant densities of common curryfish.
- ii. Zone and overall survey density over survey years for this species was quite variable. Overall the density was lower than in 2009, and similar to 2002, however, there was not a great variation in density over time.
- iii. The preliminary fishery biomass population estimate (lower 90<sup>th</sup> percentile as gutted weight) for common Curryfish in 2019/20 was 509 t. Note that deep water strata area is assumed to be the same as the reef edge area. More analysis will be required to better estimate the area of this habitat.
- iv. Provisional harvest strategy limits do not seem to have been breached, however as per prickly teatfish, the declines in density from previous surveys, while not unexpected given the level of fishing effort on them, need to be investigated further to ensure that the stock remains sustainable.

57. The Scientific Member made a general comment that some deepwater blackfish and redfish species were also observed during the survey.

58. The Scientific member also noted that the reefs in general looks to be in very good condition with high coral cover, minimal to no bleaching and no crown of thorn starfish.

59. The Scientific Member outlined the additional work below that still needs to be carried out to finalise the project as follows:

- Analyse all data for all species
- Refine deep water habitat estimates
- Population modelling

- Analysis outputs suitable for CITES non-detriment
- Habitat analysis (coral, seagrass, CoT, clams)
- Ugar reef mapping for potential re-seeding

60. The Working Group thanked the Scientific member and the rest of the project team for their work on the project to date and for all their effort in making the preliminary results available for the Working Group's consideration so soon after the completion of the last survey.
61. The Working Group further noted that the next project progress update will be provided at the Hand Collectable Working Group's meeting, tentatively in August, with the project due to be completed in December 2020.

## 5 Future Black teatfish opening

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62. The Working Group noted:

- a. that HCWG 15 (1-2 August 2019) recommended a trial opening of black teatfish, contingent on:
  - a. the implementation of the beche-de-mer Harvest Strategy and that the strategy has since been agreed by the PZJA (November 2019), and
  - b. remaking of the *Fisheries management Instrument No. 15* (FMI No. 15) in 2020. AFMA advised that this process was an ongoing however TAC arrangements for black teatfish could be administered through licence conditions;
- b. outcomes of the HCWG Traditional Inhabitant members community consultations to seek feedback on the proposal to restrict TIB licence holder access to a black teatfish opening through customary protocols and traditional lore (presented under item 2.1);
- c. the preliminary stock survey results for black teatfish from the Torres Strait beche-de-mer species stock survey undertaken in late 2019 (presented under Agenda Item 3);
- d. the overview of catch and effort data for the beche-de-mer fishery during the 2019 season (presented under Agenda Item 4); and

63. The Working Group supported the application the *Torres Strait Bech-de mer Fishery Harvest Strategy November 2019* (the BDM Harvest Strategy) in developing advice on an appropriate TAC and managements arrangements for a future black teatfish opening

### **Applying the BDM harvest Strategy: Section 2.11.4 Re-opening Decision Rule**

**Condition 1 – Using all available information, is the stock above a limit reference point level?**

64. The Scientific member advised that the preliminary outcomes of the recent stock survey (AFMA Project No. 2019/0826) indicate that the black teatfish stock in the TS is very likely above the limit reference point (BLIM) and at a level that can allow the potential opening of the fishery. The Scientific member advised that through further analysis of the survey data, the Working Group will be better placed to advise on upper reference points such as a target reference point within the BDM Harvest Strategy.
65. Noting the preliminary survey outcomes together with: a) outcomes of the 2009 survey, and b) the limited recorded fishing effort on black teatfish since its closure in 2003 (two openings 2014 and 2015) the Working Group agreed that all available evidence indicates that the stock is likely above the reference point (the default limit in the BDM Harvest strategy, BLIM, being 40% of B0).

**Condition 2 - Are monitoring and management adequate?**

66. The AFMA Member noted that the mandatory fish receiver system that has been in place for the last two years has resulted in substantial improvements in catch and effort reporting. As presented under item 4 the timeliness of reporting along with, species identification and voluntary effort reporting has improved to a relatively high standard.
67. The AFMA member advised that should fishing for black teatfish re-open, the mandatory fish receiver system can be used to require daily reporting of landed catches. Daily reporting would be essential to minimise the risk of over catching the total allowable catch (TAC).
68. The AFMA member further advised that AFMA now having responsibility for domestic compliance is able to undertake targeted compliance activities to support a black teatfish opening.
69. A traditional inhabitant member expressed concern at the catch disposal records being the only source of data for the fishery and would prefer to have had other forms of data inputs to support the re-opening of black teatfish. The AFMA Member advised that the BDM Harvest Strategy is designed to guide management decisions based on available information. This means that management is more precautionary when there is greater uncertainty about the stock and catches. Accordingly a precautionary management approach is recommended to convening a black teatfish opening at this time.
70. Other a traditional inhabitant members advised that Eastern communities had already begun discussions on voluntary measures they would adopt to further reduce the risk of mis-reporting (see detail below under condition 3).
71. The Working Group was supportive of the improvements to reporting and general management of the fishery to date. The Working Group noted that the ability to obtain accurate and timely catch and effort data was essential under the BDM Harvest Strategy to redeveloping the fishery on an ongoing basis. Members noted the harvest strategy recommends that a) if a trial TAC is exceeded by more than 5% then the fishery should be automatically paused for the following year; and b) if data collection during the Trial opening was not conducted satisfactorily, then the fishery should be closed again and the re-opening rule process applied again.

**Condition 3. If conditions 1 and 2 are met then a conditional trial opening is possible subject to the following conditions:**

*Accurate catch and effort reporting is required:*

72. Working Group members were supportive of the additional reporting requirements that were previously discussed, these being the daily, reporting of catch by licenced fish receivers to AFMA. AFMA advised that it would make provision for catch disposal records to be submitted electronically (SMS, Email) with hard copies to be forwarded to AFMA through the mail. It was noted that operators would need to ensure that they land catches in areas with telecommunications reception. Whilst this may place operational constraints on some fishers, on balance the need for daily reporting was considered by the Working Group to be a priority.
73. Traditional inhabitant members advised that fishers in the Eastern communities (Mer, Erub, Ugar and Masig) had commenced discussions about adopting voluntary reporting procedures to further reinforce timely and accurate reporting during a black teatfish opening. For example agreeing to land to a single fish receiver. The Working Group commended industry on taking such initiative. Traditional Inhabitant members however expressed concern that part-time operators or new operators attracted to fish just for black teatfish (the 'goldrush' effect) may not adhere to either the daily reporting rules or the additional voluntary measures being developed.
74. The Working Group sought advice from Traditional Inhabitant members on how such agreements could be further developed and agreed by fishers across the region. Traditional Inhabitant members advised that provided the cultural and industry agreements were discussed at the fisher level and didn't get 'political' and fishers from the central and western nations didn't feel excluded, agreements could be successfully implemented. The Working Group noted advice from the Gudumalulgal Traditional Inhabitant member that the

Gudumalulgal communities had already confirmed that they would respect the culture lore developed by the Meriam people for a black teatfish opening. This includes cultural lore on who can fish where.

75. To assist traditional owners and the BDM industry more broadly to agree on relevant cultural lore and voluntary industry agreements to reinforce timely and accurate catch reporting, the TSRA member offered to fund Malu Lamar to convene a stakeholder workshop. The TSRA member advised that the workshop would be led by Malu Lamar and facilitated by the TSRA in consultation with AFMA.
76. The Working Group welcomed the initiative by Traditional Owners and the industry. The Working Group noted that the proposed initiatives would likely complement the regulatory measures being proposed such as daily reporting.
77. Members noted the importance in future community consultations to continue to emphasise the benefits of improved reporting in ensuring the sustainability of the black teatfish stock for future generations. Improved management and data collection will also inform the development of non-detriment findings (NDF) to allow the continued export of Black and White teatfish once their Appendix II CITES listing comes into effect in August 2020. An NDF for Black and White teatfish would place the Torres Strait BDM Fishery in the unique position of being one of very few fisheries worldwide that is able to export sustainable black and white teatfish.
78. The Working Group also asked that AFMA explore media opportunities such through regional radio to widely communicate the additional management and reporting requirements for a black teatfish re-opening.

**Action item 5.1** – Malu Lamar to take the lead in convening a stakeholder workshop to further discuss and agree on cultural lore and industry agreements with respect to fishing for black teatfish and report outcomes to the HCWG.

**Action item 5.2** – AFMA explore media opportunities such as radio to widely communicate the additional management and reporting requirements for a black teatfish re-opening.

*Setting a precautionary trigger limit:*

79. The Working Group agreed that setting a precautionary catch trigger limit as a stop-go mechanism to allow for compilation of catch data within season may not be feasible given the expected very short time period that black teatfish fishing would be open for under a conservative TAC. The 2015 opening lasted eight days.

*An effective warning system required to alert fishers as catches approach the TAC:*

80. AFMA advise that it would collate catches and provide daily reports to operators on how catches are tracking against the TAC throughout the black teatfish fishing season. Catch updates would be circulated via SMS, email and the PZJA website.

*Consider the need for any further condition, including limitations on which species can be harvested in conjunction with a re-opened species, or with particular gear.*

81. The Working Group discussed the need further conditions to support a possible future opening such as;



- a. restricting catches to only black teatfish during the opening;
- b. imposing trip limits on the amount (number or weight) of black teatfish that can be landed per trip, and/or
- c. granting access through a tender process. This would restrict the number of fishers able to fish for black teatfish and generate revenue.

82. On balance the Working Group did not recommend any further conditions. The additional conditions briefly discussed were considered at this time to be unnecessary, complex and/or not supported by current PZJA licencing policy.

*Trial fishing dates to coincide with fishing dates for other species to spread the effort:*

83. The Working Group noted previous advice from Traditional inhabitant members that future black teatfish openings should coincide with fishing in the Tropical rock lobster (TRL) Fishery. This was to reduce potential management risk of having a 'goldrush' of participants entering the Fishery. However, the Working Group noted that this timing may not be possible for the current year as TRL fishing has slowed down considerably due to the current live import restrictions into China because of Coronavirus.
84. The AFMA member advised that further discussions with industry could take place as part of the proposed Workshop to agree a date for the opening. PZJA agencies would work to get a PZJA decision on having an opening sometime this year prior to the TSRA Board entering caretaker mode late April.
85. With regards to the trial opening dates, the Working Group was mindful that the fishing period needs to be long enough to provide operators with ample opportunity to fish in favourable weather and tides so as not to compromise safety.

*Cultural laws and community agreements:*

86. Traditional Inhabitant members reiterated that agreed that cultural lore and community agreements could be used to support additional voluntary reporting requirements and oversight as to who can fish where (see discussion under accurate catch and effort reporting).

**Condition 4. Set a demonstrable conservative TAC with reference to default values.**

87. The Working Group recommended adhering to the harvest strategy default trial opening TAC of 15 t for black teatfish (see Table 3 of the harvest strategy). In making this recommendation, the Working Group discussed whether a larger, but still sustainable, TAC could alleviate some of the risk of the conservative 15 t TAC being overshot as per the 2015 trial opening. One option was to set a 40 t TAC that is a little bit less than the sustainable catch estimate of 5% of the preliminary biomass estimate obtained from the scientific survey. As part of its deliberations, the Working Group considered the Scientific member's advice that while a 40 t TAC would still be considered sustainable, it should be viewed as aspirational at this stage given the preliminary nature of the assessment and it does not completely remove the risk of TAC overshoot. The collection of high quality spatial catch and effort data during the trial opening will allow for greater confidence to set higher TACs in future seasons.

**Recommendation summary**

88. In line with the harvest strategy (section 2.11.4), Working Group recommended a trial fishery reopening for black teatfish subject to a 15 tonne TAC and daily reporting landed catch noting that:
- a. based on all available information, including preliminary results from scientific dive surveys in November 2019 and January 2020, that the biomass of black teatfish is likely to be over the limit biomass reference point (BLIM - 40 percent of estimated unfished biomass);



- b. monitoring and management arrangements (with daily reporting) are adequate;
  - i. a mandatory landed catch reporting system is in place and reporting standards in the BDM Fishery have progressively improved since the system was introduced. This includes voluntary reporting of effort information.
  - ii. Fish receivers will be able to submit records to AFMA electronically (SMS, email) during the opening with hard copies to be sent to AFMA in the mail.
  - iii. AFMA is now responsible for domestic compliance and is committed to undertake a targeted compliance program to support a future opening.
- c. although the preliminary results of the recent scientific survey suggest the stock could sustain a higher TAC, priority was given to ensuring the TAC was demonstrably conservative which is a requirement of the harvest strategy;

The Working Group welcomed the commitment from Malu Lamar, with support from TSRA, to work with fishers to agree voluntary measures to reinforce cultural lore with respect to who can fish where and further ensure accurate daily catch and effort reporting. These arrangements are likely to complement regulatory efforts to reduce the risk of exceeding the TAC.

## 6 Prohibition of Hookah in the Beche-de-mer Fishery

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89. The Working Group noted:

- that the issue of permitting the use of hookah in the BDM fishery is a long standing issue, with strongly divided views among stakeholders;
- the views of Torres Strait communities on the use of hookah in the BDM fishery as discussed during PZJA Traditional Inhabitant member cluster consultations (Agenda Item 2.1);
- that HCWG15 (1-2 August 2019) recommended a discussion paper be developed to explore a longer term strategic approach to using hookah in the BDM fishery.

90. The AFMA member sought the Working Group's agreement on AFMA's proposal to undertake a dedicated, strategic workshop to address the use of hookah in the BDM fishery, which is currently prohibited, in the context of the newly implemented BDM Harvest Strategy. The Workshop would form part of the Future management priorities workshop recommended at the last HCWG meeting.

91. The AFMA member noted some stakeholders have had long held concerns relating to the sustainability and risk of over-exploitation of using the hookah method to collect BDM, some of which have since been mitigated through the implementation of the BDM Harvest strategy and the Fish Receiver System to collect catch data. Outcomes of recent Traditional Inhabitant cluster consultations however indicate that community views on the matter are still varied and stakeholder workshop would enable those views to be better understood and possible management options developed against management objectives and capacity to cost-effectively administer and enforce various options.

92. The Traditional Inhabitant member for Gudumalulgal acknowledged some stakeholders' opposition to fishing with hookah, however, it is important to review the prohibition on hookah in the context of removing barriers to economic opportunities for Torres Strait islander communities. The prohibition on hookah is currently limiting fishing for White teatfish given the species is mostly found in deeper waters and some operators are putting themselves at risk free-diving to depths of up to 30m to fish. He expressed his concern that communities traditionally known to not fish for White teatfish, and are therefore least impacted by this decision, are commenting on behalf of those that rely on the species for their livelihoods. He further reiterated that it is important to consult with full time fishers on their views on the removal of the hookah ban as opposed to those that do not fish on a consistent basis.

93. Other Traditional Inhabitant representatives (MP) agreed/confirmed that some of the stakeholders that expressed their opposition to lifting the hookah ban during the cluster visits do not have much experience working in that fishery and lacked understanding of the hookah fishing method or the impact of the prohibition on the eastern communities that depend on this resource for their livelihoods.
94. The Working Group recommended that this issue be considered in a broader stakeholder workshop and recommended that it form part of the Malu Lamar led workshop process being organised to finalise customary arrangements for the trial opening of black teatfish. This will ensure that there is good representation of communities across the Torres Strait region and provide a good opportunity to:
- share the most recent science on the distribution and status of the white teatfish stock
  - address any misinformation that may exist regarding the use of the hookah method
  - discuss and perhaps agree on the arrangements that could be implemented through cultural law to complement the regulatory ones in progressing the review of the hookah prohibition.
  - discuss possible options for lifting and/or amending the hookah prohibition. The Working Group noted, a number of communities support the use of hookah only for white teatfish and not other species. The Working Group also noted a suggestion from one traditional inhabitant member that a trial be undertaken to test the ability of traditional inhabitant fishers to take the catch using hookah.
  - develop strategies to mitigate any of the unintended risks that may arise as a result of lifting the hookah ban.
95. AFMA advised that it would support the strategic stakeholder workshop by providing advice on the administrative and compliance capabilities that currently exist to oversee and manage possible changes to the hookah prohibition.
96. The Working Group reiterated that the perception of conflict of interest needs to be addressed during this process and that all stakeholders across
97. the region is afforded procedural fairness by having an opportunity to present their views.

**Action item 6.1** – Malu Lamar to discuss the review of the hookah prohibition at the stakeholder workshop with a view to developing management recommendations.

## 7 Research

98. The Working Group discussed the research pre-proposal submitted by Nicole Murphy, CSIRO, on 'Determining weight conversion ratios for curryfish species *Stichopus hermanni* and *S. vastus*', with a view to providing advice for the TSSAC's consideration at its March 2020 meeting. In considering the research application, the Working Group noted that the research application directly addresses a research priority in the Hand Collectable Fisheries Five Year Research Plan. That is to develop weight conversion ratios for the various process forms for curryfish.
99. The Working Group supported the pre-proposal progressing to a full application noting that the proposal:
- addresses an identified research priority. Having species specific weight conversion ratios will improve the accuracy of total catch data for the fishery. Species specific weight conversion ratios would replace the conservative default conversion ratios currently used;
  - is value for money and seeks to engage two Traditional Owners to assist with data collection to provide an understanding of local conditions and processes.

- Broader consultation with traditional owners on the full application will be undertaken through the TSSAC application process.

## 8 Pearl Shell and trochus fisheries

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100. The Working Group noted the update from AFMA on reported fishing activity and licence numbers in the Pearl and Trochus Fisheries as detailed in the agenda paper. No commercial catches have been reported to AFMA through the Fish Receiver System during 2019 with limited activity reported in the Pearl Shell Fishery reported since 1 Dec 2017.

## 9 Other Business

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101. Prompted by concern from a Traditional Inhabitant member that there is insufficient ongoing research in the BDM Fishery, the Working Group discussed strategic research planning for the Fishery. The Traditional Inhabitant member noted that BDM Fishery has the potential for high returns (BDM is sold the capital cities for \$350/kg) but there is no ongoing research investment to maintain and expand our understanding of BDM Stocks. The member sought advice on whether the HCWG should recommend more research into the Fishery.
102. The Scientific member advise that the TS BDM Fishery would always be a small fishery compared to the Tropical Rock Lobster Fishery with moderate returns to fishers. The Scientific member agreed however that there are important research areas that need to be addressed for example, where the fishery wants to go, getting better certainty on stocks such as sandfish, understanding the potential for reseeding and how best to maximise value through optimum utilisation of the resource and value adding. The Scientific member noted that further development of a strategic research plan that focuses on maximising the return of benefits to Traditional Inhabitants across Torres Strait Fisheries overall (this is different to trying to maximise the benefits from each fishery) is needed when funding is constrained.
103. The AFMA member advised that AFMA's annual Torres Strait research commitment is around 400k and is part of AFMA's broader government budget which is constrained. In other Commonwealth fisheries, AFMA recovers most research costs from industry. As further investment into the growth of Torres Strait fisheries continues through TSRA's significant investment in fisheries infrastructure and training, the gap in research needed to support fishery expansion and AFMA's funding is likely to grow, highlighting the challenge to attract additional funding outside of AFMA.
104. The TSRA member highlighted the commitment from the Minister for Indigenous Australian's to increase economic and employment opportunities in the region and that this may be an avenue through which some of the research gaps can be addressed.

## 10 Date and venue for next meeting

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105. The HCWG noted the tentative date for the next HCWG is week beginning 3 August to consider the final draft outcomes of the black teatfish survey.
106. The Chair thanked members for their contributions and professional conduct throughout the meeting. The Chair recognised the significance of matters being deliberating by the HCWG on

fisher's livelihoods. The Chair noted the need to have HCWG advice to the PZJA before the TSRA board enters caretaker mode to ensure consideration of a black teatfish opening later this year can be made. The Chair encouraged timely collaboration between Malu Lamar, stakeholders, TSRA and AFMA to ensure the proposed stakeholder workshop is undertaken as soon as possible noting the likely importance of community measures to supporting a successful opening.

107. The Chair again thanked TSRA for convening the cultural awareness training and thanked members for their full participation. Member were to complete the training feedback form for TSRA.

108. Mr Sereako Stephen closed the meeting with a prayer.

Table 4. Status of actions arising from previous HCWG meetings.

#	Meeting	Action item	Responsibility	Status
1	HCWG 9 (20-21 June 2016)	AFMA to review the size limits set for the Torres Strait Beche-de-mer Fishery taking into consideration the size limits in place in Queensland and the Commonwealth Coral Sea Fishery.	AFMA	<b>Complete.</b> The PZJA agreed to the final Beche-de-mer Harvest Strategy at their meeting on 19 November 2019 which was formally implemented on 1 January 2020. Changes to minimum size limits will not be implemented until the remaking of <i>Fisheries Management Instrument No. 15</i> is complete.
2	HCWG 11 (27 June 2017)	Consideration on whether or not changes should be made to the current size limit for Prickly Redfish be undertaken during the Harvest Strategy Workshop noting relevant data will be presented.	AFMA	<b>Complete.</b> The PZJA agreed to the final Beche-de-mer Harvest Strategy at their meeting on 19 November 2019 which was formally implemented on 1 January 2020. Changes to minimum size limits will not be implemented until the remaking of <i>Fisheries Management Instrument No. 15</i> is complete.
3	Out of Session (July 2018)	The TSRA to assist TIB licence holders to develop a proposal to lift the hookah ban when fishing for white teatfish, to be put up to the PZJA for consideration.	TSRA	<b>Ongoing (replaced with Action Item 6, below).</b> The TSRA supported PZJA Traditional Inhabitant members to undertake cluster consultations in late 2019 which sought feedback from communities on the use of hookah to fish for white teatfish. An overview of the consultations outcomes will be discussed under <b>Agenda Item 5</b> .
4	HCWG 14 (24 October 2018)	Malu Lamar, AFMA and TSRA to meet and discuss a way forward in terms of an MOU/combined strategy to assist in improved data collection and proposed management arrangements in support of a black teatfish opening.	Malu Lamar AFMA TSRA	<b>Ongoing.</b> AFMA suggests removing this item from the list of actions. While no formal MOU has been developed, a suite of parallel activities have since taken place including a full round of community visits focussed on Fish Receiver System education and awareness, and more recently PZJA traditional inhabitant member cluster consultations. AFMA also continues to work with individual operators to improve data collection. Having regard to clear HCWG advice at this meeting, AFMA will meet with communities to discuss black teatfish arrangements including reporting requirements.
5	HCWG 15 (1-2 August 2019)	Dr Eva Plaganyi to circulate information about upcoming scientific conferences that could serve as opportunities to showcase the Torres Strait BDM HS as a good news story.	Dr Eva Plaganyi	<b>Complete.</b> AFMA circulated information on upcoming scientific conferences on behalf of Dr Plaganyi via email on 5 August 2019.

#	Meeting	Action item	Responsibility	Status
6	HCWG 15 (1-2 August 2019)	TSRA and AFMA to develop a discussion paper outlining suggested management arrangements, based on HCWG discussions for pursuing the use of hookah to fish for white teatfish, for further consultation with communities and consideration by the HCWG and the PZJA.	TSRA AFMA	<b>Ongoing (linked with Action Item 3, above).</b> The TSRA supported PZJA Traditional Inhabitant members to undertake cluster consultations in late 2019 which sought feedback from communities on the use of hookah to fish for white teatfish. An overview of the consultations outcomes will be discussed under <b>Agenda Item 2.1</b> . Noting key issues to be discussed under <b>Agenda Item 6</b> , AFMA is recommending this action be discussed in more detail at the planned future management priorities workshop.
7	HCWG 15 (1-2 August 2019)	AFMA to arrange a half/full day future management priorities workshop in conjunction with the next Hand Collectables Working Group meeting.	AFMA	<b>Ongoing.</b> AFMA was unable to arrange the workshop in conjunction with HCWG16 as the focus of this meeting is to seek firm advice on black teatfish for a 2020 opening. AFMA is still committed to arranging a half day workshop to discuss future management priorities for Torres Strait Hand Collectable Fisheries. A time and date for the workshop is to be discussed under <b>Agenda Item 10</b> .
8	HCWG 15 (1-2 August 2019)	AFMA to populate the Hand Collectable Fisheries Five Year Research Plan based on HCWG discussions and circulate back to HCWG members out of session for comment before submitting to the TSSAC for their consideration.	AFMA	<b>Complete.</b> AFMA circulated a revised Five Year Research Plan to Working Group members' out-of-session for comment on 16 September 2019. A summary of all comments provided by members out of session was then circulated to members via email on 9 October 2019. The updated Research Plan with incorporated member comments was considered by the TSSAC at their teleconference meeting on 25 November 2019. An update on the TSSAC outcomes will be provided under <b>Agenda Item 7</b> .
9	HCWG 15 (1-2 August 2019)	AFMA to investigate the possibility of a HCWG industry member accompanying AFMA staff to the next Queensland Sea Cucumber Fishery Working Group meeting.	AFMA	<b>Complete.</b> There has been one Queensland Sea Cucumber Fishery Working Group meeting held since HCWG15 however PZJA Traditional Inhabitants were not permitted to attend. AFMA will continue to liaise with Fisheries Queensland about future Sea Cucumber Fishery Working Group meetings and possible HCWG Traditional Inhabitant member attendance.



## Attachment A – Adopted Agenda

### 16th MEETING OF THE PZJA TORRES STRAIT HAND COLLECTABLES WORKING GROUP

Friday 21 February 2020 (8:30 am – 5:00 pm)

TSRA Boardroom, Thursday Island

### DRAFT AGENDA v2

The meeting will open at 8:30 am on Friday 21 February 2020.

#### AGENDA ITEM 1 PRELIMINARIES

##### 1.1 Acknowledgement of Traditional Owners, welcome and apologies

The Chair will welcome HCWG members and observers to the 16th Torres Strait Hand Collectables Working Group.

##### 1.2 Adoption of agenda

The Working Group is invited to consider and adopt the draft agenda.

##### 1.3 Declarations of interest

Working Group members and observers are invited to declare any real or potential conflicts of interests to the group and determine whether a member may or may not be present during discussion of or decisions made on the matter which is the subject of the conflict.

##### 1.4 Action items from previous meetings

The Working Group will note the status of action items arising from previous HCWG meetings.

##### 1.5 Out of session correspondence

The Working Group will note any out of session correspondence on HCWG matters since the previous meeting.

#### AGENDA ITEM 2 WORKING GROUP UPDATES

##### 2.1 Industry members

Industry members and observers will be invited to provide an update on matters relevant to Torres Strait Hand Collectable fisheries, including a report from PZJA Traditional Inhabitant members on their recent cluster consultation meetings.

##### 2.2 Scientific members

Scientific members and observers will be invited to provide an update on matters relevant to Torres Strait Hand Collectable fisheries.

##### 2.3 Government Agencies

The Working Group will note updates from AFMA, TSRA and Fisheries Queensland on matters relevant to Torres Strait Hand Collectable fisheries.

##### 2.4 PNG National Fisheries Authority

The Working Group will note an update from the PNG National Fisheries Authority.

##### 2.5 Native Title

The Working Group will note a verbal update from the Malu Lamar (Torres Strait Islander) Corporation RNTBC.

### **AGENDA ITEM 3 CATCH AND EFFORT SUMMARY**

The Working Group is invited to note a summary of reported catch in the Beche-de-mer Fishery for the 2019 fishing season.

### **AGENDA ITEM 4 PRELIMINARY RESULTS OF THE BECHE-DE-MER STOCK SURVEY**

The Working Group will consider the preliminary results of eastern Torres Strait stock survey of Beche-de-mer species that took place in (TBC).

### **AGENDA ITEM 5 FUTURE BLACK TEATFISH OPENING**

In consideration of the preliminary stock survey results, and guidance under the Beche-de-mer Harvest Strategy, the Working Group will provide advice to the PZJA on an appropriate TAC and relevant management arrangements required for a possible future black teatfish opening.

### **AGENDA ITEM 6 PROHIBITION ON HOOKAH**

The Working Group is invited to consider the outcomes of the PZJA Traditional Inhabitant member cluster consultations and provide advice on a strategic approach to pursuing the development of a proposal to remove the prohibition on hookah in the Beche-de-mer fishery.

### **AGENDA ITEM 7 RESEARCH**

The Working Group is invited to note an update on the current TSSAC research funding cycle for 2020-21.

### **AGENDA ITEM 8 PEARL SHELL AND TROCHUS FISHERIES**

The Working Group is invited to note an update on activities in the Torres Strait Pearl Shell and Trochus fisheries.

### **AGENDA ITEM 9 OTHER BUSINESS**

The Working Group is invited to nominate any other business for discussion.

### **AGENDA ITEM 10 DATE AND VENUE FOR NEXT MEETING**

The Working Group will be invited to discuss a suitable date for the next meeting.

**The Chair must approve the attendance of all observers at the meeting. Individuals wishing to attend the meeting as an observer must contact AFMA ([fisheriesTI@afma.gov.au](mailto:fisheriesTI@afma.gov.au)).**

## Attachment B – PZJA Traditional Inhabitant Members Cluster Consultations 2019-20

Attached separately.

### Summary of Actions Arising from HCWG16

#	Action item	Responsibility
Action item 1.1	Malu Lamar to make recommendations to AFMA and TSRA on an as needs basis to establish an MOU to assist in improved data collection in the Fishery.	Malu Lamar
Action item 5.1	Malu Lamar to take the lead in convening a stakeholder workshop to further discuss and agree on cultural lore and industry agreements with respect to fishing for black teatfish and report outcomes to the HCWG.	Malu Lamar
Action item 5.2	AFMA explore media opportunities such as radio to widely communicate the additional management and reporting requirements for a black teatfish re-opening.	AFMA
Action item 6.1	Malu Lamar to discuss the review of the hookah prohibition at the stakeholder workshop with a view to developing management recommendations.	Malu Lamar

### Summary of HCWG16 Meeting Recommendations

#	Recommendation
1	<p>In line with the harvest strategy (section 2.11.4), Working Group recommended a trial fishery reopening for black teatfish subject to a 15 tonne TAC and daily reporting landed catch noting that:</p> <ul style="list-style-type: none"> <li>a. based on all available information, including preliminary results from scientific dive surveys in November 2019 and January 2020, that the biomass of black teatfish is likely to be over the limit biomass reference point (BLIM - 40 percent of estimated unfished biomass);</li> <li>b. monitoring and management arrangements (with daily reporting) are adequate; <ul style="list-style-type: none"> <li>i. a mandatory landed catch reporting system is in place and reporting standards in the BDM Fishery have progressively improved since the system was introduced. This includes voluntary reporting of effort information.</li> <li>ii. Fish receivers will be able to submit records to AFMA electronically (SMS, email) during the opening with hard copies to be sent to AFMA in the mail.</li> <li>iii. AFMA is now responsible for domestic compliance and is committed to undertake a targeted compliance program to support a future opening.</li> </ul> </li> <li>c. although the preliminary results of the recent scientific survey suggest the stock could sustain a higher TAC, priority was given to ensuring the TAC was demonstrably conservative which is a requirement of the harvest strategy.</li> </ul>
2	<p>The Working Group recommended that this issue [prohibition on hookah] be considered in a broader stakeholder workshop and recommended that it form part of the Malu Lamar led workshop process being organised to finalise customary arrangements for the trial opening of black teatfish.</p>



Australian Government

Australian Fisheries Management Authority

## **Meeting of the Torres Strait Hand Collectables Working Group members**

**7 August 2020, Video conference**

### **Final Meeting Record**

Note all meeting papers and minutes  
are available on the PZJA webpage:

[www.pzja.gov.au](http://www.pzja.gov.au)

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# 1 Preliminaries

## 1.1 Acknowledgement of Traditional Owners, welcome and apologies

1. Quinten Hirakawa opened the meeting in prayer around 9:20 am.
2. The Chair welcomed attendees to the meeting via video conference. The Chair acknowledged the Traditional Owners of the land on which the various members were located and paid respect to Elders past, present and future.
3. Attendees at the Working Group are detailed in **Table 1** below. The position of Traditional Inhabitant Member for Maluialgal is currently vacant.
4. The Chair welcome the Scientific member, Steven Purcell, to his first meeting of the HCWG.
5. The AFMA Member advised that this meeting did not meet the requirements for quorum under PZJA Fisheries Management Paper 1, due to the absence of three traditional inhabitant members. As a result any recommendations and advice from the meeting will be of individual working group members as opposed to advice of the Hand Collectables Working Group (HCWG).
6. Apologies received are detailed in the **Table 2** below.

**Table 1. List of attendees at the meeting of HCWG members**

Members	
Anne Clarke	Chair
Tim Skewes	Scientific member
Michael Passi	Traditional Inhabitant member, Kemer Kemer Meriam
Maluwap Nona	Traditional Inhabitant member, Gudumalulgal
Selina Stoute	Australian Fisheries Management Authority (AFMA) member
Mark Anderson	Torres Strait Regional Authority (TSRA) member
Steven Purcell	Scientific Member
Nick Boucher	Queensland Department of Agriculture and Fisheries
Executive Officer	
Danait Ghebregabhier	HCWG Executive Officer, AFMA
Observers	
Maluwap Nona	Malu Lamar (Torres Strait Islanders) Corporation RNTBC
Yen Loban	TSRA Fisheries Portfolio Board Member
Nicole Murphy	Commonwealth Scientific and Industrial Research Organisation (CSIRO)
Eva Plaganyi-Lloyd	CSIRO
John Jones*	Compliance Manager, AFMA
Ian Butler	Australian Bureau of Agricultural and Resource Economics and Sciences, Department of Agriculture, Water and the Environment



Keith Brightman	TSRA
Quinten Hirakawa	TSRA

\* John Jones attended the preliminaries of the meeting and then left to remain on standby to re-join the meeting as required. That is when advice was required on compliance related matters. Mr Jones however was not recalled to the meeting.

**Table 2. List of apologies for the meeting of HCWG members.**

Apologies	
Anthony Salam	Traditional Inhabitant Member - Kaiwalagal
Patrick Bonner	Traditional Inhabitant Member - Kulkagal
Ian Liviko	PNG National Fisheries Authority (NFA) Invited Participant

## 1.2 Adoption of agenda

7. Given the video conferencing format of the meeting and in order to allow adequate time for the presentation of the preliminary survey results and consideration of a future black teatfish reopening, Working Group members:
  - a. accepted the traditional inhabitant member recommendation to bring forward Agenda Item 4 - the Preliminary survey results and Agenda Item 5 - Future black teatfish reopening
  - b. agreed, as recommended by the Chair, to take the following agenda items as read:
    - i. Agenda item 1.4 - Action items from previous meetings
    - ii. Agenda item 1.5 - Out of session correspondence
    - iii. Agenda item 2.3.1 – Government, native title and scientific updates
8. However, with regards to Agenda Item 2 – Working Group updates, the Chair noted that it would be valuable for industry to provide a general update together with an update on any impacts that COVID-19 related restrictions and impacts may have had on their fishing operations

## 1.3 Declarations of interest

9. The Chair advised members and observers, that having regard for the video conferencing format and potential for technology issues, members and observers were invited to update the register of interest provided in the agenda paper by exception and that members would not be asked to leave the meeting. Declared interests are detailed in **Table 3** below. No members objected to this process.
10. Table 3. Declared interests from each attendee.

Name	Position	Declaration of interest
<b>Members</b>		
Anne Clarke	Chair	Previously contracted with Regional Development Australia Far North Queensland and Torres Strait No pecuniary interests or otherwise.
Tim Skewes	Scientific Member	CSIRO/Independent Consultant.

Name	Position	Declaration of interest
		<p>Current co-investigator on TSSAC project 'measuring non-commercial fishing in the Torres Strait'.</p> <p>Current co-investigator on TSRA funded project 'Stock survey of Torres Strait Beche-de-mer species'.</p> <p>Previous principal scientist for Torres Strait Scientific Advisory Committee (TSSAC) project to develop a harvest strategy for the TSBDMF.</p> <p>Previous CSIRO researcher for TSSAC project investigating traditional take of finfish in Torres Strait.</p>
Steve Purcell	Scientific Member	Has interest in invertebrate fishery research has previously worked in the assessment of sea cucumber fisheries in the Pacific and New Caledonia, and on restocking/sea-ranching research; no pecuniary interests or otherwise.
Michael Passi	Traditional Inhabitant Member Kemer Kemer Meriam	TIB licence holder
Maluwap Nona	Traditional Inhabitant Member, Gudumalulgal	TIB licence holder; Chairperson of Malu Lamar; Director of MDW Fisheries Association on Mer; Traditional Inhabitant Member on TSSAC.
Selina Stoute	AFMA Member	Employed by AFMA, no pecuniary interests or otherwise
Mark Anderson	Torres Strait Regional Authority (TSRA) Member	Employed by TSRA, no pecuniary interests as an individual, TSRA holds fishing licences on behalf of traditional inhabitants.
Nick Boucher	QDAF Member	Employed by Queensland Government Managing the East Coast Sea Cucumber Fishery. Previously worked with the TSRA on Torres Strait Fisheries – no pecuniary interests or otherwise
Danait Ghebrezgabhier	Executive Officer, AFMA	Employed by AFMA, no pecuniary interests or otherwise
<b>Permanent Observers</b>		
Yen Loban	TSRA Board, Fisheries Portfolio Member	TIB licence holder; TSRA Board Member for Ngurupai
<b>Casual Observers</b>		
Eva Plaganyi-Lloyd	CSIRO	
Nicole Murphy	CSIRO	
Ian Butler	Australian Bureau of Agriculture and Resource Economics (ABARES)	Employed by ABARES, DAWE, no pecuniary interests or otherwise
Keith Brightman	TSRA officer	Employed by TSRA, no pecuniary interests or otherwise
Quinten Hirakawa	TSRA officer	

## 1.4 Action items from HCWG16 and previous meetings

11. All updates on the status of action items arising from previous HCWG meetings were taken as read and were not explicitly discussed (**Table 4**).
12. The Working Group noted the final meeting record for HCWG 16, which was finalised out of session and published on 3 April 2020.

## 1.5 Out of session correspondence

13. All out of session correspondence on Working Group matters since HCWG16 was taken as read and not explicitly discussed.

# 2 Working Group Updates

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## 2.1 Industry member update

14. Both Traditional Inhabitant Members, advised members that rough weather over the past few weeks has made it challenging to go fishing but the stocks in the fishing grounds appear to be healthy. The member has had discussion with other full time TIB operators on ramping up fishing operations once the weather improves.
15. COVID-19 related restrictions have given the members a chance to discuss and reflect on various issues in the fishery with other traditional inhabitant members on the HCWG and other operators in the community. This has given them an insight into how to do business in the community, including management arrangements for the reopening of black teatfish.

# 3 Catch and effort Summary

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16. Working Group members noted the Executive Officer's update on Beche-de-mer (BDM) catches for the 2020 fishing season (as at 24 July 2020) noting that under AFMA's Information Disclosure Policy, data on reported catch within a season can only be provided for species that have been reported as being caught by five or more operators.
  - a. A bit over 14 tonnes of BDM had been reported as being caught across 14 different species. A total of 20 different licenced TIB fishers have landed BDM to a total of eight different licenced fish receivers.
17. Industry members agreed that the catch summary is a fair representation of catches for the 2020 fishing season to date.
18. The issue about different product forms being weighed by fishers or fish receivers was questioned because the catch weights in gutted-weight equivalents will be in error unless the appropriate conversion ratios are used according to each product form. Incorrect reporting of product form in this fishery will probably result in underestimation of the overall catch, so this is an important issue to get right.
19. The AFMA Member clarified that BDM is required to be weighed at the point of landing to a licence fish receiver. Landed product can be processed and agreed conversion ratios for various processing methods are used to convert all reported catch to a standard weight (wet gutted). Where species specific conversion ratios are not available, the most conservative

conversion factor calculated for other species from that same processing method is applied. The reported catch data provided in the summaries is converted weight.

## 4 Preliminary results of the Beche-de-mer stock survey

20. The Scientific member and co-investigator for the project, Mr Tim Skewes, presented the preliminary results of the Beche-de-mer underwater dive surveys undertaken in eastern Torres Strait between November 2019-January 2020 as part of the TSRA funded and CSIRO led project 'Stock survey of Torres Strait Beche-de-mer species' (AFMA Project No. 2019/0826). As well as assessing the distribution and stock status of beche-de-mer species in the Torres Strait, the survey also undertook some exploration and mapping of deep water habitats to help inform better environmental management and ground truth reef mapping from previous projects.
21. A total of 297 sites, in 6 zones and a range of strata (equivalent to reef habitat areas) in East Torres Strait were surveyed, most of which had also been done in the 2002-2009 surveys. 53 new deep water sites were surveyed to investigate potential deep water population species such as white teatfish. The deep water surveys covered 20m-50m depths and a TSRA camera system recorded underwater footage during 10 minute drifts of transects (40m – 675m long). The outputs of the survey include relative average densities for species by zones and strata, comparative density over time, and standing stock estimates for the stock. The results for the Barrier and GNEC zone are excluded from the comparative density estimates as they were not surveyed during all previous surveys, however they are still used in the 2019/20 standing stock estimate. The project also carried out detailed sampling of sea cucumbers and habitats on Ugar reefs to support a potential reseeded project there, the results of which were also tabled at the meeting but not discussed.

### **PART 1 – Preliminary survey results**

22. The preliminary results presented here were produced for consideration by the Working Group members to facilitate decisions related to the reopening of the BTF fishery, and as a “first pass” assessment of the sustainability of currently targeted species. The full analysis and recommendations will be contained in the Final report due end December 2020. The preliminary results of the survey are summarised below:

#### **a. Black teatfish (*Holothuria whitmaei*)**

- i. Black teatfish density across all zones and strata surveyed averaged 7.4 per hectare (Ha) – with the average density in the reef-top buffer strata, its preferred habitat, of about 12 per Ha. None were seen in the deep water strata (>20m). The Barrier and Don Cay zones had the highest average density of black teatfish (>17/Ha) which is well above the 12.5/Ha indicative healthy density for Black teatfish from a FAO global review. The higher densities observed at these sites are consistent with industry's reports of observations.
- ii. The Darnley, Great North East Channel (GNEC) zones had the lowest density of black teatfish as expected but the results of this survey show a decrease from previous surveys. The results of the Seven Reefs zone on the other hand show an increase in density from previous surveys.
- iii. The 2019/20 4-zone density is only slightly less than the 2009 density which was considered to have recovered to close to  $B_0$  levels. Together with the very high density observed in the Barrier and Don Cay zones, especially in the preferred reef top buffer strata, in 2019/20 and the similarity of the density in these areas to closed population

densities in the GBR, this indicates that the black teatfish population is currently in a healthy state.

- iv. The conservative stock estimate for black teatfish was 817.8t (gutted weight), this being the lower 90<sup>th</sup> percentile of the estimated biomass of 1,238t (gutted weight) to account for the uncertainty in the estimate due to natural variation in densities and the extrapolation of the survey results to produce the biomass estimate.
- v. The length frequency data showed the presence of some of the largest Black teatfish recorded however there was a slightly lower relative proportion of legal size animals compared to 2009 and the average size was slightly smaller than that measured in 2009, but larger than other surveys. Members noted the advice from one of scientific members that this could be a sign of shrinking of larger individuals and/or the presence of new recruitment to the fishery (hence a greater proportion of smaller animals are present).
- vi. Additional work is required to advise on carrying capacity and the limit reference point for this species.

**b. White teatfish (*H. fuscogilva*)**

- i. The survey results indicates that the deep water strata (20 m - 50 m) (where sampled) in 2019/20 had the highest densities of white teatfish of any strata, with an average density of 15 per Ha. This high density was consistent in all zones sampled. They were also noted in high density on the reef top in the Barrier and Don Cay zones, especially on the deeper reef top habitats. Don Cay had the higher overall density of any zone at over 10 per Ha.
- ii. White teatfish average (stratified) density in east Torres Strait reef zones was very variable over the years. Don Cay zone again had the highest density of White teatfish in the east Torres Strait area, and the Barrier zone had the highest ever observed.
- iii. The highest overall (4-zone) average stratified average for white teatfish (shallow reefs only) observed was in 2002 at 2.5 per Ha. While the 2019/20 estimate of 1.83 per Ha was not as high as 2002, the observed density coupled with the substantial population in deeper water that is likely unfished, indicates that the white teatfish population was still in a healthy state.
- iv. The preliminary fishery biomass population estimate (lower 90<sup>th</sup> percentile as gutted weight) for white teatfish in 2019/20 was 543 t, with almost half of that found in the deep water strata, but none found beyond 36m (deep water strata area is assumed to be the same as the reef edge area – more analysis will be required to better estimate the area of this habitat). The highest density occurs between the depths of 20m-36m and the species seems to prefer sandy-bottom habitat.
- v. Density estimates in deep water far surpassed density in shallow water. Delineating deep water habitat will be challenging to come up with a biomass estimate given their depth.
- vi. Currently the area of the deep water strata is assumed to be the same as the reef slope area. This is likely to be an underestimate therefore this will result in an underestimation of the stock.
- vii. Additional work is required to advise on carrying capacity and the limit reference point for this species.

**c. Prickly teatfish (*Thelenota ananas*)**

- i. The survey results indicates that the highest density was in the Barrier edge strata, and this was true overall as well, with the reef edge having an average density of 16 per Ha.

- There were few prickly teatfish seen in deep water (>20 m). The Barrier zone also had the highest overall density at 18 per Ha.
- ii. Overall (4-zone) density was the lowest ever observed for prickly teatfish at 1.5 per Ha, being only 63% of the 2005 estimate, and continues a downward trend for this species since 2005.
  - iii. The Cumberland zone, which has a large area and is an important habitat for this species, had a relatively low density, especially when compared to the Barrier zone, where high levels of fishing are unlikely.
  - iv. The preliminary fishery biomass population estimate (lower 90<sup>th</sup> percentile as gutted weight) for prickly teatfish in 2019/20 is 375t.
  - v. The low prickly redfish densities observed at Darnley were not surprising and seemed consistent with fishers' observations to that effect. It was noted that the Darnley fishing grounds are usually better known for their curryfish assemblages.
  - vi. Juvenile/small sea cucumbers were not observed.
  - vii. The level of depletion observed is expected given the level of fishing on the species and the TAC has been reduced previously in response to industry's concerns that under reporting may be occurring in the fishery.
  - viii. Industry members further confirmed that sustainability of the species was a concern for them and they have been rotating between the key fishing grounds using traditional knowledge and understanding on a 3-4 month basis and have seen the benefit in the recovery of the larger individuals.
  - ix. The scientific member Tim Skewes commented that the 3-4 month cycle rotational strategy is most likely allowing larger animals from other areas of the reef to move in.
  - x. The scientific member Steven Purcell added that the variation in density may also be due to the species' daily cryptic (hiding/burrowing) and semi-aggregation behaviour, which may in turn be influencing the abundance estimates.
  - xi. The scientific members and industry members agreed that further opportunities should be pursued to enable science to inform industry's rotational strategies and traditional ecological knowledge to help inform future scientific stock surveys especially with regards to juvenile/settlement areas.

**d. Curryfish (common) (*Stichopus herrmanni*)**

- i. The survey results indicates that the highest common curryfish density was on the reef top buffer strata, particularly in the Darnley zone, at 38 per Ha. They were also seen on the reef edge and, to a lesser extent, on the reef top strata. Some were even observed in the deep water strata, but in low densities. The Darnley zone had the highest overall density. Cumberland and Don Cay zones also had significant densities of common curryfish.
- ii. Zone and overall survey density over survey years for this species was quite variable. Overall the density was lower than in 2009, and similar to 2002, however, there was not a great variation in density over time.
- iii. The preliminary fishery biomass population estimate (lower 90<sup>th</sup> percentile as gutted weight) for common Curryfish in 2019/20 was 632t. Note that deep water strata area is assumed to be the same as the reef edge area. More analysis will be required to better estimate the area of this habitat.
- iv. Provisional harvest strategy limits do not seem to have been breached, however as per prickly teatfish, the declines in density from previous surveys, while not unexpected given the level of fishing effort on them, need to be investigated further to ensure that the stock remains sustainable.



- v. Species specific identification can be challenging for curryfish species and a dedicated project on collecting morphological info and understanding habitat preference for Curryfish species is a priority.

**e. Curryfish (*S. vastus*)**

- i. The survey results indicates density increased significantly since the 2009 survey. Industry confirmed that they do come across a lot more *S. vastus* while fishing although none of the traditional inhabitant members on the HCWG target *S. vastus* specifically – they are usually just included in the curryfish catch.
- ii. We were not able to produce a preliminary fishery biomass estimate at this stage due to the extreme patchiness of this species. more analysis will be done for the final report.
- iii. Acknowledged that species identification is key and more work needs to be done to standardise naming of Curryfish species.
- iv. Industry commented that curry fish processing can be fiddly and requires careful handling and a lot of patience. Some industry members are working on best processing methods and have worked out a way to dry the product. If successful, dry curryfish can fetch up to \$155/kg (dried) compared to \$28/kg (wet)
- v. The Traditional Inhabitant Member, Gudumalulgal requested that full time TIB operators be invited to participate at HCWG meetings to share their expertise in the industry.
- vi. AFMA Member confirmed that it strongly supports additional industry expertise being made available to the HCWG as required.

**f. Surf redfish (*Actintopyga mauritiana*)**

- i. The survey observed low densities of this species most likely due to its cryptic behaviour during daytime. A dedicated surf redfish survey on the wave-exposed reef crests is likely required to search for individuals.
- ii. This is currently a closed species and current abundance is not sufficient to warrant re-opening the fishery.
- iii. The scientific member Steven Purcell remarked that the low abundance for this species was a concern.

**g. Deepwater redfish (*A. echinites*)**

- i. This species has gone through a significant decline due to extensive fishing effort but seems to have recovered.
- ii. It has a very patchy distribution and this makes it hard to survey.
- iii. The preliminary fishery biomass population in 2019/20 is 70t.

**h. Hairy blackfish (*A. miliaris*)**

- i. Similar to Deepwater redfish, this species is also hard to survey due to its patchy distribution. Previous surveys have found a couple of high density patches but none were seen in this survey.
- ii. It is hard to determine whether the density trends are due to patchiness in distribution or to fishing.
- iii. The preliminary fishery biomass population in 2019/20 is 10t.

**i. Greenfish (*S. chloronotus*)**

- i. Greenfish is not a heavily fished species but populations tend to be variable over time and space, making them challenging to survey.
- ii. They can be one of the most abundant sea cucumber species in the Torres Strait – they were extremely abundant during the 2009 survey.

iii. The preliminary fishery biomass population in 2019/20 is 706t.

23. The scientific member Tim Skewes advised that none of the preliminary results appears to raise immediate sustainability concerns that need to be addressed as a matter of urgency prior to the project being finalised in December 2020 and before the start of the 2021 fishing season.
24. Having considered the results and advice from the scientific member, Working Group members agreed to consider the finalised survey results and their implications for future management arrangements across all species (noting black teatfish results are being considered in detail at this meeting) in the Beche-de-mer Fishery at their meeting in early 2021.
25. With agreement from the project team and traditional inhabitant members at the meeting, the AFMA Member advised that AFMA would make arrangements for further discussions between industry and the project team to inform the further work required to interpret the current survey results across all species. In consultation with participants, these meetings would likely be organised for the coming months.
26. The scientific member Tim Skewes also advised that future scientific stock surveys could benefit from Industry input with regards to future areas to be surveyed given that some specific areas that have high densities and/or specific length compositions have been observed by fishers for some species.
27. Working Group members thanked the Scientific member and the rest of the project team for their work on the project to date and noted that the next project progress update is due in October, with the project due to be completed in December 2020.

## **Part 2 - Black teatfish stock status**

28. Following the presentation of the survey results, the Scientific Member Tim Skewes provided additional information and clarification on the status of black teatfish stock in the Torres Strait and interpretation of the survey results in the context of the harvest strategy HS, the current gaps in the knowledge and comparison with management strategies used by other jurisdictions.
29. Default values of  $B_{TARG}$  and  $B_{LIM}$  in the Commonwealth Harvest Strategy Guidelines are 48%  $B_0$  for  $B_{TARG}$  and 20%  $B_0$  for  $B_{LIM}$ . However, there is broad recognition that these reference levels may be too low for sea cucumbers. The Torres Strait Beche-de-mer Fishery Harvest Strategy has a conservative proxy value of  $B_{LIM}$  of 40% $B_0$ . It is envisaged that these reference levels, including values of  $B_{TARG}$ , will be developed as more data become available. The scientific member Tim Skewes agreed to provide members with supporting resources on harvest strategy reference levels.
30. When drawing comparisons with other surveys, such as the ones undertaken for the Great Barrier Reef, unbiased comparisons between locations are difficult as sea cucumber density varies across reef habitats and in relation to distance from terrigenous influence (across shelf)—and likely several other lesser known gradients. Comparison depends on a clear delineation of the surveyed habitats and historical surveys in Torres Strait have been carried out using the same sample design and survey approach. The current report is showing better confidence in the biomass estimate and this is a sign that future surveys should replicate the sampling protocol for comparability. The results of the surveys are also consistent with industry's reports that stock abundance has increased for certain species.
31. It is hard to compare between various density reference points used in Australia and globally due to how habitat is defined in the various studies, however, by comparing density estimates in similar habitats between regions, it appears that black teatfish density in Torres Strait compares favourably to other regions, including closed areas on the GBR, indicating that black

teatfish densities in the Torres Strait are in a reasonable state. This inference is supported by comparisons with densities in other reports across all habitats and within the species preferred habitats.

### **PART 3 – modelling analyses**

32. Dr Eva Plaganyi presented the results of supplementary modelling analyses that built on the survey results for the Black teatfish stock in the Torres Strait. The biomass dynamic model uses the total 4-zone average biomass reported in the survey results and reported catch data to explore the changes over time to the biomass and productivity of the black teatfish population and see which life history parameters are consistent with the trends in the data. Whilst acknowledging there are limited data and large uncertainties, this type of analysis can help inform on sustainable fishing levels. This level of information cannot be obtained from a stock survey which is a static measure of the standing stock biomass at a given point in time.
33. The model is simple due to the limited information that is currently available for the fishery (i.e., relatively few values in the survey time series (5)) but provides a useful first step in exploring a range of alternative harvest scenarios with different levels of precautions added to support decision making. The fact that there is some contrast in the time series (a decline followed by a recovery) however provides some confidence to use the data to estimate productivity. Consistent with the BDM HS's tiered approach, the model incorporates precaution to deal with the level of uncertainty of the data for the fishery.
34. Key precautions when fitting to the 2019/20 survey estimate is to use the lower 90th percentile estimate and for models where the total biomass is estimated, the models estimate a lower biomass estimate and apply fairly conservative estimates of the growth rate parameter  $r$  so as not to over-estimate the productivity of the stock (especially given recruitment is sometimes sporadic in this species). Although a number of alternative sensitivities were considered, the model base-case doubled the starting 1995 survey estimate based on consideration of reasons why this estimate may be an under-estimate. The exact correction factor isn't known, but this assumption results in a steeper declining trend in survey indices in the early years (catches were also doubled) which also adds to the precaution applied. The model will get more refined and improved as more data become available.
35. As well as standing stock biomass estimates derived from surveys and catch data, the model uses a combination of the intrinsic growth rate ( $r$ ) and the carrying capacity ( $K$ ) parameters to obtain an estimate of productivity and replacement yield in the fishery (that is more robust than either parameter on its own) and hence a relatively robust estimate of Maximum Sustainable Yield (MSY) (assuming a Schaefer logistic growth model). The biomass estimate from the 1995 survey was doubled to provide an estimate of the carrying capacity of the stock. This was considered to be an appropriate starting point as the fishery was in its initial phases and the stock survey at the time is likely to have underestimated the biomass of the stock, relative to any other period in the surveyed history of the fishery.
36. The base-case model estimates the stock is currently at around two-thirds (67%) of  $K$ , and even though this is uncertain, all models suggest considerable stock recovery (well above BLIM), and hence it is reasonable to suggest MSY could be used as the sustainable replacement yield to inform decisions on a sustainable TAC.
37. Given the data inputs and the conservative parameter settings applied, the base case model was used to forward project the biomass trajectory under different exploitation levels, with 15t TAC and 30t TAC presented. The results suggest that 20-21 tonnes (MSY) may be a sustainable catch level for the trial reopening of the black teatfish fishery. This estimate is slightly higher than the 15t default opening TAC recommended by the BDM HS agreed in 2019.

The model projections suggest that a constant annual TAC of 30t would not be sustainable and would lead to a consistent decline in the biomass of the stock after the first year of fishing.

38. There was concern expressed by the TSRA Member that the base-case model (Model 4) did not accurately match the abundance estimates from the stock survey (the survey estimate is 818 tonnes for 2019/20 whereas the model estimate is around 300 tonnes). This was because the base-case model was selected as the base-case based on formal model selection methods which provides the best fit (with fewest associated parameters) to all of the observed data, including surveys from previous years and reported removals, and thus most plausible explanation of the trend in the data that the model are fitted to. Models are not reality but simplified depictions that help the understanding of some of the properties of complex systems.
39. Dr Plaganyi explained that in addition to the base-case model, a number of additional model versions were run and results of some of these presented in the accompanying report and at the meeting, including versions that fixed the biomass at higher levels more similar or identical to the 2019/20 survey biomass estimate. Across all model versions tried, the MSY estimate was roughly in the range 17-28t (with 22t estimates for the version identically matching the survey biomass level) and hence the MSY estimate of 21t was considered relatively robust.
40. In this instance, the biomass dynamic model uses conservative assumptions to provide assurance that the stock is at a healthy place and uses the different pieces of information that are available for the fishery to explain how the productivity of the stock will respond to different levels of exploitation. That is, it provides information on how stock levels might change over time (the trend in biomass: constant, increasing, declining).
41. This level of information cannot be obtained from a stock survey alone which is a static measure of the standing stock biomass at a given point in time and does not take into account the level of susceptibility of the stock to fishing. Furthermore, the base case model could be considered as representing the fished areas only, as opposed to the entire region (which the survey results are extrapolated to). Poor catch reporting can underestimate stock productivity. This is because a decline in stock biomass may be attributed to low catches and hence associated low productivity of the stock, whereas if the catches were actually higher, this means the stock productivity must have been higher.
42. The following additional data would help refine model analyses in the future:
  - Available biomass would be a better index to use when managing a recovering stock because it accounts for the lag effect in recruitment to the fishery, especially if they are a slow growing species, to give them a chance to reproduce.
  - Additional data– (catch per species, effort (e.g., data on hours spent fishing per day and number of fishers for each reported catch), catch per unit effort, spatial footprint (approximate areas or reefs fished by each fisher for each reported catch) and species composition) or better certainty in catch data will help to refine and substantially improve modelling results, and assess the accuracy of the current productivity estimate.
  - spatial aspects need to be accounted for in the modelling to reconcile the absolute biomass estimates with the trends in the survey data. Data loggers/tracking devices could be used to quantify spatial footprint and dive times etc
  - Sub-samples of catches could be sampled by fishers/individuals to collect data such as size measurements
43. A TSRA observer acknowledged the value of the modelling work but argued that it was full of uncertainty and as such should not be used to inform the discussion on setting a trial reopening TAC for black teatfish. The TSRA officer alleged that the supplementary modelling work was prepared in secrecy and outside of the scope of the project contract and without any consultation with traditional owners. He further alleged the purpose of undertaking this work was not explained adequately.

44. The AFMA Member advised that it took exception to the accusation made by the TSRA officer that the supplementary work was undertaken in secrecy and implication that AFMA and the project team have not been transparent. The information was not purposefully held back and a copy of the report was shared with the TSRA as soon as it became available. The project team has worked hard to undertake the analysis in time for the meeting. The purpose of the analysis is to support members in developing advice, including traditional inhabitant members. The modelling is not intended to replace data but simply add further lines of evidence for the working group to consider. This meeting provides an opportunity for members to understand and review the information with the project team.
45. Dr Plaganyi advised that there was nothing sinister about the additional work and expressed regret at the misunderstanding that this has caused. Dr Plaganyi outlined that the project team had gone through a considerable amount of effort to upskill to be able to use additional tools to provide insight into the application of the HS using a bootstrapping approach that was previously applied in this fishery but requires time to implement, in the midst of the disruption that the current COVID climate has caused for everyone. The intention of the additional work was to provide as strong a scientific basis as possible to inform the Working Group and industry's consideration of the survey results in light of a future reopening of black teatfish.
46. The Scientific member Steve Purcell advised that in his view the report is very well put together particularly give the time constraints. The survey is of high quality and the modelling advances the analysis. The member understood why some members find it confusing that the model biomass estimates do not match with the survey estimates of biomass. The modelling unlike the survey, incorporates all catch data and potential stock recovery rates. The survey results unlike the modelling also incorporates areas that are not necessarily fished.
47. The Scientific member, Tim Skewes, further advised members that the modelling uses all available information and gives an indication of the potential susceptibility of the species to fishing. It tries to explain why the population dropped so much historically noting catch was very much a likely driver of that decline. This involves a lot of work and it is unfair to say it was done in secret.
48. The TSRA Fisheries Portfolio Board member suggested that the Working Group members proceed to discussing the opening of the fishery based on the advice of the initial modelling work that a trial TAC level of 20-21t is considered sustainable. The Board member further suggested that the modelling be revisited following an initial opening to assess whether higher catch levels are possible for black teatfish in the fishery, following the collection of good quality fishing data.
49. AFMA Member noted that through the development of the HS industry had made clear their preference to rebuild a fishery for this stock cautiously over time and that the collection of data was a long-term commitment. Periodic surveys alone will not resolve uncertainties, good quality catch and effort data is required
50. The TSRA observer withdrew his allegation of the supplementary work being undertaken in secrecy and that it is not a reflection of the science rather an expression of frustration at not having being able to access the supplementary information earlier.
51. To conclude her presentation Dr Plaganyi outlined further research opportunities in exploring the potential uses of a revised and updated MSE (incorporating multispecies spatial operating model):
  - Could model all key species, with age structure and spatial component and bound the range of uncertainties
  - A tool to more comprehensively evaluate the risks of different TAC alternatives
  - A tool to validate the new Harvest Strategy (HS) and help implement rules such as how best to use indicators to adjust TACs e.g. size measurements used to inform on age structure and hence available biomass



- Can explore how adding data reduces uncertainty and hence consequences for management recommendations
- More broadly can contribute to aspirational development of an integrated ecosystem model that incorporates climate change

## 5 Future Black teatfish opening

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### Recommending a TAC based on information presented at the meeting

52. In recognition that new information (the modelling and estimates of available biomass) had been tabled at the meeting and circulated only a few days before the meeting, the AFMA member sought advice from members on whether or not they would like additional time to consider the information, including at a future HCWG meeting. The AFMA member noted that a further meeting of the HCWG could be convened.
53. Both traditional inhabitants together with the TSRA Board Fisheries Portfolio member advised they did not want further time. They supported using the information available and noted industry's commitment and understanding on the need to improve data for the fishery overtime.

### Is the stock above the limit reference point?

54. Working Group members agreed that, all available information indicates that the stock is above the limit reference point, thus satisfying the first condition of *Section 2.11.4 Re-opening Decision Rule* of the TSBDM HS.

### Recommending a TAC based on harvesting an agreed proportion of the estimated standing stock biomass for 2019/20

55. Working Group members discussed the merits of recommending a TAC based on a percentage (e.g., 10%) of the standing stock biomass estimate (available biomass or total) versus a modelling approach to recommending a starting black teatfish TAC to the PZJA. The Scientific Member Tim Skewes advised working group members that he considers the modelling approach to be more reliable and expressed his preference to use this as a basis for decision making, including setting catch limits, along with other lines of evidence. The 5-10% rules of thumb are derived from existing literature to inform exploitation levels for sea cucumbers in the absence of other data and analysis for a given fishery. A 5 % exploitation rate is intended to provide a conservative harvest limit taking into account the slow growth rate and susceptibility to depletion of sea cucumber species generally. It is hard to estimate an upper exploitation limit for these species and 10% was therefore identified as a rule of thumb for the maximum level of take that a healthy sea cucumber stock could sustain.
56. The scientific member, Steve Purcell, advised that 5% exploitation level is of limited application to black teatfish as populations have still been depleted at this level of fishing—the East Coast fishery being a well-studied example. Importantly, rules of thumb do not abrogate the need to collect good fishery data to inform the management and decision making in a fishery. Rules of thumb are based on observations that may be thought of as precautionary but can sometimes be misleading as they may not always account for change in productivity due to changes in recruitment.

### Member advice on a reopening TAC

57. Working Group members proceeded to individually recommend a trial opening TAC that they consider to be demonstrably conservative as per Condition 4 of the Reopening decision rule of the BDM HS.



58. None of the Working Group members recommended applying the rule of thumb approach described above.
59. **AFMA Member supported a recommended trial opening TAC of 20t** based on the conservative model outputs.
60. **Traditional Inhabitant Member Gudumalulgal** recommended a TAC of 20t noting that 21t would still be considered sustainable but the 1t would provide a buffer should the TAC be exceeded. The member also recommended an April 2021 re-opening to allow enough time for the engagement of individual TIB operators to get their perspectives on the arrangements for the reopening.
61. **Traditional Inhabitant Member Kemer Kemer Meriam** – reiterated his agreement with Traditional Inhabitant Member, Gudumalulgal with regards to recommending a 20t TAC level. The member also reiterated that it is important to undertake consultation with full time fishers on all the elements of a black teatfish trial reopening, including presentation of the scientific basis for the recommended TAC and the additional catch reporting requirements that would in place.
62. **The TSRA Member recommended** a TAC of 21t, relying on the provisions in the HS to provide the 5% buffer should catches exceed the set Trial TAC. The member further confirmed that the TSRA Board have supported for the TSRA Fisheries section to undertake community visits, given the stakeholder workshop could not proceed due to COVID-19 restrictions.
63. *Traditional Inhabitant Member, Gudumalulgal left the meeting at 3pm to pay respects to an elder that has passed away at Badu.*
64. **The Scientific Member Steven Purcell recommended** the more conservative 15t Trial TAC for the reopening as the rate that can be demonstrated by the science as being more sustainable especially in light of the CITES Appendix II Listing for black teatfish coming into effect at the end of August. The member noted that the model indicates that 20t would be a sustainable and is based on a precautionary biomass estimate. However this is the maximum sustainable yield (MSY) level that can be taken without impeding the sustainability of the stock and if exceeded runs the risk of having to close the fishery in the future. Whereas a 15t TAC would lower that risk and would support the sustainable redevelopment of the fishery as more CPUE data becomes available to support setting higher TACs in future years. The present lack of data from fishers about fishing effort and areas being fished for each reported catch leaves too much uncertainty (i.e., no way to monitor) about how the stock of black teatfish will respond over subsequent years of re-opening the fishery.
65. **The QDAF Member recommended** a 15t Trial TAC, which is consistent with Table 3. 'TAC Recommendations' which is referred to under the Reopening Decision Rule in the Torres Strait Beche-de-mer Fishery Harvest Strategy. QDAF would support higher TACs in the fishery in the future, if the scientific data supports it and the TAC is not exceeded during the trial openings. QDAF recommended the 15t amount to be consistent with the harvest strategy, because previous trial black teatfish openings have reached or exceeded the TAC quickly and as black teatfish is now a CITES Listed species there can be flow on effects in other jurisdictions when TACs are exceeded.
66. **The Scientific Member Tim Skewes recommended** a trial TAC of 20t as a conservative MSY estimate based on a conservative stock biomass estimate, noting that 21t would still be considered sustainable but the 1t would provide a buffer should the TAC be exceeded. The member stated that he is comfortable that this is a precautionary and justifiable catch limit that balances precaution with the livelihood considerations for Torres Strait Islanders. The member further commented that the current information adequately justifies this level of take from a

CITES Listing perspective also and that other considerations need to be progressed in the fishery such as managing the level of effort and minimising product wastage during processing which this meeting has not touched on.

67. The Permanent observer on the Working Group, Yen Loban, TSRA Fisheries Portfolio Board Member, supported the recommendations of the Traditional Inhabitant Member, Gudumalulgal and the Traditional Inhabitant Member Kemer Kemer Meriam on their recommended TAC of 20 tonnes and the need to undertake community visits prior to the trial reopening, including a presentation of the science that has informed the recommended TAC.
68. Given Working Group members' recommendations and the view expressed to aim for a black teatfish trial opening in April 2021, the AFMA member advised that AFMA will engage with the traditional inhabitant members that have not had a chance to participate in the discussion today to get their views on the recommended TAC levels. AFMA would advise the HCWG on the process for doing so.

## 6 Date and venue for next meeting

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69. The HCWG noted that a tentative date for the next meeting of the HCWG during the week beginning 5 October had been proposed by AFMA, the format of the meeting will depend on the COVID-19 situation at the time. The need for this meeting was contingent in part on advice from members at this meeting on whether or not any management responses to the preliminary stock survey outcomes (for example advice on BDM TACs limits for the 2021 season) need to be considered. Based on advice from members under agenda item 4, this discussion can be held next year.
70. Other items noted by AFMA requiring advice this year include:
  - Research priorities for 2022-23; and
  - Legislative instrument amendments.
71. The Working Group noted that AFMA would liaise with members on a suitable process to progress these items (out of session or in-session in a meeting).
72. The Chair concluded the meeting of the HCWG at approximately 3:30pm
73. Quinten Hirakawa closed the meeting with a prayer.

Table 4. Status of actions arising from previous HCWG meetings.

#	Meeting	Action item	Responsibility	Status
1	HCWG 15 (1-2 August 2019)	TSRA and AFMA to develop a discussion paper outlining suggested management arrangements, based on HCWG discussions for pursuing the use of hookah to fish for white teatfish, for further consultation with communities and consideration by the HCWG and the PZJA.	TSRA AFMA	<b>Ongoing.</b> The TSRA supported PZJA Traditional Inhabitant members to undertake cluster consultations in late 2019 which sought feedback from communities on the use of hookah to fish for white teatfish. An overview of the consultations outcomes was considered at HCWG 16. The HCWG recommended Malu Lamar discuss the review of the hookah prohibition at the stakeholder workshop with the view to developing management recommendations (see <b>Action 6</b> below).
2	HCWG 15 (1-2 August 2019)	AFMA to arrange a half/full day future management priorities workshop in conjunction with the next Hand Collectables Working Group meeting.	AFMA	<b>Ongoing.</b> AFMA was unable to arrange the workshop in conjunction with HCWG16 as the focus of that meeting was to seek firm advice on black teatfish for a 2020 opening. Options, including timing and means, for a future workshop will continue to be explored in consultation with members having regard for Covid 19 response measures.
3	HCWG 16 (21 February 2020)	Malu Lamar to make recommendations to AFMA and TSRA on an as needs basis to establish an MOU to assist in improved data collection in the Fishery.	Malu Lamar	<b>Ongoing.</b> While no formal MOU has been developed, a suite of parallel activities have since taken place including a full round of community visits focussed on Fish Receiver System education and awareness, and more recently PZJA traditional inhabitant member cluster consultations. AFMA also continues to work with individual operators to improve data collection.  The TSRA is also working with Malu Lamar to agree a service level MOU that may include programs aimed at improving reporting.  At the HCWG16 meeting, the Malu Lamar Chairperson expressed preference to maintain an ongoing action item on the

#	Meeting	Action item	Responsibility	Status
				development of the MOU to ensure it remains an option if needed.
4	HCWG 16 (21 February 2020)	Malu Lamar to take the lead in convening a stakeholder workshop to further discuss and agree on cultural lore and industry agreements with respect to fishing for black teatfish and report outcomes to the HCWG.	Malu Lamar (supported by TSRA)	<b>Ongoing.</b> The stakeholder workshop was initially planned to take place on 7-8 April but had to be postponed due to the COVID-19 emergency and resulting restrictions. A further workshop was scheduled for the 4-5 August, however it is no longer proceeding. TSRA advise that a series of meetings in communities may now be pursued.
5	HCWG 16 (21 February 2020)	AFMA explore media opportunities such as radio to widely communicate the additional management and reporting requirements for a black teatfish re-opening.	AFMA	<b>In progress.</b> To date, AFMA has identified a number of media avenues to communicate the additional management and reporting requirements for a black teatfish re-opening. These include radio interviews, newspaper adverts, and digital notice boards throughout the region as well as the PZJA website and AFMA's social media platforms.
6	HCWG 16 (21 February 2020)	Malu Lamar to discuss the review of the hookah prohibition at the stakeholder workshop with a view to developing management recommendations.	Malu Lamar (supported by TSRA)	<b>Ongoing.</b> The stakeholder workshop was initially planned to take place on 7-8 April but had to be postponed due to the COVID-19 emergency and resulting restrictions. A further workshop was scheduled for the 4-5 August, however it is no longer proceeding. TSRA advise that a series of meetings in communities may now be pursued.

## Attachment A – Adopted Agenda

### MEETING OF THE PZJA TORRES STRAIT HAND COLLECTABLES WORKING GROUP MEMBERS

7 August 2020 (9:00 am – 3:00 pm)

Teleconference

**DRAFT AGENDA**

The meeting will open at 9:00am on 7 August 2020.

#### **AGENDA ITEM 1                      PRELIMINARIES**

##### **1.1      Acknowledgement of Traditional Owners, welcome and apologies**

The Chair will welcome HCWG members, permanent observers, and casual observers to the meeting of Torres Strait Hand Collectables Working Group members.

##### **1.2      Adoption of agenda**

The working group is invited to consider and adopt the draft agenda.

##### **1.3      Declarations of interest**

Working group members are invited to declare any real or potential conflicts of interests to the group and determine whether a member may or may not be present during discussion of or decisions made on the matter which is the subject of the conflict.

##### **1.4      Action items from previous meetings**

The working group will note the status of action items arising from previous HCWG meetings.

##### **1.5      Out of session correspondence**

The working group will note any out of session correspondence on HCWG matters since the previous meeting.

#### **AGENDA ITEM 2                      WORKING GROUP UPDATES**

The Working Group will note updates from members and observers on matters relevant to Torres Strait Hand Collectable fisheries.

##### **2.1      Industry members**

##### **2.2      Scientific members**

##### **2.3      Government Agencies**

###### **2.2.1      Australian Fisheries Management Authority (AFMA) – Management**

###### **2.2.2      Australian Fisheries Management Authority (AFMA) – Compliance**

###### **2.2.3      Torres Strait Regional Authority (TSRA)**

## 2.2.4 Queensland Department of Agriculture and Fisheries (QDAF)

### 2.3 Native Title

### 2.4 Papua New Guinea National Fisheries Authority

## AGENDA ITEM 3 CATCH AND EFFORT SUMMARY

- 3.1 The working group will note a summary of reported catch in the Beche-de-mer Fishery for the 2020 fishing season to date.

## AGENDA ITEM 4 PRELIMINARY RESULTS OF THE BECHE-DE-MER STOCK SURVEY

- 4.1 The Working Group will consider the preliminary results of the eastern Torres Strait stock survey of Beche-de-mer species that took place in November 2019 and January 2020.

## AGENDA ITEM 5 FUTURE BLACK TEATFISH OPENING

- 5.1 In consideration of the preliminary stock survey results, and guidance under the Beche-de-mer Harvest Strategy, the Working Group will provide advice to the PZJA on an appropriate TAC and relevant management arrangements required for a possible future black teatfish opening.

**Expected Outcome:** The Working Group will **provide advice to the PZJA** on a suitable time and appropriate management arrangements, including a recommended total allowable catch, required to conduct a black teatfish opening in accordance with the decision rule in the BDM harvest strategy for re-opening a closed species.

## AGENDA ITEM 6 OTHER BUSINESS

### 6.1 Other Business

The Working Group is invited to nominate any other business for discussion.

### 6.2 Date and venue for next meeting

The Working Group will consider a date and venue for HCWG17.

## CLOSE OF MEETING



<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting 1 6-8 October 2021</b>
<b>HARVET STRATEGY IMPLICATIONS OF SURVEY RESULTS AND CATCH DATA</b>	<b>Agenda Item 5 For Discussion and Advice</b>

## RECOMMENDATIONS

1. That the Hand Collectables Resource Assessment Group (RAG),
  - a. **NOTE** that on 19 November 2019 the Protected Zone Joint Authority (PZJA) agreed to adopt the Torres Strait Bech-de-mer Fishery Harvest Strategy. Current total allowable catches (TACs) were agreed in line with the starting TACs recommended in the harvest strategy and have applied since 1 January 2020.
  - b. **CONSIDER** all new information available since the adoption of the harvest strategy including:
    - i. the results of the scientific stock survey tabled at Agenda item 3; and
    - ii. catch data for the 2020 and 2021 (preliminary) fishing seasons (**Attachment A**).
    - iii. CSIRO summary on the current knowledge for sea cucumber species in the Torres Strait (**Attachment B**).
  - c. **DISCUSS** and **PROVIDE ADVICE** on recommended TACs for the 2022 fishing season commencing on 1 January 2022 (noting Black teatfish will be considered under Agenda item 4) or where relevant, further analysis to be undertaken.
    - i. AFMA recommends that the RAG work through a Species Assessment Sheet for each species to guide the formulation of its advice.
  - d. **CONSIDER** the information required to support decision rules under each tier of the harvest strategy and **PROVIDE ADVICE** on any short to medium-term data and research needs.

## KEY ISSUES

1. The BDM Fishery Harvest Strategy is based on a tiered framework which accounts for improvements in data and information. The HS applies to 18 species (inclusive of the 3 closed species).
2. Current TAC's reflect the starting TACs recommended in the harvest strategy (Table 3 Starting HS TAC Recommendations).
3. Since the harvest strategy was agreed, a scientific survey has been undertaken and (Agenda Item 3) and basic catch data has been collected for almost two fishing seasons (2020 and 2021) through the fish receiver system (a copy of the fish receiver TBDO2 Catch Disposal Record is at **Attachment C**). A summary of catch data as reported in the TBDO2 Catch Disposal Records is provided in **Attachment A**. Further a preliminary stock assessment was undertaken for black teatfish (please note black teatfish is to be considered by the RAG under Agenda Item 4).
4. The Hand Collectables Working Group (HCWG) considered preliminary results of the scientific survey in August 2020 and were satisfied that the results did not raise immediate sustainability concerns that needed to be urgently addressed before the 2021 fishing

season. As a result, this meeting presents the first application of the harvest strategy (except for black teatfish<sup>1</sup>) since its commencement.

5. To assist the RAG in formulating its advice on TACs for the 2022 fishing season or further analysis to be undertaken, a Species Assessment Sheet (SAS) has been developed for each species (**Attachments D**). The SAS is designed to assist the RAG:
  - a. compile and characterise all relevant information (for example adequacy of survey and catch data for a particular species);
  - b. confirm the appropriate harvest strategy tier for each species;
  - c. apply the harvest strategy decisions rules (otherwise known as control rules) within the tier OR recommend further analysis to be undertaken. Given the number of species being reviewed, the RAG is asked to prioritise any recommendations for further analysis across species; and
  - d. identify any short to medium-term data and research needs.
6. An overview of each harvest strategy tier is provided in the Background. Subject to RAG advice, it is likely that most species will fall into the low tier. This is because a transition to the middle tier requires at least two primary indicators and is not applicable during the initial years of HS implementation as insufficient detailed historical fishery data are available. For the high tier to apply a time series of high-quality species-specific surveys together with a reasonable level of catch is required.

## BACKGROUND

7. A summary of each harvest strategy tier is provided below

### ***Low Tier***

8. In the low tier, the minimum data needed for each species is the total catch taken each fishing season. The low tier has rules to guide:
  - a. what happens to a species if the TAC is over caught or a trigger limit for a species within a joint TAC is reached; and
  - b. what happens if there is no data reported for a species at all.
9. Depending on the information available, the low tier allows single species TACs to be maintained or reduced. For species with individual triggers, within a joint TAC, the low tier may allow changes to the joint TAC, or to individual species triggers (up or down).

### ***Middle Tier***

10. To transition to the middle tier, two or more primary indicators must be available. The harvest strategy states however that the middle tier is not applicable during the initial years of HS implementation as insufficient detailed historical fishery data are available.
11. For the purposes of the middle tier the primary indicators are:
  - a. Catch per unit effort;
  - b. Spatial footprint;
  - c. Average size; and
  - d. Catch proportion.

---

<sup>1</sup> The harvest strategy reopening rule was applied to develop advice on the 2021 black teatfish opening TAC.

12. The information from these primary indicators will guide how much TACs should be varied. If the primary indicators suggest an increase is possible, there are pre-agreed rules that set a maximum level that the TAC can increase by before high-quality survey data is required (refer to Table 3 in the harvest strategy for the Max middle tier TAC increase).

### ***High Tier***

13. The high tier may be applied to all species if species-specific, high quality survey data becomes available. Under this tier, TACs may be adjusted upwards (in cases where there is evidence of scope to increase TACs) or downwards (in cases where there are concerns about the status of a fished species).

### ***Closed Species***

14. A species may be closed to fishing if it has been overfished, the TAC has been significantly over caught, or if fishing has been occurring but there is no reported catch. The harvest strategy has rules to guide how to re-open a fishery if enough information is available.

**TORRES STRAIT HAND COLLECTABLES  
RESOURCE ASSESSMENT GROUP**
**Meeting No. 1  
6-8 October 2021**
**Beche-de-mer 2020 fishing season catch data**
**Key messages**

1. Some of the key reporting improvements that have continued in the 2020 fishing season include:
  - a. no 'unidentified sea cucumbers' have been reported;
  - b. fishers have continued to provide voluntary, high level, effort and spatial information that continues to provide some insight into how the fishery operates;
  - c. operators are not landing catch after it has been overly processed (i.e. dried) meaning the timeframe between the product being caught and landed to a fish receiver is minimised; and
  - d. fishers have continued to voluntarily report damaged product separately.
  - e. There are some important aspects of the catch reports that still need to improve, mainly species level identification of curryfish species and the level of effort and spatial reporting which has declined since the 2018 and 2019 fishing seasons
2. A summary of key reporting metrics and status from 2018 – 2020 are summarised in Table 1.

**Table 1. Summary of changes in key reporting metrics from 2018 to 2020.**

<b>Metric</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>Change since 2019</b>
Number of CDRs submitted	258	239	140	↓(41%)
Total catch reported (tonnes)	64.3	39.00	31.97	↓ (18%)
No. of species reported	14	14	11	↓
% of CDRs reporting Area Fished	84%	69%	60%	↓
% of CDRs reporting Number of Days Fished	77%	70%	64%	↓
% of CDRs reporting Number of Fishers	96%	71%	65%	↓
Number of licenced TIB fishers reporting BDM	34	40	30	↓
Number of licenced Fish Receivers reporting BDM	13	17	15	↓

**Reported landed catch**

3. A total of 31.97 tonnes of beche-de-mer catch was reported across 11 different species in the BDM Fishery in the 2020 fishing season. A summary of reported catches by species for the 2019, 2020 and 2021 (as at 18 Aug) fishing seasons is provided in Table 3. It should be noted that some of the differences in catches between the 2019 and 2020 fishing seasons may be due to changes to the conversion ratios on 1 January 2021, following the implementation of the BDM Harvest Strategy.
4. Prickly redfish (15.65 t) and curryfish (11.29 t) were the most caught species, followed by white teatfish (1.77t), blackfish (hairy) (1.40t) and lollyfish (1.27t).
5. The prickly redfish TAC of 15t was slightly exceeded for the second time since 2005. With the exception of prickly redfish and white teatfish, 2020 catches were less than 2019 catches across all species.
6. 2020 season catches were reported across 140 Catch Disposal Records (CDRs) (i.e. number of CDR pages submitted), from 15 fish receivers and 30 licenced traditional inhabitant boat (TIB) fishers. A summary of licences in the BDM fishery is outlined in Table 4.
7. Although the total number of CDRs submitted for 2020 has dropped by 41% compared to the 2019 season, the corresponding reduction in total reported catch is only 18%.

**Processed State**

8. In the 2020 fishing season, BDM catch was reported in eight different processed states including: boiled, boiled and chilled, boiled and frozen, boiled and salted, frozen and green, salted, whole weight and damaged.
9. 59% of the catch was reported as 'salted' and 33% as 'boiled and salted'.
10. The improvements in the number of CDRs and fishers voluntarily reporting damaged product separately have continued.

**Voluntary Section**

11. Of the 140 CDRs submitted during the 2020 fishing season, 59% of records contained voluntary, high level information on the number of fishers, areas fished and number of days fished.

**Catch by Area**

12. 60% of the records reported the 'Area Fished', a summary of which is provided in Table 2 for the fishing seasons 2019, 2020 and 2021 to date. 25% of the catch reported for 2020 did not have corresponding spatial information.
13. By volume of catch, more than 70% of the 2019 and 2020 catches were reported as having been caught in areas 14 (Great North East Channel), 16 (Darnley), 17 (Cumberland) and 19 (Don Cay).

**Table 2. Summary and comparison of BDM catches in the reporting areas in the BDM Fishery during the 2019, 2020 and 2021 fishing seasons. Note that 2021 catches are current as at 18 August 2021.**

<b>Area Fished</b>	<b>2019 (t)</b>	<b>2020 (t)</b>	<b>2021 (t)</b>
11 (Warrior)	1.7	1.45	0.97
12 (Warraber)	0.02		
14 (Great North East Channel)	10.2	4.64	0.95
16 (Darnley)	4.7	3.46	3.46
17 (Cumberland)	7.0	10.21	9.86
18 (Seven Reefs)	0.6		
19 (Don Cay)	3.4	4.37	1.86
Not reported	7.4	7.84	15.17
<b>Total</b>	<b>35.0</b>	<b>31.97</b>	<b>32.27</b>

#### ***Catch by trip length (number of days fished)***

14. 64% of records reported the 'number of days fished' (compared to 70% in 2019), which accounted for 86% of the total reported catch volume (compared to 88% in 2019).
15. Reported trip lengths ranged from 1-10 days, with only 13% of the total reported catch having been caught on single day trips (compared to 37% in 2019). It is highly likely that fishers and fish receivers are recording catch from multiple trips on one CDR record which may be underestimating the number of single day fishing trips undertaken in the fishery.

#### ***Number of Fishers and fish receivers***

16. 65% of the records reported number of days fished. Majority of those records (85%) indicate that 2 or 3 people fished per trip (assuming that one record corresponds to one trip which is not always the case). More specifically, 61% of the catch was reported to have been caught in dinghies with 2-3 people.
17. Of the 30 fishers that landed catch in 2020, 12 had also landed BDM in 2019 and 2018. A total of 7 fishers were reported as having landed catch for the first time in 2020 since the implementation of the Fish Receiver System in 2017.
18. Of the 15 fish receivers that received catch in 2020, 9 had consistently received catch since 2018 and 12 since 2019.



**ATTACHMENT A – 2020 FISHING SEASON DATA SUMMARY**

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**Table 3. Breakdown of reported BDM catch<sup>1</sup> by species since 2005.**

Common name	TAC (t)	2005 (kg)	2007 (kg)	2010 (kg)	2011 (kg)	2012 (kg)	2013 (kg)	2014 (kg)	2015 (kg)	2016 (kg)	2017 <sup>2</sup> (kg)	2018 <sup>3</sup> (kg)	2019 (kg)	2020 (kg) <sup>4</sup>	2021 (kg) <sup>5</sup>
Black teatfish	0 (15 <sup>6</sup> ) (20)				75	2,001	138	16,624	23,303						17,615
Prickly redfish	15 (20 <sup>7</sup> )	5,564	128	146	11,056	1,255	5,888	9,173	28,110	11,211	12,185	14,741	11,875	15,654	8,797
Sandfish	0			5	31	2,152	26	6				18			
Surf Redfish	0	734					52	1			747			199	
White teatfish	15	186			3,179	13,924	12,633	16,341	4,200	990		1,774	1,564	1,767	1,308
Blackfish (Hairy)	5 <sup>8</sup>		128		507	73	216	1,960	3,596	1,098	11,118	1,368	3,475	1399	482
Deepwater redfish	5 <sup>9</sup>			7			5,024	4,229	5,546		160	172	50		17
Greenfish	40 <sup>10</sup>						1	1	14		63	1,013	271	15	
Curryfish – mixed	60t basket <sup>11</sup>				1,118				6,099	1,085	597	42,392	14,538	10,521	3,961
Curryfish Herrmanni (common)													1,343	621	
Curryfish vastus													491	153	
Deepwater blackfish	50t basket <sup>12</sup>												177	166	72
Elephant trunkfish					4	28	2		133			190	12		
Golden sandfish							52	351	55			8	32		
Burrowing blackfish													10		
Stonefish				459							6				
Leopardfish											6,876	2,322	958	206	
Brown sandfish												30	204		
Lollyfish													3,997	1,272	22
Unidentified BDM												67			
<b>'Basket total'</b>		<b>186</b>	<b>256</b>	<b>466</b>	<b>1,629</b>	<b>101</b>	<b>5,295</b>	<b>6,541</b>	<b>15,443</b>	<b>2,183</b>	<b>19,831</b>	<b>47,761</b>	<b>25,558</b>	<b>1,644</b>	<b>94</b>
<b>GRAND TOTAL</b>		<b>6,484</b>	<b>256</b>	<b>617</b>	<b>15,970</b>	<b>18,803</b>	<b>24,032</b>	<b>48,686</b>	<b>71,056</b>	<b>14,384</b>	<b>32,764</b>	<b>64,300</b>	<b>38,997</b>	<b>31,972</b>	<b>32,274</b>

<sup>1</sup> No catch reported in 2006, 2008, 2009

<sup>2</sup> Catch data for 2017 is converted weights where processed form is known (47kg unknown), based on catch reported through tax invoices, HC01, TDB01 and TBD02. Verification was conducted to remove possible duplicates between records.

<sup>3</sup> Data for fishing seasons 2018 onwards is reported through TDB02 Catch Disposal Records only and converted to wet weight gutted using CSIRO recommended conversion factors.

<sup>4</sup> New conversion ratios as per the BDM Harvest Strategy were implemented for some species on 1 January 2020.

<sup>5</sup> Catches current as at 18 August 2021.

<sup>6</sup> The 15t TAC was available during 2014 and 2015 only

<sup>7</sup> The 20t TAC was available until the end of 2017.

Yellow highlighted cells indicate an exceeded TAC

<sup>8</sup> New individual species TAC as of 1 January 2020, previously part of the 80t basket species TAC.

<sup>9</sup> New individual species TAC as of 1 January 2020, previously part of the 80t basket species TAC.

<sup>10</sup> New individual species TAC as of 1 January 2020, previously part of the 80t basket species TAC.

<sup>11</sup> New Curryfish species basket TAC as of 1 January 2020, previously part of the 80t basket species TAC

<sup>12</sup> Prior to 2020 the total allowable catch limit for basket species was 80t.

Table 4. Number of licences in the Beche-de-mer Fishery as at 1 September 2020 and 2021.

Year	Number of TIB licences with BDM fishery entries	Number of TVH licences	Fish Receiver licences
2020	156	1 licence held in trust by the TSRA	67
2021	180	1 licence held in trust by the TSRA	83

## Sea cucumber 2021 species review for East Torres Strait

Nicole Murphy, Eva Plaganyi and Tim Skewes



Murphy NE, Plaganyi E, Edgar S, Salee K, Skewes T (2021) Stock survey of sea cucumbers in East Torres Strait. Final report. May 2021. CSIRO, Australia. 138 pp.

This is a summary of current knowledge for sea cucumber species in Torres Strait, in order to prioritise and inform structured discussion, based on the following questions:

1. Was it covered by the survey?
2. Was survey adequate for that species?
3. Any unexpected results e.g. found more, less than expected, trends changed etc.
4. Any concern indicated by survey results (trend or absolute abundance), or need for change?

\*Preliminary results presented, noting potential for future analyses to be refined by accounting for unequal variances associated with survey estimates (and hence adjusting the weighting accorded to different survey estimates (regressions)).

\*Comments for individual species need to be considered in conjunction with catch data, which are not presented in full in this document.

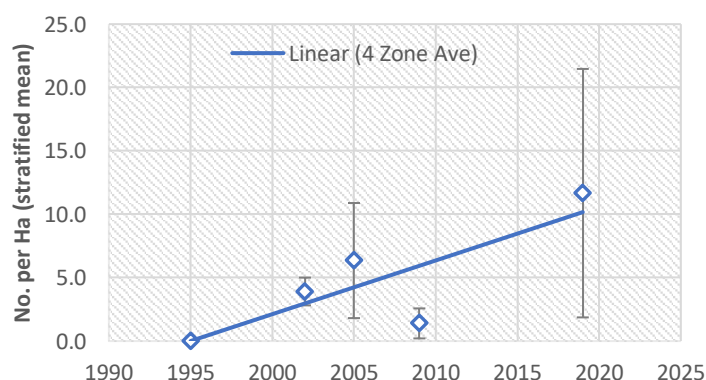
### Definitions

Catch assessment: Check whether TAC exceeded, or whether there is an increasing trend in catches (etc.) - could mean a species is of concern and survey data can't be considered in isolation.

No concern for Total Allowable Catch (TAC): TAC is ok to stay unchanged - a stable survey trend is reassuring in that there are not sustainability concerns.

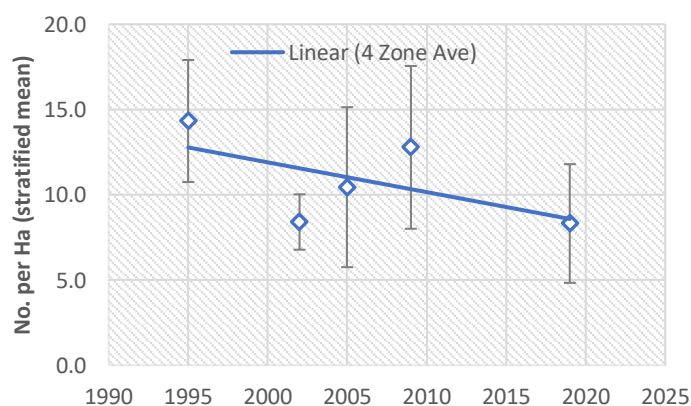
\*Trends are useful for indicating whether a TAC increase or decrease may be considered ie. if strong trend (slope).

### Plot interpretation - showing trends in survey estimates:



**Upward trend:** An increasing trend – good to wait for further Harvest Strategy indicators to confirm that a TAC increase could be possible

\*Fishery-dependent data becomes very important for a TAC increase



**Downward trend:** A declining trend suggests the HCRAAG needs to carefully review the species

**Table 1. Summary for sea cucumber species and preliminary recommended actions**

Common name	Species	Indicator concern	Status finding	Recommended action
White teatfish	<i>Holothuria fuscogilva</i>	No	Quantified stock	Potential to increase TAC
Prickly redfish	<i>Thelenota ananas</i>	Yes	Possible decline	Catch assessment
Curryfish - common	<i>Stichopus herrmanni</i>	Yes	Possible decline Mixed species issue	Catch assessment
Curryfish - vastus	<i>Stichopus vastus</i>	Yes	Mixed species issue	Catch assessment
Surf redfish	<i>Actinopyga mauritiana</i>	No	Remain closed	Harvest Strategy rule applies
Deepwater redfish	<i>Actinopyga echinites</i>	No	-	No concern for TAC
Hairy blackfish	<i>Actinopyga miliaris</i>	Yes	Possible decline Unknown status	Catch assessment Targeted sampling
Elephant trunkfish	<i>Holothuria fuscopunctata</i>	No	Possible decline or natural variability	Catch assessment
Lollyfish	<i>Holothuria atra</i>	Yes	Possible decline or natural variability	Catch assessment
Amberfish	<i>Thelenota anax</i>	No	-	No concern for TAC
Leopardfish	<i>Bohadschia argus</i>	No	-	No concern for TAC
Pinkfish	<i>Holothuria edulis</i>	No	Possible decline or natural variability	Catch assessment
Deepwater blackfish	<i>Holothuria palauensis</i>	Yes	Unknown status	Catch assessment Targeted sampling
Sandfish	<i>Holothuria scabra</i>	No	Remain closed	Harvest Strategy rule applies


**Species: White teatfish - *Holothuria fuscogilva***

Open

Species triage	Outcome
Covered by survey	Yes
Survey adequate	Yes
Unexpected results	No
Indicated concerns	No

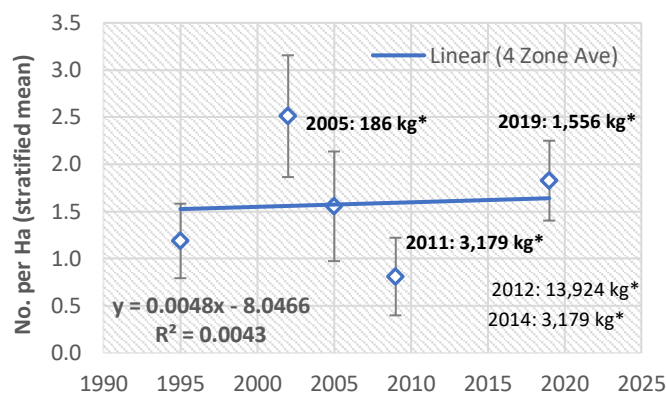


Figure 1. East Torres Strait (4 zone = Cumberland, Darnley, Seven Reefs and Don Cay) average (stratified) density (No. per Ha) for reef stratum for White teatfish (*H. fuscogilva*) from five surveys (error bars = 1 s.e.) (does not include deep-reef strata) (\*reported catch for year)

**Comments:** Deepwater survey undertaken for first time in 2019/20. Confident that White teatfish population for East Torres Strait has been quantified. Survey trend fairly constant over time. Review TAC - potential to increase.


**Species: Prickly redfish – *Thelenota ananas***

Open

Species triage	Outcome
Covered by survey	Yes
Survey adequate	Yes
Unexpected results	No
Indicated concerns	Yes

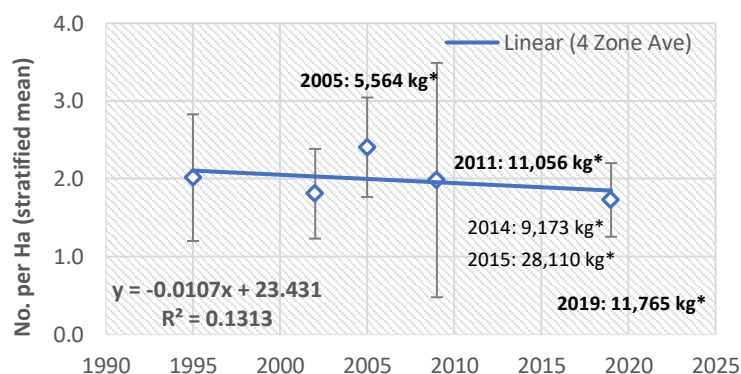


Figure 2. East Torres Strait (4 zone = Cumberland, Darnley, Seven Reefs and Don Cay) average (stratified) density (No. per Ha) for reef stratum for Prickly redfish (*T. ananas*) from five surveys (error bars = 1 s.e.) (does not include deep-reef strata) (\*reported catch for year)

**Comments:** Slight decline (in slope - density over time), suggesting some concern given reports of sustained high catches. Close monitoring recommended. Catch assessment needed.


**Species: Curryfish (common) – *Stichopus herrmanni***

Open

Species triage	Outcome
Covered by survey	Yes
Survey adequate	Yes
Unexpected results	No
Indicated concerns	Yes

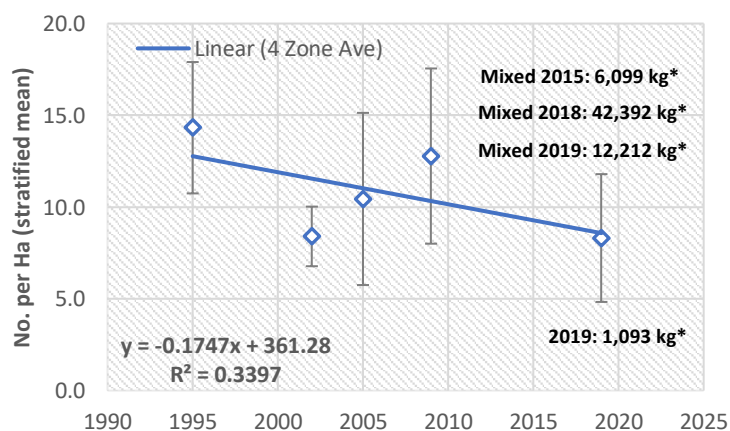


Figure 3. East Torres Strait (4 zone = Cumberland, Darnley, Seven Reefs and Don Cay) average (stratified) density (No. per Ha) for reef stratum for Curryfish (common) (*S. herrmanni*) from five surveys (error bars = 1 s.e.) (does not include deep-reef strata) (\*reported catch for year)

**Comments:** Possible decline (noting fairly negative trend fitted to survey data). Catch assessment needed. Close monitoring recommended - part of 'Curryfish mixed' (catch split 50:50 between Curryfish species when not identified).


**Species:** Curryfish (*vastus*) – *Stichopus vastus*

Open

Species triage	Outcome
Covered by survey	Yes
Survey adequate	Yes
Unexpected results	No
Indicated concerns	Yes

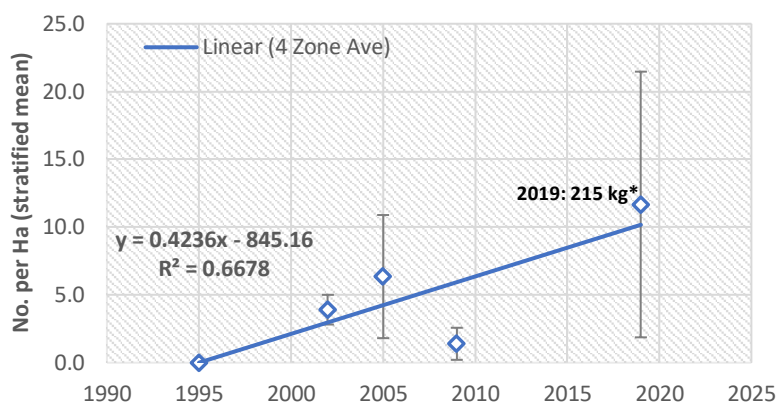


Figure 4. East Torres Strait (4 zone = Cumberland, Darnley, Seven Reefs and Don Cay) average (stratified) density (No. per Ha) for reef stratum for Curryfish (*vastus*) (*S. vastus*) from five surveys (error bars = 1 s.e.) (does not include deep-reef strata) (\*reported catch for year)

**Comments:** Higher ratio of *S. vastus* observed in 2019 survey. Close monitoring recommended - part of 'Curryfish mixed' (catch split 50:50 between Curryfish species when not identified).


**Species:** Surf redfish – *Actinopyga mauritiana*

Closed

Species triage	Outcome
Covered by survey	Yes
Survey adequate	Yes
Unexpected results	No
Indicated concerns	No

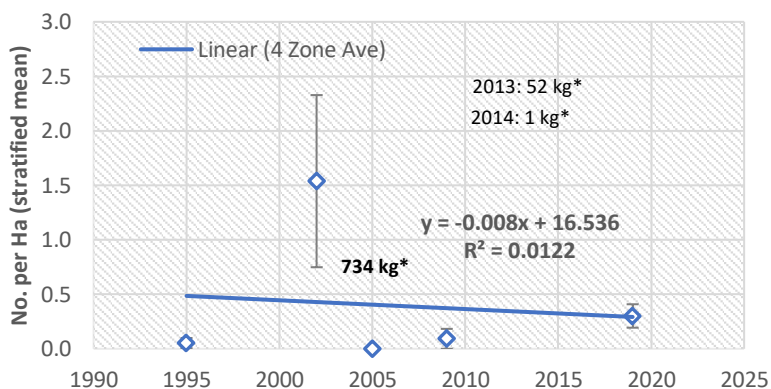


Figure 5. East Torres Strait (4 zone = Cumberland, Darnley, Seven Reefs and Don Cay) average (stratified) density (No. per Ha) for reef stratum for Surf redfish (*A. mauritiana*) from five surveys (error bars = 1 s.e.) (does not include deep-reef strata) (\*reported catch for year)

**Comments:** Species remains closed – Harvest Strategy closed species rule applies.


**Species:** Deepwater redfish – *Actinopyga echinites*

Open

Species triage	Outcome
Covered by survey	Yes
Survey adequate	Yes
Unexpected results	No
Indicated concerns	No

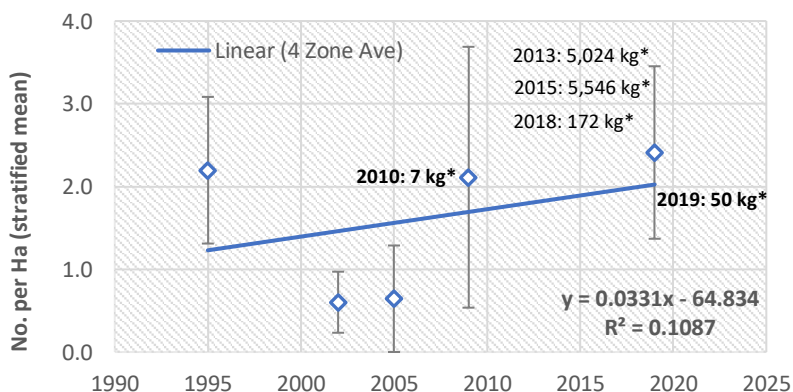


Figure 6. East Torres Strait (4 zone = Cumberland, Darnley, Seven Reefs and Don Cay) average (stratified) density (No. per Ha) for reef stratum for Surf redfish (*A. echinites*) from five surveys (error bars = 1 s.e.) (does not include deep-reef strata) (\*reported catch for year)

**Comments:** Catches low. No concern for TAC.




**Species:** Hairy blackfish – *Actinopyga miliaris*

Open

Species triage	Outcome
Covered by survey	Yes
Survey adequate	Limited
Unexpected results	No
Indicated concerns	Yes

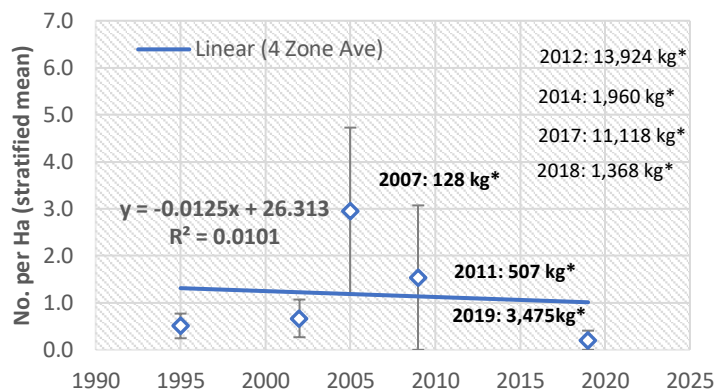


Figure 7. East Torres Strait (4 zone = Cumberland, Darnley, Seven Reefs and Don Cay) average (stratified) density (No. per Ha) for reef stratum for Hairy blackfish (*A. miliaris*) from five surveys (error bars = 1 s.e.) (does not include deep-reef strata) (\*reported catch for year)

**Comments:** Status still remains relatively unknown. Possible decline or natural variability. Catch assessment needed. Targeted survey sampling may need to be factored into future fishery surveys.


**Species:** Elephant trunkfish – *Holothuria fuscopunctata*

Open

Species triage	Outcome
Covered by survey	Yes
Survey adequate	Yes
Unexpected results	No
Indicated concerns	No

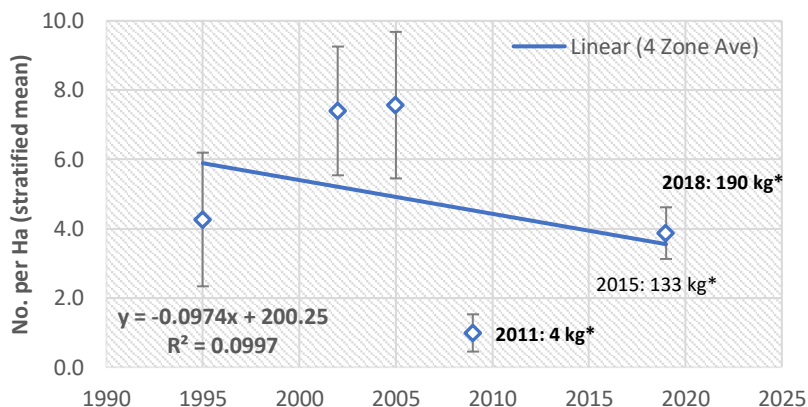


Figure 8. East Torres Strait (4 zone = Cumberland, Darnley, Seven Reefs and Don Cay) average (stratified) density (No. per Ha) for reef stratum for Elephant trunkfish (*H. fuscopunctata*) from five surveys (error bars = 1 s.e.) (does not include deep-reef strata) (\*reported catch for year)

**Comments:** Catch rates low. Possible decline or natural variability. Catch assessment needed.


**Species:** Lollyfish – *Holothuria atra*

Open

Species triage	Outcome
Covered by survey	Yes
Survey adequate	Yes
Unexpected results	No
Indicated concerns	Yes

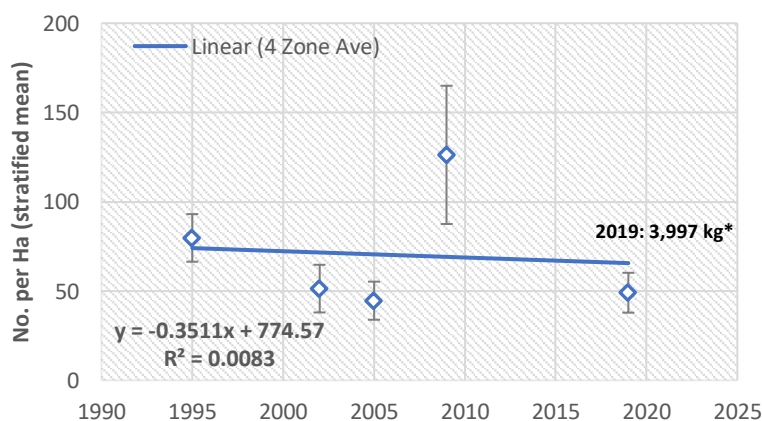


Figure 9. East Torres Strait (4 zone = Cumberland, Darnley, Seven Reefs and Don Cay) average (stratified) density (No. per Ha) for reef stratum for Lollyfish (*H. atra*) from five surveys (error bars = 1 s.e.) (does not include deep-reef strata) (\*reported catch for year)

**Comments:** Noted catch increase. Possible decline or natural variability. Catch assessment needed.


**Species:** Amberfish – *Thelenota anax*

Open

Species triage	Outcome
Covered by survey	Yes
Survey adequate	Yes
Unexpected results	No
Indicated concerns	No

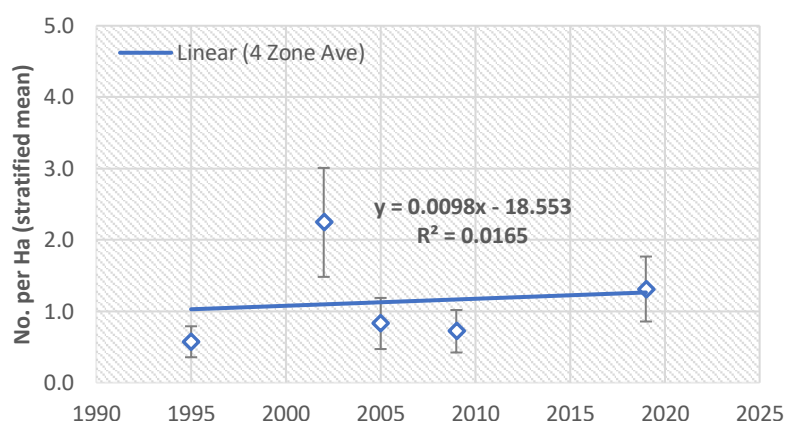


Figure 10. East Torres Strait (4 zone = Cumberland, Darnley, Seven Reefs and Don Cay) average (stratified) density (No. per Ha) for reef stratum for Amberfish (*T. anax*) from five surveys (error bars = 1 s.e.) (does not include deep-reef strata)

**Comments:** Catches low. No concern for TAC.


**Species:** Greenfish – *Stichopus chloronotus*

Open

Species triage	Outcome
Covered by survey	Yes
Survey adequate	Yes
Unexpected results	No
Indicated concerns	No

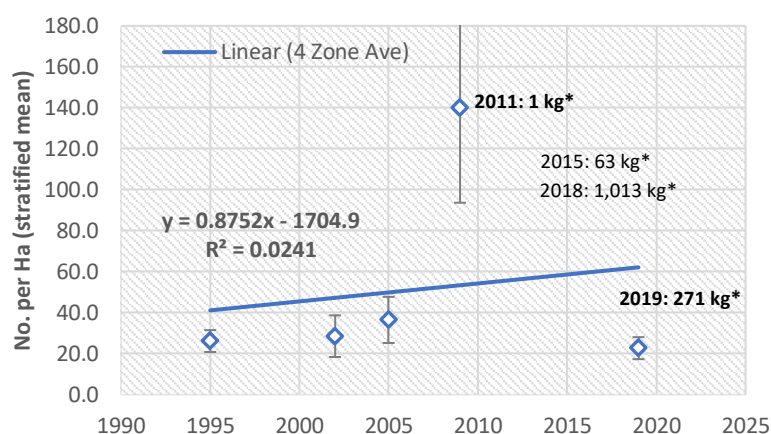


Figure 11. East Torres Strait (4 zone = Cumberland, Darnley, Seven Reefs and Don Cay) average (stratified) density (No. per Ha) for reef stratum for Greenfish (*S. chloronotus*) from five surveys (error bars = 1 s.e.) (does not include deep-reef strata) (\*reported catch for year)

**Comments:** Catches low. No concern for TAC.


**Species:** Leopardfish – *Bohadschia argus*

Open

Species triage	Outcome
Covered by survey	Yes
Survey adequate	Yes
Unexpected results	No
Indicated concerns	No

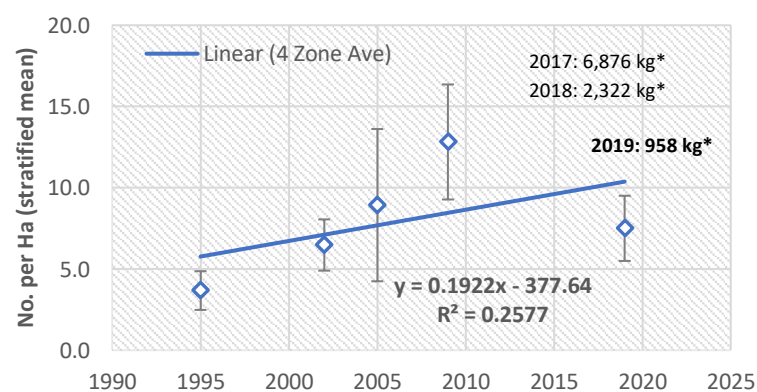


Figure 12. East Torres Strait (4 zone = Cumberland, Darnley, Seven Reefs and Don Cay) average (stratified) density (No. per Ha) for reef stratum for Leopardfish (*B. argus*) from five surveys (error bars = 1 s.e.) (does not include deep-reef strata) (\*reported catch for year)

**Comments:** Catches low. No concern for TAC.



**Species:** Pinkfish – *Holothuria edulis*

Open

Species triage	Outcome
Covered by survey	Yes
Survey adequate	Yes
Unexpected results	No
Indicated concerns	Yes

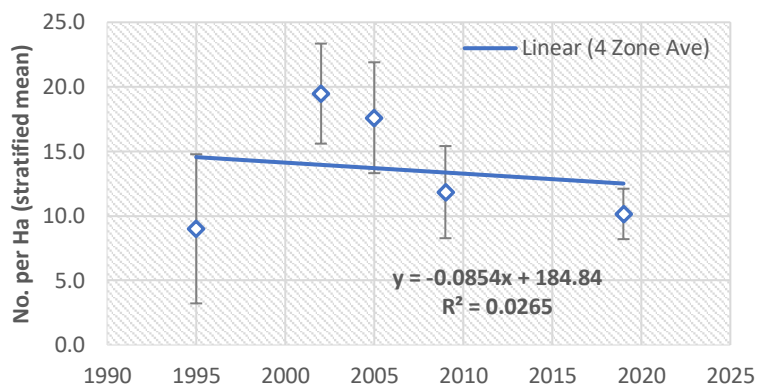


Figure 13. East Torres Strait (4 zone = Cumberland, Darnley, Seven Reefs and Don Cay) average (stratified) density (No. per Ha) for reef stratum for Pinkfish (*H. edulis*) from five surveys (error bars = 1 s.e.) (does not include deep-reef strata)

**Comments:** Possible decline or natural variability. Catch assessment needed.



**Species:** Deepwater blackfish – *Actinopyga palauensis*

Open

Species triage	Outcome
Covered by survey	Yes
Survey adequate	Limited
Unexpected results	No
Indicated concerns	Yes

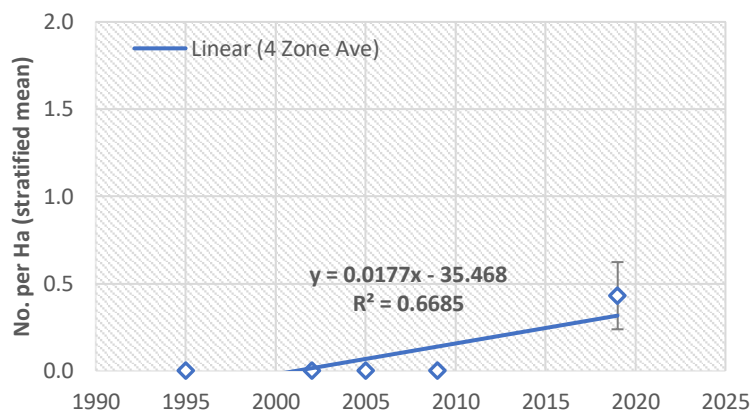


Figure 14. East Torres Strait (4 zone = Cumberland, Darnley, Seven Reefs and Don Cay) average (stratified) density (No. per Ha) for reef stratum for Deepwater blackfish (*A. paulensis*) from five surveys (error bars = 1 s.e.) (does not include deep-reef strata)

**Comments:** Status still remains relatively unknown. Catch assessment needed. Targeted survey sampling may need to be factored into future fishery surveys.



**Species:** Sandfish – *Holothuria scabra*

Closed

**Comments:** No survey undertaken. Harvest Strategy closed species rule applies.



Australian Government  
Australian Fisheries  
Management Authority

Torres Strait  
**PZJA**  
Protected Zone  
Joint Authority

TORRES STRAIT FISHERIES  
CATCH DISPOSAL  
RECORD

TDB02



Business Name

# Please remember

The pages in this book are self carbonating, place this flap under the original copy and the two duplicate pages to prevent writing transferring to the next set of forms.

## SPECIES CODES:

• Tropical Rock Lobster	TOB	• Spanish Mackerel	SNM
• Mud crab	CRM	• School Mackerel	MAO
• Prickly redfish	CUP	• Spotted Mackerel	MAL
• White teatfish	CUW	• Grey/Broad Barred Mackerel	MAG
• Curryfish (all species basket)	CUC	• Salmon Mackerel	MSH
Common curryfish (brown)	CUH	• Coral Trout (mixed basket)	TCG
Curryfish vastus (green)	CUV	Common Coral Trout	TCO
• Hairy blackfish	CUK	Barcheek (Islander) Coral Trout	TCI
• Burrowing blackfish	CBB	Passionfruit Coral Trout	TCL
• Deepwater blackfish	CDB	Bluespotted Coral Trout	TCB
• Deepwater redfish	CUD	• Cod	CRO
• Golden sandfish	CUN	• Barramundi Cod	COB
• Brown sandfish	CBS	• Red Emperor	RDE
• Greenfish	CUG	• Spangled Emperor	SPE
• Elephant Trunkfish	CUE	• Other Emperors	RSE
• Leopardfish	CLF	• Stripey Bass	SSB
• Stonefish	CUF		
• Lollyfish	CUL	• Trochus	TCH
• Sandfish	CUS	• Pearl shell	PSH
• Surf redfish	CUR		
• Black teatfish	CUB		

## PROCESSING CODES:

### *TRL and Crustaceans*

• Tail	T
• Whole	W
• Live	L

### *Finfish:*

• Fillets	F
• Whole	W
• Head and Gutted	HG
• Gilled and Gutted	GG
• Live	L

### *Molluscs*

• Whole	W
• Shell Only	SH
• Meat Only	MT

### *Beche de mer (BDM)*

• Boiled	B
• Boiled and Salted	BS
• Salted	S
• Salted and Chilled	SC
• Chilled	C
• Boiled and Frozen	BF
• Salted and Frozen	SF
• Frozen and Green	FG
• Boiled and Chilled	BC
• Dried	DI



AREAS FOR TORRES STRAIT CATCH DISPOSAL RECORD



Use area where most catch was taken

Edition Date:  
September 2017



# Torres Strait Fisheries Catch Disposal Record TDB02

## GENERAL INFORMATION

### About this Catch Disposal Record

- This TDB02 Catch Disposal Record is designed to record verified landed information about fish catches - it does not replace any requirement for fishers to complete daily catch and effort logbooks.
- Information supplied on this Catch Disposal Record will be used for fisheries management purposes. AFMA may release data on specific returns in connection with the investigation and prosecution of offences against the *Torres Strait Fisheries Act 1984* and associated legislation or under a court order.
- All fields **must** be completed in part A of the form, fields in part B are not mandatory.

### Who must complete this Catch Disposal Record?

- The licensed Torres Strait Fish Receiver (the Receiver) or their Registered Authorised Agent must complete the Catch Disposal Record.
  - a Registered Authorised Agent is a person who has been nominated by the licensed Torres Strait Fish Receiver to complete the TDB02 on their behalf. The Receiver must complete and lodge with AFMA the appropriate nomination form. **Note:** *all further references in this Catch Disposal Record to Receiver/s should be taken to also be a reference to a Registered Authorised Agent as prescribed by AFMA's Registered Authorised Agent Nomination process.*
  - the fish receiver (or agent) signing the CDR form must be a different person to fisher signing the fishing licence details.
- The Receiver must accurately determine the weight of the fish and complete the Catch Disposal Record for every consignment of fish received.

### When must this Catch Disposal Record be completed?

- This Catch Disposal Record must be completed by the Receiver immediately upon receipt of the fish and before the fish are placed with any other fish that are not part of the consignment.
- Retaining the Catch Disposal Record – the Receiver must retain this Catch Disposal Record. Once completed the Receiver must keep this book for a minimum period of five years and make it available to any authorised officer on request.

### Where and how must the forms be submitted?

- **White copy** – the Receiver must forward the white original copy to AFMA within 3 calendar days of the fish being received. Where the premises at which the fish were received was a boat, the Receiver must forward the white original copy to AFMA within 3 business days of that boat returning to port.
- **Pink Copy** – the holder of the Torres Strait commercial fishing licence (the Fisher) who is disposing of the fish retains the pink copy.
- **Green copy** – must remain in this book and be held by the Receiver.

**Note:** As each page of this Catch Disposal Record is numbered, any spoiled or incorrectly completed forms must be clearly marked 'cancelled' and returned to AFMA.

If you have any queries about completing this Catch Disposal Record please contact AFMA Direct on 1300 723 621.

**FAILURE TO SUPPLY AN ACCURATE AND FULLY COMPLETED CATCH DISPOSAL RECORD FOR ALL FISH RECEIVED IS A BREACH OF THE LICENCE CONDITIONS OF YOUR FISH RECEIVER LICENCE. BREACH OF ANY LICENCE CONDITION(S) IS AN OFFENCE UNDER THE TORRES STRAIT FISHERIES ACT 1984 AND PENALTIES APPLY.**

## INSTRUCTIONS FOR FISH RECEIVERS

You **must** provide details for **PART A** for each consignment of fish as follows:

• **Has a TDB02 been completed for this fish by another Receiver?**    **No**    **Not Sure**

- If you know another receiver has completed a TDB02 for this consignment of fish then you do not need to complete a TDB02.
- If you know another TDB02 has not been completed then circle NO and continue completing this form as required.
- If you don't know if another form has been completed then circle Not Sure and continue completing this form as required.

• **Fishing Licence Holder Name** – enter the name of the person who holds the licence that is nominated to the boat from which the fish were caught. Enter their name as it appears on the fishing licence.

• **Fishing Licence Number** – enter the fishing licence number of the fishing licence that is nominated to the boat from which the fish were caught. Enter the number as it appears on their fishing licence.

• **Fisher Type** – circle one of the three options provided (TIB, TVH, or Sunset).

• **Boat Symbol** - enter the boat symbol that appears on the fishing licence nominated to the boat from which the fish were caught.

• **Fisher/or Agent Name** - enter the name of the person signing as the fisher/or agent.

• **Signature of Fisher/ or Agent** – Where fish are received directly from a fisher or their agent, the fishing licence holder (or agent) must sign the CDR form to verify their licence details.

• **Date** – Enter the date Fisher signed.

• **Fish Receiver** – enter the name of the Fish Receiver name as it appears on your Fish Receiver Licence.

• **Fish Receiver Licence Number** – enter your Fish Receiver Licence number.

• **Fish Receiver Address** – enter the address of the premise the fish were received.

• **Species** – species codes are shown on the cardboard page divider in this logbook. Enter either the species code or name of each species in the consignment.

• **Processing Code** – processing codes are shown on the cardboard page divider in this logbook. Where processing has occurred please indicate the nature of the processing (e.g. gutted and blanched, dried, headed and gutted, etc.).

• **Weight (kg)** – Weight must be determined by accurate scales

- Where the fish have not been processed in any way, enter the accurate weight in kilograms of all the whole fish received of each individual species.
- Where the fish have been processed prior to receiving, record the accurate processed weight in kilograms of all the fish received of each individual species.
- Where only part of the catch of a species is processed, record the processed and unprocessed components of the species on separate rows.
- Do not record processed and unprocessed forms in the same row.

• **Fish Number** – Enter the number of fish **for records of live Fin Fish** only.

• **Signature of Receiver** – The Receiver or their Registered Authorised Agent must sign this part to certify accurate completion of the Catch Disposal Record.

• **Printed name** of Receiver – enter the name of the Receiver or Registered Authorised Agent who signed this form.

• **Date** – Enter the date on which this form was completed.

The following information **may** also be completed in **PART B**. These fields are not mandatory:

• **Number of Fishers** – enter the number of fishers who participated in the fishing trip for which the Catch Disposal Record relates.

• **Number of Days** – enter the duration of the fishing trip for which the Catch Disposal Record relates.

• **Area Fished** – enter the area where the fish were taken using the map shown at the start of this logbook. Enter more than one area if the fishing trip for which the Catch Disposal Record relates if applicable.

• **Start Date** – enter the start date of the fishing trip for which the Catch Disposal Record relates.

• **End Date** – enter the end date of the fishing trip for which the Catch Disposal Record relates.

• **Logbook Type** – record the logbook type that was completed. For example catches of tropical rock lobster may have been recorded in their Tropical Rock Lobster Daily Fishing Log TRL04.

• **Logbook Number and Page Number this catch relates to** – Record detail if this catch has also been entered into a daily fishing logbook. Please enter N/A (Not applicable) if this catch has not previously been entered in a daily fishing logbook.

• **Fishing Method** – tick (✓) the fishing method used to take the fish for the fishing trip for which the Catch Disposal Record relates. Tick (✓) more than one fishing method if applicable.

If you have any queries about completing this Catch Disposal Record please contact AFMA Direct on 1300 723 621.









# **Torres Strait Bêche-de-mer (BDM) Fishery**

## **Species Assessment Sheets - 2021**

**Attachment D to Agenda Item 5 – Harvest Strategy Implications of scientific survey results and catch data**

Hand Collectables Resource Assessment Group (HCRAAG) Meeting No.1  
6-8 October 2021  
Thursday Island



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## Purpose

This document is intended to be used in conjunction with the *Torres Strait Beche-de-mer Harvest Strategy 2019* (the Harvest Strategy), applicable species stock assessments and annual catch and effort summaries.

The individual species assessment sheets (SAS) are aimed at guiding the Hand Collectables Resource Assessment Group's (HCRAAG) assessment of commercial sea cucumber species in the BDM fishery in line with the Harvest Strategy, and to determine the recommended biological and/or total allowable catches for the fishing season commencing on 1 January each year.

The SAS provide a stepped application of the harvest strategy decision rules to recommend RBCs and/or TACs for each species, taking into account the latest scientific and fishing information available. The SAS also provides a summary of the basic information on stock status and assessment details for each species.

This resource is also intended to be used by the HCRAAG to identify information gaps and research needs for each species that can feed into the TSSAC research need identification and prioritisation process for Torres Strait Fisheries.

## Individual target species

White teatfish

HCRAG Species Assessment Sheet						
Common names	White teatfish – <i>Holothuria fuscogilva</i>					
Pre-HS TAC	15 tonnes					
Status open/closed	Open					
Current TAC	15 tonne	Based on harvest strategy starting TAC				
Basket trigger	N/A					
Minimum size limit	32cm					
New information since the TAC was last considered (in this it was at the implementation of the Harvest Strategy)						
Latest scientific survey data	Year	Standing stock biomass (90 <sup>th</sup> percentile) (t)	Standing stock biomass above min species size limit (t)	Is standing stock biomass above the default limit reference point?		
	2019/20	880	142.9	RAG to discuss		
	Survey adequate for species	Any unexpected results	Any concerns with biomass trend or absolute abundance	Need for management response		
	Yes	No	No	RAG to discuss		
Comments on scientific survey findings	CSIRO paper ( <b>attachment B of agenda item 5</b> ): Deepwater survey undertaken for the first time in 2019/20. Confident that white teatfish population for East Torres Strait has been quantified. Survey trend fairly constant over time. Review TAC – potential to increase.					
Catch data	Available for 2020 and 2021 (as at 18 Aug 2021). Refer to <b>attachment A of Agenda Item 5</b> .					
Any other considerations?	Listed on Appendix II of CITES. <i>*RAG members to provide advice*</i>					
Any other changes in the fishery?	<i>*RAG members to provide advice. For example, fishing behaviour/market demand? *</i>					
Any other sources of mortality apart from fishing?	<i>*RAG members to provide advice*</i>					
Low Tier						
Total catch data	Fishing season	Catch (t)	TAC (t)	% TAC caught	TAC or basket trigger exceeded?	% of TAC overcatch
	2020	1.77	15	11.8 %	TAC: No	N/A
					Basket: N/A	
2021 <sup>1</sup>	1.31	15	8.7 %	TBA	TBA	
Decision rules	Is the total catch reliable? <i>*RAG members to provide advice*</i>					

<sup>1</sup> Catches for the 2021 season to date – as of 18 August 2021.

	Not overcaught so overcatch decision rules not triggered (refer to section 2.11.1.1 of the harvest strategy).									
	For species with an individual TAC: Should the TAC be reduced or maintained (refer to section 2.11.1 of the harvest strategy)?									
<b>Middle Tier (not applicable during initial years of HS) (data for 2020 fishing season)</b>										
<b>Are two or more primary indicators available?</b>	<b>CPUE (at least 3 years required)</b>	<b>Average size (over 3 years)</b>	<b>Spatial footprint (% of areas fished)</b>	<b>Catch proportion (average over past 3 years)</b>						
	<ul style="list-style-type: none"> <li>27 records in total</li> <li>26 reported 'no. of fishers' and 'no. of days fished'</li> </ul>	Not being collected.	21 records reported area fished	Average catch of species relative to total catch for all BDM spp 5.5% of total catch for 2020						
<b>RAG advice</b>	Based on harvest strategy data needs to develop reliable primary indicators the RAG should identify any gaps in the current data collection program and possible options to address those gaps. The information above is a summary of data held and not an analysis of primary indicators.									
<b>High Tier</b>										
<b>Standardised biomass survey index</b>	<b>Are the surveys comparable</b>	<b>Are the inter-survey intervals acceptable</b>	<b>Has there been sufficient catch (average catch used in decision rule)</b>							
	<i>*RAG to discuss*</i>	<i>*RAG to discuss*</i>	<i>*RAG to discuss*</i>							
<b>RAG advice</b>	Can the survey-based decision rule be applied to this species? If yes, is it a high assessment priority currently?									
<b>Species specific data gaps and needs</b>										
<i>*to be completed at the meeting*</i>										
<b>Species Specific Research and Priorities</b>										
<i>*to be completed at the meeting*</i>										
<b>HCRAG recommendations</b>	<b>Fishing season</b>	<b>RBC (t)</b>	<b>Overcatch to be discounted (t)</b>	<b>Other source(s) of mortality (t)</b>	<b>TAC (t)</b>					
	2022									
<i>*General RAG comments*</i>										

## Prickly redfish

HCRAG Species Assessment Sheet						
Common names	Prickly redfish – <i>Thelenota ananas</i>					
Pre-HS TAC	15 tonnes (changed from 20 tonnes to 15 tonnes in 2017)					
Status open/closed	Open					
Current TAC	15 tonnes	Based on harvest strategy starting TAC				
Basket trigger	N/A					
Minimum size limit	35cm					
New information						
Latest scientific survey data	Year	Standing stock biomass (90 <sup>th</sup> percentile) (t)	Standing stock biomass above min species size limit (t)	Is standing stock biomass above the default limit reference point?		
	2019/20	461	253.3	RAG to discuss		
	Survey adequate for species	Any unexpected results	Any concerns with biomass trend or absolute abundance	Need for management response		
	Yes	No	Yes	RAG to discuss		
Comments on scientific survey findings	CSIRO paper ( <b>attachment B of agenda item 5</b> ): Slight decline (in slope – density over time), suggesting some concern given reports of sustained high catches. Close monitoring recommended. Catch assessment needed.					
Catch data	Available for 2020 and 2021 (as at 18 Aug 2021). Refer to <b>attachment A of Agenda Item 5</b> .					
Any other considerations?	*RAG members to provide advice*					
Any other changes in the fishery?	*RAG members to provide advice. For example, fishing behaviour/market demand? *					
Any other sources of mortality apart from fishing?	*RAG members to provide advice*					
Low Tier						
Total catch data	Fishing season	Catch (t)	TAC (t)	% TAC caught	TAC or basket trigger exceeded?	% of TAC overcatch
	2020	15.65	15	104.36 %	TAC: Yes	4.36%
					Basket: N/A	
2021 <sup>2</sup>	8.79	15	58.6 %	TBA	TBA	
Decision rules	Is the total catch reliable? *RAG members to provide advice*					
	Reported overcatch does not trigger any of the overcatch decision rules (refer to section 2.11.1.1 of the harvest strategy).					

<sup>2</sup> Catches for the 2021 season to date – as of 18 August 2021.

	For species with an individual TAC, should the TAC be reduced or maintained (refer to section 2.11.1 of the harvest strategy)? <i>*RAG members to provide advice*</i>														
<b>Middle Tier (not applicable during initial years of HS) (data for 2020 fishing season)</b>															
<b>Are two or more primary indicators available?</b>	<b>CPUE (at least 3 years required)</b>	<b>Average size (over 3 years)</b>	<b>Spatial footprint (% of areas fished)</b>	<b>Catch proportion (average over past 3 years)</b>											
	40 records in total: • 39 reported 'no. of fishers' and 'no. of days fished'	Not being collected.	34 records reported area fished	Average catch of species relative to total catch for all BDM spp 49% of total catch for 2020											
<b>RAG advice</b>	Based on harvest strategy data needs to develop reliable primary indicators the RAG should identify any gaps in the current data collection program and possible options to address those gaps. The information above is a summary of data held and not an analysis of primary indicators.														
<b>High Tier</b>															
<b>Standardised biomass survey index</b>	<b>Are the surveys comparable</b>	<b>Are the inter-survey intervals acceptable</b>	<b>Has there been sufficient catch (average catch used in decision rule)</b>												
	<i>*RAG to discuss*</i>	<i>*RAG to discuss*</i>	<i>*RAG to discuss*</i>												
<b>RAG advice</b>	Can the survey-based decision rule be applied to this species? If yes, is it a high assessment priority currently?														
<b>Species specific data gaps and needs</b>															
<i>*to be completed at the meeting*</i>															
<b>Species Specific Research and Priorities</b>															
<i>*to be completed at the meeting*</i>															
<b>HCRAG recommendations</b>	<b>Fishing season</b>	<b>RBC (t)</b>	<b>Overcatch to be discounted (t)</b>	<b>Other source(s) of mortality (t)</b>	<b>TAC (t)</b>										
	2022														
<i>*General RAG comments*</i>															



## Deepwater redfish

HCRAG Species Assessment Sheet						
Common names	Deepwater redfish – <i>Actinopyga echinites</i>					
Pre-HS TAC	Part of 80t basket species TAC					
Status open/closed	Open					
Current TAC	5 tonnes	Based on harvest strategy starting TAC				
Basket trigger	N/A (previously 5t basket trigger limit)					
Minimum size limit	20cm					
New information						
Latest scientific survey data	Year	Standing stock biomass (90 <sup>th</sup> percentile) (t)	Standing stock biomass above min species size limit (t)	Is standing stock biomass above the default limit reference point?		
	2019/20	66	55	RAG to discuss		
	Survey adequate for species	Any unexpected results	Any concerns with biomass trend or absolute abundance	Need for management response		
	Yes	No	No	RAG to discuss		
Comments on scientific survey findings	CSIRO paper ( <b>attachment B of agenda item 5</b> ): Catches low. No concern for TAC.					
Catch data	Available for 2020 and 2021 (to date). Refer to <b>attachment A of Agenda Item 5</b> .					
Any other considerations?	Assessed as Uncertain by ABARES in the 2020 Fishery Status Reports – given its low density it is unclear if catches of this species would impede effective recruitment and recovery of the species.					
Any other changes in the fishery?	*RAG members to provide advice. For example, fishing behaviour/market demand? *					
Any other sources of mortality apart from fishing?	*RAG members to provide advice*					
Low Tier						
Total catch data	Fishing season	Catch (t)	TAC (t)	% TAC caught	TAC or basket trigger exceeded?	% of TAC overcatch
	2020	0	5	0 %	TAC: No Basket: N/A	N/A
	2021 <sup>3</sup>	0.017	5	0.11 %	TBA	TBA
Decision rules	Is the total catch reliable? *RAG members to provide advice*					
	Not overcaught so overcatch decision rules not triggered (refer to section 2.11.1.1 of the harvest strategy).					

<sup>3</sup> Catches for the 2021 season to date – as of 18 August 2021.

	For species with an individual TAC, should the TAC be reduced or maintained (refer to section 2.11.1 of the harvest strategy)? <i>*RAG members to provide advice*</i>									
<b>Middle Tier (not applicable during initial years of HS)(data for 2020 fishing season)</b>										
<b>Are two or more primary indicators available?</b>	<b>CPUE (at least 3 years required)</b>	<b>Average size (over 3 years)</b>	<b>Spatial footprint (% of areas fished)</b>	<b>Catch proportion (average over past 3 years)</b>						
	CDRs report days fished and number of fishers No catch reported in 2020	Not being collected.	CDRs report area by zones No catch reported in 2020	Average catch of species relative to total catch for all BDM spp No catch reported in 2020						
<b>RAG advice</b>	Based on harvest strategy data needs to develop reliable primary indicators the RAG should identify any gaps in the current data collection program and possible options to address those gaps. The information above is a summary of data held and not an analysis of primary indicators.									
<b>High Tier</b>										
<b>Standardised biomass survey index</b>	<b>Are the surveys comparable</b>	<b>Are the inter-survey intervals acceptable</b>	<b>Has there been sufficient catch (average catch used in decision rule)</b>							
	<i>*RAG to discuss*</i>	<i>*RAG to discuss*</i>	<i>*RAG to discuss*</i>							
<b>RAG advice</b>	Can the survey-based decision rule be applied to this species? If yes, is it a high assessment priority currently?									
<b>Species specific data gaps and needs</b>										
<i>*to be completed at the meeting*</i>										
<b>Species Specific Research and Priorities</b>										
<i>*to be completed at the meeting*</i>										
<b>HCRAG recommendations</b>	<b>Fishing season</b>	<b>RBC (t)</b>	<b>Overcatch to be discounted (t)</b>	<b>Other source(s) of mortality (t)</b>	<b>TAC (t)</b>					
	2022									
<i>*General RAG comments*</i>										

## Hairy blackfish

HCRAG Species Assessment Sheet						
<b>Common names</b>	Hairy blackfish – <i>Actinopyga miliaris</i>					
<b>Pre-HS TAC</b>	Part of 80t basket species TAC					
<b>Status open/closed</b>	Open					
<b>Current TAC</b>	5 tonnes	Based on harvest strategy starting TAC				
<b>Basket trigger</b>	N/A (previously 5t basket trigger limit)					
<b>Minimum size limit</b>	22cm					
New information since the TAC was last considered (in this it was the implementation of the Harvest Strategy)						
<b>Latest scientific survey data</b>	<b>Year</b>	<b>Landed (wet gutted) weight (t)</b>	<b>Standing stock biomass above min species size limit (t)</b>	<b>Is standing stock biomass above the default limit reference point?</b>		
	2019/20	15	-	RAG to discuss		
	<b>Survey adequate for species</b>	<b>Any unexpected results</b>	<b>Any concerns with biomass trend or absolute abundance</b>	<b>Need for management response</b>		
	Limited	No	Yes	RAG to discuss		
<b>Comments on scientific survey findings</b>	CSIRO paper (attachment B agenda item 5): Status still remains relatively unknown. Possible decline or natural variability. Catch assessment needed. Targeted survey sampling may need to be factored into future fishery surveys.					
<b>Catch data</b>	Available for 2020 and 2021 (as at 18 Aug 2021). Refer to <b>Attachment A of Agenda item 5</b> .					
<b>Any other considerations?</b>	Assessed as Uncertain by ABARES in the 2020 Fishery Status Reports – given its low density it is unclear if catches of this species would impede effective recruitment and recovery of the species.					
<b>Any other changes in the fishery?</b>	*RAG members to provide advice. For example, fishing behaviour/market demand? *					
<b>Any other sources of mortality apart from fishing?</b>	*RAG members to provide advice*					
Low Tier						
<b>Total catch data</b>	<b>Fishing season</b>	<b>Catch (t)</b>	<b>TAC (t)</b>	<b>% TAC caught</b>	<b>TAC or basket trigger exceeded?</b>	<b>% of TAC overcatch</b>
	2020	1.4	5	28 %	TAC: No	N/A
					Basket: N/A	
	2021 <sup>4</sup>	0.5	5	10 %	TBA	N/A
<b>Decision rules</b>	Is the total catch reliable? *RAG members to provide advice*					
	Not overcaught so overcatch decision rules not triggered (refer to section 2.11.1.1 of the harvest strategy).					

<sup>4</sup> Catches for the 2021 season to date – as of 18 August 2021.

	For species with an individual TAC, should the TAC be reduced or maintained (refer to section 2.11.1 of the harvest strategy)? <i>*RAG members to provide advice*</i>														
<b>Middle Tier (not applicable during initial years of HS)(data for 2020 fishing season)</b>															
<b>Are two or more primary indicators available?</b>	<b>CPUE (at least 3 years required)</b>	<b>Average size (over 3 years)</b>	<b>Spatial footprint (% of areas fished)</b>	<b>Catch proportion (average over past 3 years)</b>											
	34 records in total <ul style="list-style-type: none"> <li>11 reported 'no. of fishers' and 'no. of days fished'</li> </ul>	Not being collected.	6 records reported 'area fished'	Average catch of species relative to total catch for all BDM spp 4.4% of total 2020 catch											
<b>RAG advice</b>	Based on harvest strategy data needs to develop reliable primary indicators the RAG should identify any gaps in the current data collection program and possible options to address those gaps. The information above is a summary of data held and not an analysis of primary indicators.														
<b>High Tier</b>															
<b>Standardised biomass survey index</b>	<b>Are the surveys comparable</b>	<b>Are the inter-survey intervals acceptable</b>	<b>Has there been sufficient catch (average catch used in decision rule)</b>												
	<i>*RAG to discuss*</i>	<i>*RAG to discuss*</i>	<i>*RAG to discuss*</i>												
<b>RAG advice</b>	Can the survey-based decision rule be applied to this species? If yes, is it a high assessment priority currently?														
<b>Species specific data gaps and needs</b>															
<i>*to be completed at the meeting*</i>															
<b>Species Specific Research and Priorities</b>															
<i>*to be completed at the meeting*</i>															
<b>HCRAG recommendations</b>	<b>Fishing season</b>	<b>RBC (t)</b>	<b>Overcatch to be discounted (t)</b>	<b>Other source(s) of mortality (t)</b>	<b>TAC (t)</b>										
	2022														
<i>*General RAG comments*</i>															

HCRAG Species Assessment Sheet						
Common names	Greenfish – <i>Stichopus chloronotus</i>					
Pre-HS TAC	Part of 80t basket species TAC					
Status open/closed	Open					
Current TAC	40 tonnes	Based on harvest strategy starting TAC				
Basket trigger	N/A					
Minimum size limit	nil					
New information since the TAC was last considered (in this it was at the implementation of the Harvest Strategy)						
Latest scientific survey data	Year	Standing stock biomass (90 <sup>th</sup> percentile) (t)	Standing stock biomass above min species size limit (t)	Is standing stock biomass above the default limit reference point?		
	2019/20	739	N/A	RAG to discuss		
	Survey adequate for species	Any unexpected results	Any concerns with biomass trend or absolute abundance	Need for management response		
	Yes	No	No	RAG to discuss		
Comments on scientific survey findings	CSIRO paper ( <b>attachment B of agenda item 5</b> ): Catches low. No concern for TAC.					
Catch data	Available for 2020 and 2021 (to date). Refer to <b>attachment A of Agenda Item 5</b> .					
Any other considerations?	*RAG members to provide advice*					
Any other changes in the fishery?	*RAG members to provide advice. For example, fishing behaviour/market demand? *					
Any other sources of mortality apart from fishing?	*RAG members to provide advice*					
Low Tier						
Total catch data	Fishing season	Catch (t)	TAC (t)	% TAC caught	TAC or basket trigger exceeded?	% of TAC overcatch
	2020	0.015	40	0.04 %	TAC: No Basket: N/A	N/A
	2021 <sup>5</sup>	0	40	0	N/A	N/A
Decision rules	Is the total catch reliable? *RAG members to provide advice*					
	Not overcaught so overcatch decision rules not triggered (refer to section 2.11.1.1 of the harvest strategy).					

<sup>5</sup> Catches for the 2021 season to date – as of 18 August 2021.

	For species with an individual TAC, should the TAC be reduced or maintained (refer to section 2.11.1 of the harvest strategy)? <i>*RAG members to provide advice*</i>														
<b>Middle Tier (not applicable during initial years of HS) (data for 2020 fishing season)</b>															
<b>Are two or more primary indicators available?</b>	<b>CPUE (at least 3 years required)</b>	<b>Average size (over 3 years)</b>	<b>Spatial footprint (% of areas fished)</b>	<b>Catch proportion (average over past 3 years)</b>											
	1 record for 2020 – no reports of ‘days fished’ and ‘number of fishers’	Not being collected.	Not reported for 2020	Average catch of species relative to total catch for all BDM spp 0.05% of total 2020 catch											
<b>RAG advice</b>	Based on harvest strategy data needs to develop reliable primary indicators the RAG should identify any gaps in the current data collection program and possible options to address those gaps. The information above is a summary of data held and not an analysis of primary indicators.														
<b>High Tier</b>															
<b>Standardised biomass survey index</b>	<b>Are the surveys comparable</b>	<b>Are the inter-survey intervals acceptable</b>	<b>Has there been sufficient catch (average catch used in decision rule)</b>												
	<i>*RAG to discuss*</i>	<i>*RAG to discuss*</i>	<i>*RAG to discuss*</i>												
<b>RAG advice</b>	Can the survey-based decision rule be applied to this species? If yes, is it a high assessment priority currently?														
<b>Species specific data gaps and needs</b>															
<i>*to be completed at the meeting*</i>															
<b>Species Specific Research and Priorities</b>															
<i>*to be completed at the meeting*</i>															
<b>HCRAG recommendations</b>	<b>Fishing season</b>	<b>RBC (t)</b>	<b>Overcatch to be discounted (t)</b>	<b>Other source(s) of mortality (t)</b>	<b>TAC (t)</b>										
	2022														
<i>*General RAG comments*</i>															



## Basket species – curryfish

Curryfish common

HCRAG Species Assessment Sheet						
<b>Common names</b>	Curryfish common – <i>Stichopus herrmanni</i>					
<b>Pre-HS TAC</b>	Part of 80t basket species TAC					
<b>Status open/closed</b>	Open					
<b>Current TAC</b>	60 tonnes (Curryfish basket TAC)		Based on harvest strategy starting TAC			
<b>Basket trigger</b>	N/A					
<b>Minimum size limit</b>	31cm					
<b>New information</b>						
<b>Latest scientific survey data</b>	<b>Year</b>	<b>Standing stock biomass (90<sup>th</sup> percentile) (t)</b>	<b>Standing stock biomass above min species size limit (t)</b>	<b>Is standing stock biomass above the default limit reference point?</b>		
	2019/20	667	632.4	RAG to discuss		
	<b>Survey adequate for species</b>	<b>Any unexpected results</b>	<b>Any concerns with biomass trend or absolute abundance</b>	<b>Need for management response</b>		
	Yes	No	Yes	RAG to discuss		
<b>Comments on scientific survey findings</b>	CSIRO paper ( <b>attachment B of agenda item 5</b> ): Possible decline (noting fairly negative trend fitted to survey data). Catch assessment needed. Close monitoring recommended – part of 'Curryfish mixed' (catch split 50:50 between Curryfish species when not identified).					
<b>Catch data</b>	Available for 2020 and 2021 (as at 18 August 2021). Refer to <b>attachment A of Agenda Item 5</b> .					
<b>Any other considerations?</b>	*RAG members to provide advice*					
<b>Any other changes in the fishery?</b>	*RAG members to provide advice. For example, fishing behaviour/market demand? *					
<b>Any other sources of mortality apart from fishing?</b>	*RAG members to provide advice*					
<b>Low Tier</b>						
<b>Total catch data</b>	<b>Fishing season</b>	<b>Catch (t)</b>	<b>TAC (t)</b>	<b>% TAC caught</b>	<b>TAC or basket trigger exceeded?</b>	<b>% of TAC overcatch</b>
	2020	0.6	60	1 % 17.5 % (mixed)	TAC: No	N/A
		10.5 (mixed)			Basket: N/A	
2021 <sup>6</sup>	3.96 (mixed)	60	TBA	TBA	TBA	
<b>Decision rules</b>	Is the total catch reliable? *RAG members to provide advice*					

<sup>6</sup> Catches for the 2021 season to date – as of 18 August 2021.

	Reported overcatch does not trigger any of the overcatch decision rules (refer to section 2.11.1.1 of the harvest strategy).				
	For species with individual triggers within a basket with a joint TAC, should the joint TAC or individual triggers be changed (up or down) (refer to section 2.11.1.2 of the harvest strategy)? <i>*RAG members to provide advice*</i>				
Middle Tier (not applicable during initial years of HS) (data for the 2020 fishing season)					
Are two or more primary indicators available?	CPUE (at least 3 years required)	Average size (over 3 years)	Spatial footprint (% of areas fished)	Catch proportion (average over past 3 years)	
	Curryfish Herrmanni – 4 total records all contain no. of days fished and no. of fishers Curryfish (mixed) 53 total records: <ul style="list-style-type: none"><li>50 records reported ‘no. of fishers’</li><li>48 records reported ‘no. of days fished’</li></ul>	Not being collected.	Curryfish Herrmanni – 4 records reported area fished Curryfish (mixed) – 48 records reported ‘area fished’	Average catch of species relative to total catch for all BDM spp 2% of 2020 catch (curryfish herrmanni) 33% of 2020 catch (curryfish mixed)	
RAG advice	Based on harvest strategy data needs to develop reliable primary indicators the RAG should identify any gaps in the current data collection program and possible options to address those gaps. The information above is a summary of data held and not an analysis of primary indicators.				
High Tier					
Standardised biomass survey index	Are the surveys comparable	Are the inter-survey intervals acceptable	Has there been sufficient catch (average catch used in decision rule)		
	<i>*RAG to discuss*</i>	<i>*RAG to discuss*</i>	<i>*RAG to discuss*</i>		
RAG advice	Can the survey-based decision rule be applied to this species? If yes, is it a high assessment priority currently?				
Species specific data gaps and needs					
<i>*to be completed at the meeting*</i>					
Species Specific Research and Priorities					
<i>*to be completed at the meeting*</i>					
HCRAg recommendations	Fishing season	RBC (t)	Overcatch to be discounted (t)	Other source(s) of mortality (t)	TAC (t)
	2022				
<i>*General RAG comments*</i>					

## Curryfish vastus

HCRAG Species Assessment Sheet						
Common names	Curryfish vastus – <i>Stichopus vastus</i>					
Pre-HS TAC	Part of the 80t basket species TAC					
Status open/closed	Open					
Current TAC	60 tonnes (Curryfish basket TAC)		Based on harvest strategy starting TAC			
Basket trigger	15 tonnes species trigger limit					
Minimum size limit	15cm					
New information since the TAC was last considered (in this it was at the implementation of the Harvest Strategy)						
Latest scientific survey data	Year	Standing stock biomass (90 <sup>th</sup> percentile) (t)		Standing stock biomass above min species size limit (t)		Is standing stock biomass above the default limit reference point?
	2019/20	168		168		RAG to discuss
	Survey adequate for species	Any unexpected results		Any concerns with biomass trend or absolute abundance		Need for management response
	Yes	No		Yes		RAG to discuss
Comments on scientific survey findings	CSIRO paper ( <b>attachment B of agenda item 5</b> ): Higher ratio of curryfish vastus observed in 2019 survey. Close monitoring recommended – part of 'Curryfish mixed' (catch split 50:50 between curryfish species when not identified).					
Catch data	Available for 2020 and 2021 (as at 18 August 2021). Refer to <b>attachment A of Agenda Item 5</b> .					
Any other considerations?	*RAG members to provide advice*					
Any other changes in the fishery?	*RAG members to provide advice. For example, fishing behaviour/market demand? *					
Any other sources of mortality apart from fishing?	*RAG members to provide advice*					
Low Tier						
Total catch data	Fishing season	Catch (t)	TAC (t)	% TAC caught	TAC or basket trigger exceeded?	% of TAC overcatch
	2020	0.15 10.5 (mixed)	60 (15t trigger limit)	0.25 % 17.5 % (mixed)	TAC: No	N/A
					Basket: No	
2021 <sup>7</sup>	- 3.96 (mixed)	60 (15t trigger limit)	TBA	TBA	TBA	
Decision rules	Is the total catch reliable? *RAG members to provide advice*					
	Not overcaught so overcatch decision rules not triggered (refer to section 2.11.1.1 of the harvest strategy).					

<sup>7</sup> Catches for the 2021 season to date – as of 18 August 2021.

	For species with individual triggers within a basket with a joint TAC, should the joint TAC or individual triggers be changed (up or down) (refer to section 2.11.1.2 of the harvest strategy)? <i>*RAG members to provide advice*</i>														
<b>Middle Tier (not applicable during initial years of HS) (data for 2020 fishing season)</b>															
<b>Are two or more primary indicators available?</b>	<b>CPUE (at least 3 years required)</b>	<b>Average size (over 3 years)</b>	<b>Spatial footprint (% of areas fished)</b>	<b>Catch proportion (average over past 3 years)</b>											
	<b>Curryfish vastus:</b> 4 total records all contain no. of days fished and no. of fishers  <b>Curryfish (mixed):</b> 53 total records <ul style="list-style-type: none"> <li>50 records reported 'no. of fishers'</li> <li>48 records reported 'no. of days fished'</li> </ul>	Not being collected.	<b>Curryfish vastus:</b> <ul style="list-style-type: none"> <li>4 records reported area fished</li> </ul> <b>Curryfish (mixed):</b> <ul style="list-style-type: none"> <li>48 records reported 'area fished'</li> </ul>	Average catch of species relative to total catch for all BDM spp <ul style="list-style-type: none"> <li>0.5% of 2020 catch (curryfish vastus)</li> <li>33% of 2020 catch (curryfish mixed)</li> </ul>											
<b>RAG advice</b>	Based on harvest strategy data needs to develop reliable primary indicators the RAG should identify any gaps in the current data collection program and possible options to address those gaps. The information above is a summary of data held and not an analysis of primary indicators.														
<b>High Tier</b>															
<b>Standardised biomass survey index</b>	<b>Are the surveys comparable</b>	<b>Are the inter-survey intervals acceptable</b>	<b>Has there been sufficient catch (average catch used in decision rule)</b>												
	<i>*RAG to discuss*</i>	<i>*RAG to discuss*</i>	<i>*RAG to discuss*</i>												
<b>RAG advice</b>	Can the survey-based decision rule be applied to this species? If yes, is it a high assessment priority currently?														
<b>Species specific data gaps and needs</b>															
<i>*to be completed at the meeting*</i>															
<b>Species Specific Research and Priorities</b>															
<i>*to be completed at the meeting*</i>															
<b>HCRAG recommendations</b>	<b>Fishing season</b>	<b>RBC (t)</b>	<b>Overcatch to be discounted (t)</b>	<b>Other source(s) of mortality (t)</b>	<b>TAC (t)</b>										
	2022														
<i>*General RAG comments*</i>															

## Basket species

## Elephant trunkfish

HCRAG Species Assessment Sheet						
Common names	Elephant trunkfish – <i>Holothuria fuscopunctata</i>					
Pre-HS TAC	Part of 80t basket species TAC					
Status open/closed	Open					
Current TAC	Part of 50t basket species TAC		Based on harvest strategy starting TAC			
Basket trigger	15 tonnes					
Minimum size limit	24cm					
New information since the TAC was last considered (in this it was at the implementation of the Harvest Strategy)						
Latest scientific survey data	Year	Standing stock biomass (90 <sup>th</sup> percentile) (t)	Standing stock biomass above min species size limit (t)	Is standing stock biomass above the default limit reference point?		
	2019/20	451t	-	RAG to discuss		
	Survey adequate for species	Any unexpected results	Any concerns with biomass trend or absolute abundance	Need for management response		
	Yes	No	Yes	RAG to discuss		
Comments on scientific survey findings	CSIRO paper ( <b>attachment B of agenda item 5</b> ): Catch rates low. Possible decline or natural variability. Catch assessment needed.					
Catch data	Available for 2020 and 2021 (as at 18 August 2021). Refer to <b>attachment A of agenda item 5</b> .					
Any other considerations?	*RAG members to provide advice*					
Any other changes in the fishery?	*RAG members to provide advice. For example, fishing behaviour/market demand? *					
Any other sources of mortality apart from fishing?	*RAG members to provide advice*					
Low Tier						
Total catch data	Fishing season	Catch (t)	TAC (t)	% TAC caught	TAC or basket trigger exceeded?	% of TAC overcatch
	2020	No catch reported	50	-	TAC: No	N/A
					Basket: No	
2021 <sup>8</sup>	No catch reported	50	TBA	TBA	TBA	
Decision rules	Is the total catch reliable? *RAG members to provide advice*					

<sup>8</sup> Catches for the 2021 season to date – as of 18 August 2021.

	Not overcaught so overcatch decision rules not triggered (refer to section 2.11.1.1 of the harvest strategy).									
	For species with individual triggers within a basket with a joint TAC, should the joint TAC or individual triggers be changed (up or down) (refer to section 2.11.1.2 of the harvest strategy)? <i>*RAG members to provide advice*</i>									
<b>Species specific data gaps and needs</b>										
<i>*to be completed at the meeting*</i>										
<b>Species Specific Research and Priorities</b>										
<i>*to be completed at the meeting*</i>										
<b>HCRA recommendations</b>	<b>Fishing season</b>	<b>RBC (t)</b>	<b>Overcatch to be discounted (t)</b>	<b>Other source(s) of mortality (t)</b>	<b>TAC/trigger limit (t)</b>					
	2022									
<i>*General RAG comments*</i>										



HCRA Species Assessment Sheet						
Common names	Lollyfish - <i>Holothuria atra</i>					
Pre-HS TAC	Part of 80t basket species TAC					
Status open/closed	Open					
Current TAC	Part of 50t basket species TAC		Based on harvest strategy starting TAC			
Basket trigger	40 tonnes					
Minimum size limit	15cm					
New information since the TAC was last considered (in this it was at the implementation of the Harves Strategy)						
Latest scientific survey data	Year	Standing stock biomass (90 <sup>th</sup> percentile) (t)	Standing stock biomass above min species size limit (t)	Is standing stock biomass above the default limit reference point?		
	2019/20	5,668	-	RAG to discuss		
	Survey adequate for species	Any unexpected results	Any concerns with biomass trend or absolute abundance	Need for management response		
	Yes	No	Yes	RAG to discuss		
Comments on scientific survey findings	CSIRO paper ( <b>attachment B of agenda item 5</b> ): Noted catch increase. Possible decline or natural variability. Catch assessment needed.					
Catch data	Available for 2020 and 2021 (as at 18 August 2021). Refer to <b>attachment A of Agenda Item 5</b> .					
Any other considerations?	*RAG members to provide advice*					
Any other changes in the fishery?	*RAG members to provide advice. For example, fishing behaviour/market demand? *					
Any other sources of mortality apart from fishing?	*RAG members to provide advice*					
Low Tier						
Total catch data	Fishing season	Catch (t)	TAC (t)	% TAC caught	TAC or basket trigger exceeded?	% of TAC overcatch
	2020	1.3	50 (40t basket trigger limit)	2.6 %	TAC: No Basket: No	N/A
	2021 <sup>9</sup>	0.021	50 (40t basket trigger limit)	TBA	TBA	TBA
Decision rules	Is the total catch reliable? *RAG members to provide advice*					
	Not overcaught so overcatch decision rules not triggered (refer to section 2.11.1.1 of the harvest strategy).					

<sup>9</sup> Catches for the 2021 season are as of 18 August 2021.

	For species with individual triggers within a basket with a joint TAC, should the joint TAC or individual triggers be changed (up or down) (refer to section 2.11.1.2 of the harvest strategy)? <i>*RAG members to provide advice*</i>									
<b>Species specific data gaps and needs</b>										
<i>*to be completed at the meeting*</i>										
<b>Species Specific Research and Priorities</b>										
<i>*to be completed at the meeting*</i>										
<b>HCRA recommendations</b>	<b>Fishing season</b>	<b>RBC (t)</b>	<b>Overcatch to be discounted (t)</b>	<b>Other source(s) of mortality (t)</b>	<b>TAC/trigger limit (t)</b>					
	2022									
<i>*General RAG comments*</i>										

## Burrowing blackfish

HCRA Species Assessment Sheet						
<b>Common names</b>	Burrowing blackfish – <i>Actinopyga spinea</i>					
<b>Pre-HS TAC</b>	Part of the 80t basket species TAC					
<b>Status open/closed</b>	Open					
<b>Current TAC</b>	Part of 50 tonne basket species TAC			Based on harvest strategy starting TAC		
<b>Basket trigger</b>	5 tonnes					
<b>Minimum size limit</b>	22 cm					
New information since the TAC was last considered (in this it was the implementation of the Harvest Strategy)						
<b>Latest scientific survey data</b>	<b>Year</b>	<b>Standing stock biomass (90<sup>th</sup> percentile) (t)</b>	<b>Standing stock biomass above min species size limit (t)</b>	<b>Is standing stock biomass above the default limit reference point?</b>		
	2019/20	N/A	N/A	RAG to discuss		
	<b>Survey adequate for species</b>	<b>Any unexpected results</b>	<b>Any concerns with biomass trend or absolute abundance</b>	<b>Need for management response</b>		
	N/A	N/A	N/A	RAG to discuss		
<b>Comments on scientific survey findings</b>	CSIRO paper ( <b>attachment B of agenda item 5</b> ): N/A					
<b>Catch data</b>	Available for 2020 and 2021 (as at 18 Aug 2021). Refer to <b>attachment A of Agenda Item 5</b> .					
<b>Any other considerations?</b>	*RAG members to provide advice*					
<b>Any other changes in the fishery?</b>	*RAG members to provide advice. For example, fishing behaviour/market demand? *					
<b>Any other sources of mortality apart from fishing?</b>	*RAG members to provide advice*					
Low Tier						
<b>Total catch data</b>	<b>Fishing season</b>	<b>Catch (t)</b>	<b>TAC (t)</b>	<b>% TAC caught</b>	<b>TAC or basket trigger exceeded?</b>	<b>% of TAC overcatch</b>
	2020	No catch reported	50 (5t trigger limit)	No catch reported	TAC: No Basket: No	N/A
	2021 <sup>10</sup>	No catch reported	50 (5t trigger limit)	TBA	TBA	TBA
<b>Decision rules</b>	Is the total catch reliable? *RAG members to provide advice*					
	Not overcaught so overcatch decision rules not triggered (refer to section 2.11.1.1 of the harvest strategy).					

<sup>10</sup> Catches for the 2021 season to date – as of 18 August 2021.

	For species with individual triggers within a basket with a joint TAC, should the joint TAC or individual triggers be changed (up or down) (refer to section 2.11.1.2 of the harvest strategy)? <i>*RAG members to provide advice*</i>									
<b>Species specific data gaps and needs</b>										
<i>*to be completed at the meeting*</i>										
<b>Species Specific Research and Priorities</b>										
<i>*to be completed at the meeting*</i>										
<b>HCRA recommendations</b>	<b>Fishing season</b>	<b>RBC (t)</b>	<b>Overcatch to be discounted (t)</b>	<b>Other source(s) of mortality (t)</b>	<b>TAC/trigger limit (t)</b>					
	2022									
<i>*General RAG comments*</i>										

## Deepwater blackfish

HCRAAG Species Assessment Sheet						
Common names	Deepwater blackfish – <i>Actinopyga palauensis</i>					
Pre-HS TAC	Part of 80t basket species TAC					
Status open/closed	Open					
Current TAC	Part of 50t basket species TAC		Based on harvest strategy starting TAC			
Basket trigger	0.5t					
Minimum size limit	22cm					
New information since the TAC was last considered (in this it was at the implementation of the Harvest Strategy)						
Latest scientific survey data	Year	Landed weight (wet gutted) (t)	Standing stock biomass above min species size limit (t)	Is standing stock biomass above the default limit reference point?		
	2019/20	104	-	RAG to discuss		
	Survey adequate for species	Any unexpected results	Any concerns with biomass trend or absolute abundance	Need for management response		
	Limited	No	Yes	RAG to discuss		
Comments on scientific survey findings	CSIRO paper ( <b>attachment B of agenda item 5</b> ): Status still remains relatively unknown. Catch assessment needed. Targeted survey sampling may need to be factored into future fishery surveys.					
Catch data	Available for 2020 and 2021 (as at 18 Aug 2021). Refer to <b>attachment A and Agenda Item 5</b> .					
Any other considerations?	*RAG members to provide advice*					
Any other changes in the fishery?	*RAG members to provide advice. For example, fishing behaviour/market demand? *					
Any other sources of mortality apart from fishing?	*RAG members to provide advice*					
Low Tier						
Total catch data	Fishing season	Catch (t)	TAC (t)	% TAC caught	TAC or basket trigger exceeded?	% of TAC overcatch
	2020	0.17	50 (0.5t trigger limit)	0.34 %	TAC: No	N/A
					Basket: No	
2021 <sup>11</sup>	0.07	50 (0.5t trigger limit)	TBA	TBA	TBA	
Decision rules	Is the total catch reliable? *RAG members to provide advice*					
	Not overcaught so overcatch decision rules not triggered (refer to section 2.11.1.1 of the harvest strategy).					

<sup>11</sup> Catches for the 2021 season to date – as of 18 August 2021.

	For species with individual triggers within a basket with a joint TAC, should the joint TAC or individual triggers be changed (up or down) (refer to section 2.11.1.2 of the harvest strategy)? <i>*RAG members to provide advice*</i>									
<b>Species specific data gaps and needs</b>										
<i>*to be completed at the meeting*</i>										
<b>Species Specific Research and Priorities</b>										
<i>*to be completed at the meeting*</i>										
<b>HCRA recommendations</b>	<b>Fishing season</b>	<b>RBC (t)</b>	<b>Overcatch to be discounted (t)</b>	<b>Other source(s) of mortality (t)</b>	<b>TAC/trigger limit (t)</b>					
	2022									
<i>*General RAG comments*</i>										



## Golden sandfish

HCRA Species Assessment Sheet						
<b>Common names</b>	Golden sandfish – <i>Holothuria lessoni</i>					
<b>Pre-HS TAC</b>	Part of 80t basket species TAC					
<b>Status open/closed</b>	Open					
<b>Current TAC</b>	Part of 50t basket species TAC		Based on harvest strategy starting TAC			
<b>Basket trigger</b>	0.5 tonnes					
<b>Minimum size limit</b>	22cm					
New information since the TAC was last considered (in this it was at the implementation of the Harvest Strategy)						
<b>Latest scientific survey data</b>	<b>Year</b>	<b>Standing stock biomass (90<sup>th</sup> percentile) (t)</b>	<b>Standing stock biomass above min species size limit (t)</b>	<b>Is standing stock biomass above the default limit reference point?</b>		
	Not included in 2019-20 survey	-	-	RAG to discuss		
	<b>Survey adequate for species</b>	<b>Any unexpected results</b>	<b>Any concerns with biomass trend or absolute abundance</b>	<b>Need for management response</b>		
	No	N/A	N/A	RAG to discuss		
<b>Comments on scientific survey findings</b>	CSIRO paper (attachment B of agenda item 5): N/A					
<b>Catch data</b>	Available for 2020 and 2021 (as at 18 Aug 2021). Refer to <b>attachment A of Agenda Item 5</b> .					
<b>Any other considerations?</b>	*RAG members to provide advice*					
<b>Any other changes in the fishery?</b>	*RAG members to provide advice. For example, fishing behaviour/market demand? *					
<b>Any other sources of mortality apart from fishing?</b>	*RAG members to provide advice*					
Low Tier						
<b>Total catch data</b>	<b>Fishing season</b>	<b>Catch (t)</b>	<b>TAC (t)</b>	<b>% TAC caught</b>	<b>TAC or basket trigger exceeded?</b>	<b>% of TAC overcatch</b>
	2020	No catch reported	15	-	TAC: No Basket: No	N/A
	2021 <sup>12</sup>	No catch reported	15	-	TBA	TBA
<b>Decision rules</b>	Is the total catch reliable? *RAG members to provide advice*					
	Not overcaught so overcatch decision rules not triggered (refer to section 2.11.1.1 of the harvest strategy).					

<sup>12</sup> Catches for the 2021 season to date – as of 18 August 2021.

	For species with individual triggers within a basket with a joint TAC, should the joint TAC or individual triggers be changed (up or down) (refer to section 2.11.1.2 of the harvest strategy)? <i>*RAG members to provide advice*</i>									
<b>Species specific data gaps and needs</b>										
<i>*to be completed at the meeting*</i>										
<b>Species Specific Research and Priorities</b>										
<i>*to be completed at the meeting*</i>										
<b>HCRA recommendations</b>	<b>Fishing season</b>	<b>RBC (t)</b>	<b>Overcatch to be discounted (t)</b>	<b>Other source(s) of mortality (t)</b>	<b>TAC (t)</b>					
	2022									
<i>*General RAG comments*</i>										

## Brown sandfish

HCRAAG Species Assessment Sheet						
<b>Common names</b>	Brown sandfish – <i>Bohadschia vitiensis</i>					
<b>Pre-HS TAC</b>	Part of the 80t basket species TAC					
<b>Status open/closed</b>	Open					
<b>Current TAC</b>	Part of the 50t basket species TAC		Based on harvest strategy starting TAC			
<b>Basket trigger</b>	3 tonnes					
<b>Minimum size limit</b>	25cm					
New information since the TAC was last considered (in this it was at the implementation of the Harvest Strategy)						
<b>Latest scientific survey data</b>	<b>Year</b>	<b>Standing stock biomass (90<sup>th</sup> percentile) (t)</b>	<b>Standing stock biomass above min species size limit (t)</b>	<b>Is standing stock biomass above the default limit reference point?</b>		
	Not included in 2019-20 survey	-	-	RAG to discuss		
	<b>Survey adequate for species</b>	<b>Any unexpected results</b>	<b>Any concerns with biomass trend or absolute abundance</b>	<b>Need for management response</b>		
	-	-	-	RAG to discuss		
<b>Comments on scientific survey findings</b>	N/A					
<b>Catch data</b>	Available for 2020 and 2021(as at 18 Aug 2021). Refer to <b>attachment A of Agenda Item 5</b> .					
<b>Any other considerations?</b>	*RAG members to provide advice*					
<b>Any other changes in the fishery?</b>	*RAG members to provide advice. For example, fishing behaviour/market demand? *					
<b>Any other sources of mortality apart from fishing?</b>	*RAG members to provide advice*					
Low Tier						
<b>Total catch data</b>	<b>Fishing season</b>	<b>Catch (t)</b>	<b>TAC (t)</b>	<b>% TAC caught</b>	<b>TAC or basket trigger exceeded?</b>	<b>% of TAC overcatch</b>
	2020	No catch reported	50 (3t trigger limit)	N/A	TAC: No	N/A
					Basket: No	
	2021 <sup>13</sup>	No catch reported	50 (3t trigger limit)	TBA	TBA	TBA
<b>Decision rules</b>	Is the total catch reliable? *RAG members to provide advice*					
	Not overcaught so overcatch decision rules not triggered (refer to section 2.11.1.1 of the harvest strategy).					

<sup>13</sup> Catches for the 2021 season to date – as of 18 August 2021.

	For species with individual triggers within a basket with a joint TAC, should the joint TAC or individual triggers be changed (up or down) (refer to section 2.11.1.2 of the harvest strategy)? <i>*RAG members to provide advice*</i>									
<b>Species specific data gaps and needs</b>										
<i>*to be completed at the meeting*</i>										
<b>Species Specific Research and Priorities</b>										
<i>*to be completed at the meeting*</i>										
<b>HCRA recommendations</b>	<b>Fishing season</b>	<b>RBC (t)</b>	<b>Overcatch to be discounted (t)</b>	<b>Other source(s) of mortality (t)</b>	<b>TAC/trigger limit (t)</b>					
	2022									
<i>*General RAG comments*</i>										

## Leopardfish

HCRAG Species Assessment Sheet						
<b>Common names</b>	Leopardfish – <i>Bohadschia argus</i>					
<b>Pre-HS TAC</b>	Part of the 80t basket species TAC					
<b>Status open/closed</b>	Open					
<b>Current TAC</b>	Part of the 50t basket species TAC		Based on harvest strategy starting TAC			
<b>Basket trigger</b>	40 tonnes					
<b>Minimum size limit</b>	30cm					
New information since the TAC was last considered (in this it was at the implementation of the Harvest Strategy)						
<b>Latest scientific survey data</b>	<b>Year</b>	<b>Standing stock biomass (90<sup>th</sup> percentile) (t)</b>	<b>Standing stock biomass above min species size limit (t)</b>	<b>Is standing stock biomass above the default limit reference point?</b>		
	2019/20	508	-	RAG to discuss		
	<b>Survey adequate for species</b>	<b>Any unexpected results</b>	<b>Any concerns with biomass trend or absolute abundance</b>	<b>Need for management response</b>		
	Yes	No	No	RAG to discuss		
<b>Comments on scientific survey findings</b>	CSIRO paper ( <b>attachment B of agenda item 5</b> ): catches low. No concern for TAC.					
<b>Catch data</b>	Available for 2020 and 2021 (as at 18 Aug 2021). Refer to <b>attachment A of agenda item 5</b> .					
<b>Any other considerations?</b>	*RAG members to provide advice*					
<b>Any other changes in the fishery?</b>	*RAG members to provide advice. For example, fishing behaviour/market demand? *					
<b>Any other sources of mortality apart from fishing?</b>	*RAG members to provide advice*					
Low Tier						
<b>Total catch data</b>	<b>Fishing season</b>	<b>Catch (t)</b>	<b>TAC (t)</b>	<b>% TAC caught</b>	<b>TAC or basket trigger exceeded?</b>	<b>% of TAC overcatch</b>
	2020	0.2	50 (40t basket trigger limit)	0.004 %	TAC: No Basket: No	N/A
	2021 <sup>14</sup>	No catch reported	50 (40t basket trigger limit)	TBA	TBA	TBA
<b>Decision rules</b>	Is the total catch reliable? *RAG members to provide advice*					

<sup>14</sup> Catches for the 2021 season to date – as of 18 August 2021.

	Reported overcatch does not trigger any of the overcatch decision rules (refer to section 2.11.1.1 of the harvest strategy).									
	For species with individual triggers within a basket with a joint TAC, should the joint TAC or individual triggers be changed (up or down) (refer to section 2.11.1.2 of the harvest strategy)? <i>*RAG members to provide advice*</i>									
<b>Species specific data gaps and needs</b>										
<i>*to be completed at the meeting*</i>										
<b>Species Specific Research and Priorities</b>										
<i>*to be completed at the meeting*</i>										
<b>HCRA recommendations</b>	<b>Fishing season</b>	<b>RBC (t)</b>	<b>Overcatch to be discounted (t)</b>	<b>Other source(s) of mortality (t)</b>	<b>TAC/trigger limit (t)</b>					
	2022									
<i>*General RAG comments*</i>										

HCRA Species Assessment Sheet						
Common names	Pinkfish – <i>Holothuria edulis</i>					
Pre-HS TAC	Part of 80t basket species TAC					
Status open/closed	Open					
Current TAC	Part of 50t basket species TAC		Based on harvest strategy starting TAC			
Basket trigger	N/A					
Minimum size limit	N/A					
New information						
Latest scientific survey data	Year	Standing stock biomass (90 <sup>th</sup> percentile) (t)	Standing stock biomass above min species size limit (t)	Is standing stock biomass above the default limit reference point?		
	2019/20	85	-	RAG to discuss		
	Survey adequate for species	Any unexpected results	Any concerns with biomass trend or absolute abundance	Need for management response		
	Yes	No	Yes	RAG to discuss		
Comments on scientific survey findings	CSIRO paper ( <b>attachment B of agenda item 5</b> ): Possible decline or natural variability. Catch assessment needed.					
Catch data	Available for 2020 and 2021 (as at 18 August 2021). Refer to <b>attachment A of Agenda Item 5</b> .					
Any other considerations?	*RAG members to provide advice*					
Any other changes in the fishery?	*RAG members to provide advice. For example, fishing behaviour/market demand? *					
Any other sources of mortality apart from fishing?	*RAG members to provide advice*					
Low Tier						
Total catch data	Fishing season	Catch (t)	TAC (t)	% TAC caught	TAC or basket trigger exceeded?	% of TAC overcatch
	2020	No catch reported	50	N/A	TAC: No Basket: N/A	N/A
	2021 <sup>15</sup>	No catch reported	50	TBA	TBA	TBA
Decision rules	Is the total catch reliable? *RAG members to provide advice*					
	Not overcaught so overcatch decision rules not triggered (refer to section 2.11.1.1 of the harvest strategy).					

<sup>15</sup> Catches for the 2021 season to date – as of 18 August 2021.



	For species with individual triggers within a basket with a joint TAC, should the joint TAC or individual triggers be changed (up or down) (refer to section 2.11.1.2 of the harvest strategy)? <i>*RAG members to provide advice*</i>									
<b>Species specific data gaps and needs</b>										
<i>*to be completed at the meeting*</i>										
<b>Species Specific Research and Priorities</b>										
<i>*to be completed at the meeting*</i>										
<b>HCRA recommendations</b>	<b>Fishing season</b>	<b>RBC (t)</b>	<b>Overcatch to be discounted (t)</b>	<b>Other source(s) of mortality (t)</b>	<b>TAC/trigger limit (t)</b>					
	2022									
<i>*General RAG comments*</i>										

HCRAG Species Assessment Sheet						
Common names	Amberfish – <i>Thelenota anax</i>					
Pre-HS TAC	Part of the 80t basket species TAC					
Status open/closed	Open					
Current TAC	Part of the 50t basket species TAC			Based on harvest strategy starting TAC		
Basket trigger	N/A					
Minimum size limit	N/A					
New information since the TAC was last considered (in this it was at the implementation of the Harvest Strategy)						
Latest scientific survey data	Year	Standing stock biomass (90 <sup>th</sup> percentile) (t)	Standing stock biomass above min species size limit (t)		Is standing stock biomass above the default limit reference point?	
	2019/20	478	-		RAG to discuss	
	Survey adequate for species	Any unexpected results	Any concerns with biomass trend or absolute abundance		Need for management response	
	Yes	No	No		RAG to discuss	
Comments on scientific survey findings	CSIRO paper ( <b>attachment B of agenda item 5</b> ): Catches low. No concern for TAC.					
Catch data	Available for 2020 and 2021 (as at 18 Aug 2021). Refer to <b>attachment A of Agenda Item 5</b> .					
Any other considerations?	*RAG members to provide advice*					
Any other changes in the fishery?	*RAG members to provide advice. For example, fishing behaviour/market demand? *					
Any other sources of mortality apart from fishing?	*RAG members to provide advice*					
Low Tier						
Total catch data	Fishing season	Catch (t)	TAC (t)	% TAC caught	TAC or basket trigger exceeded?	% of TAC overcatch
	2020	No catch reported	50	-	TAC: No Basket: N/A	N/A
	2021 <sup>16</sup>	No catch reported	50	TBA	TBA	TBA
Decision rules	Is the total catch reliable? *RAG members to provide advice*					

<sup>16</sup> Catches for the 2021 season to date – as of 18 August 2021.

	Not overcaught so overcatch decision rules not triggered (refer to section 2.11.1.1 of the harvest strategy).									
	For species with individual triggers within a basket with a joint TAC, should the joint TAC or individual triggers be changed (up or down) (refer to section 2.11.1.2 of the harvest strategy). <i>*RAG members to provide advice*</i>									
<b>Species specific data gaps and needs</b>										
<i>*to be completed at the meeting*</i>										
<b>Species Specific Research and Priorities</b>										
<i>*to be completed at the meeting*</i>										
<b>HCRA recommendations</b>	<b>Fishing season</b>	<b>RBC (t)</b>	<b>Overcatch to be discounted (t)</b>	<b>Other source(s) of mortality (t)</b>	<b>TAC/trigger limit (t)</b>					
	2022									
<i>*General RAG comments*</i>										

## Closed species

Surf redfish (closed)

HCRA Species Assessment Sheet				
Common names	Surf redfish – <i>Actinopyga mauritiana</i>			
Pre-HS TAC	0 tonnes			
Status open/closed	Closed since 2003 due to sustainability concerns			
Minimum size limit	22cm			
New information				
Latest scientific survey data	Year	Standing stock biomass (90 <sup>th</sup> percentile) (t)	Standing stock biomass above min species size limit (t)	Is standing stock biomass above the default limit reference point?
	2019/20	20	6.7	RAG to discuss
	Survey adequate for species	Any unexpected results	Any concerns with biomass trend or absolute abundance	Need for management response
	Yes	No	No	RAG to discuss
Comments on scientific survey findings	CSIRO paper ( <b>attachment B of agenda item 5</b> ): Species remains closed – Harvest Strategy closed species rule applies.			
Catch data	This species is closed to fishing however 200kg of catch was reported by a fisher in 2020. This matter was followed up by AFMA Compliance.			
Any other considerations?	*RAG members to provide advice*			
Re-opening Decision Rule (2.11.4 section of the harvest strategy) – this rule can only be applied if, using all available and reliable information, it can be established that the stock is above a limit reference point level.				
Species specific data gaps and needs				
*to be completed at the meeting*				
Species Specific Research and Priorities				
*to be completed at the meeting*				
*General RAG comments*				

Sandfish (closed)

HCRAG Species Assessment Sheet				
Common names	Sandfish – <i>Holothuria scabra</i>			
Pre-HS TAC	0 tonnes			
Status open/closed	Closed since 1998 due to sustainability concerns			
Minimum size limit	18cm			
New information				
Latest scientific survey data	Year	Standing stock biomass (90 <sup>th</sup> percentile) (t)	Standing stock biomass above min species size limit (t)	Is standing stock biomass above the default limit reference point?
	Planned for but not included in 2019-20 survey	unknown	unknown	RAG to discuss
	Survey adequate for species	Any unexpected results	Any concerns with biomass trend or absolute abundance	Need for management response
	-	-	-	RAG to discuss
Comments on scientific survey findings	CSIRO paper (attachment B of agenda item 5): No survey undertaken. Harvest Strategy closed species rule applies.			
Catch data	This species is closed to fishing			
Any other considerations?	Assessed as 'Overfished' but 'Not subject to overfishing' by ABARES in the Annual Fishery Status Reports as no recovery in overall density was observed between 1998 and 2010, and there is no other robust information to inform stock status  *RAG members to provide advice*			
Re-opening Decision Rule (2.11.4 section of the harvest strategy) – this rule can only be applied if, using all available and reliable information, it can be established that the stock is above a limit reference point level.				
Species specific data gaps and needs				
*to be completed at the meeting*				
Species Specific Research and Priorities				
*to be completed at the meeting*				
*General RAG comments*				

<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting No. 1</b> <b>6-8 October 2021</b>
<b>ECOLOGICAL RISK ASSESSMENT FOR THE BDM FISHERY (CSIRO)</b>	<b>Agenda Item 6</b> <b>For DISCUSSION &amp; ADVICE</b>

## RECOMMENDATIONS

1. That the Resource Assessment Group (RAG):
  - a. **NOTE** the draft report (**Attachment A**) and presentation to be provided at the meeting by CSIRO on the Ecological Risk Assessment for the Effects of Fishing (ERA) process and the progress of the ERA for the BDM Fishery.
  - b. **DISCUSS** and **PROVIDE ADVICE** on the draft results of the BDM ERA, noting that the final draft assessment will be provided to the HCRAAG for review once available.

## BACKGROUND

2. The ERA framework was initially developed in 2007 by CSIRO in collaboration with AFMA to help AFMA meet its ecologically sustainable development (ESD) objective<sup>1</sup> by managing the impacts of commercial fisheries on commercial species, by-product species, bycatch species, protected species, and habitats and communities. The framework also addresses the need to assist in evaluating impacts of fishing for strategic assessments under the *Environment Protection and Biodiversity Conservation Act 1999*.
3. Since its development, the framework has been successfully applied to several fisheries in Australia and internationally. The framework has been reviewed and refined since its implementation to ensure that it is credible, cost effective and adaptable enough to consider new information, species, reference points, methods/tools or adaptation to new standards and policy developments.
4. The framework consists of a set of risk assessment methodologies that are used to assess the impact of fishing across five ecological components of the marine environment (commercial species, by-product species, bycatch species, protected species, and habitats and communities). The methodologies start off as qualitative and becomes more quantitative as the fishery progresses through the different assessment levels.
5. CSIRO are undertaking an ERA for the Torres Strait BDM Fishery to address an assessment priority and export approval condition for the fishery, which currently requires an ERA to be completed by 1 January 2022<sup>2</sup>. Stakeholder consultation is an important feature of the ERA especially in the Scoping and Level 1 phases to improve the assessment, increase the chance of uptake of results and to identify suitable management responses.
6. Once the ERA is finalised, any ecological components with a moderate-high risk score at Level 1 are escalated to the next level of ERA assessment (Level 2 semi-quantitative-quantitative methods) and an Ecological Risk Management strategy is developed to address, manage and monitor those risks.
7. More information on the ERA and ERM process is available on the [AFMA website](#) and the [Guide to AFMA's Ecological Risk Management](#).

<sup>1</sup> Under the *Fisheries Management 1991*

<sup>2</sup> Torres Strait Beche de mer Fishery WTO Condition 5: The Protected Zone Joint Authority must complete an ecological risk assessment of the Torres Strait Beche-de-mer Fishery by 1 January 2022 and develop an associated risk management strategy to address any risks identified in this assessment.

<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting No. 1 6-8 October 2021</b>
<b>CLIMATE CHANGE IMPACTS ON TORRES STRAIT FISHERIES (CSIRO)</b>	<b>Agenda Item 7 For NOTING &amp; ADVICE</b>

## RECOMMENDATIONS

1. That the Resource Assessment Group (RAG):
  - a. **NOTE** the presentation to be provided by Dr Leo Dutra (CSIRO) at the meeting on the outcomes of the project *Climate variability and change relevant to key fisheries resources in the Torres Strait — a scoping study* (climate change scoping project).
  - b. **NOTE** the Torres Strait Scientific Advisory Committee (TSSAC) considered the projects outcomes and recommendations at its 79<sup>th</sup> meeting on 9-10 June and agreed that a further climate change project needs to (draft meeting record):
    - i. be made a priority, as there are very real climate change threats to the Torres Strait;
    - ii. be tackled at a national /political scale and funding beyond TSSAC will need to be secured due to the high cost of the project;
    - iii. provide clear guidance on risks, threats and opportunities (if any) associated with climate change, and actions to address them;
    - iv. identify other participants both for funding and end users; and
    - v. that the modelling should start with focusing on commercial fisheries, and then can be upscaled to have more information on other fisheries.
  - c. **DISCUSS** and **PROVIDE ADVICE** on the project recommendations for further research on evaluating the implications of climate variability and change on Torres Strait Fisheries.

## BACKGROUND

2. The need to better understand the species-specific effects of climate change and variability on Torres Strait Fisheries was initially identified as a research priority by TSSAC in December 2018 (meeting 71). TSSAC agreed that as a starting point, a scoping study should be undertaken on the possible methods and resources needed to build an information framework that can evaluate the implications of future climate variability and change scenarios on fisheries to better allow fisheries managers and industry to respond and adapt to any changes.
3. The project scope that went out in the 2019-20 TSSAC call for research funding proposals is provided as **Attachment A** for the RAG's reference. The project was funded by AFMA and finalised on 31 January 2020. A summary of the suggested components and estimated costs for a full climate modelling project are outlined in **Table 1** in **Attachment B** and the full project report is provided as **Attachment C**.
4. The project builds on a literature review of the main climate change drivers in Torres Strait affecting tropical rock lobster, bêche-de-mer (sea cucumber), finfish, prawns, turtles and dugongs to provide detailed specification and costings for a future project that will produce the over-arching data framework at the appropriate spatial scales, as required to address



future climate variability and change scenarios for Torres Strait fisheries. The report also includes detailed information about data availability, and specifications on data storage, management and data accessibility issues.

5. The TSSAC considered the project's outcomes and recommendations at their 79<sup>th</sup> meeting on 9-10 June 2021 and agreed that if the project was to progress beyond this scoping phase, it would provide a range of information that is of value to fisheries management, including:
  - Understanding interactions between fisheries and ecosystems.
  - Understanding impacts that different climate change scenarios could have on fisheries/ species.
  - Understanding impacts of changes in catchment conditions and rainfall.
  - Understanding impacts of incidences.
  - Assisting fisheries managers and communities with preparation for adaptation, where possible.
  - Providing predictions of changes in abundance, growth, reproductive capacity and distribution.
  - Helping to differentiate between the relative effects of fishing and environmental (climate) change on marine resources.
  - Use existing, and new data to be collected, to generate information of value to other sectors beyond fisheries, e.g. water circulation, winds, predicted sea level rise, rainfall and wind speed.
6. Given the limited annual research budget, the TSSAC agreed that other funding sources need to be explored including the Fisheries Research and Development Corporation (FRDC) and other agencies such as councils and state environment agencies.

*Other research to date on climate change impacts on Torres Strait Fisheries*

7. In terms of assessing the likely impacts of climate change on Torres Strait Fisheries the following has been undertaken:
  - a. Qualitative Sensitivity Analysis: Assessing the vulnerability of Torres Strait fisheries and supporting habitats to climate change (Welch and Johnson 2013);
  - b. Management Strategy Evaluation to integrate climate changes into the TRL Stock Assessment: An Integrated Management Strategy Evaluation (MSE) for the Torres Strait Rock Lobster *Panulirus ornatus* fishery (Plaganyi *et al* 2012);
  - c. System Modelling: Models of Intermediate Complexity of Ecosystems (MICE) – applied to TRL in the Torres Strait. Used in the following projects:
    - i. AFMA project 2017/0816 – Environmental drivers of variability and climate projections for the Torres Strait tropical lobster *Panulirus ornatus*. (Plaganyi *et al* 2018).
    - ii. Decadal-Scale Forecasting of Australian Fish and Fisheries (Fulton *et al* 2018). A non-technical summary of the decadal-scale forecasting project<sup>1</sup> is provided at **Attachment D**.

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<sup>1</sup> AFMA led project *Adaption of Commonwealth fisheries management framework to climate change project* (FRDC 2016-059)

8. In June 2018 the TSRA and National Environmental Science Programs (NESP) Earth Systems and Climate Change Hub convened a workshop on climate change implications for fisheries and marine ecosystems in the Torres Strait. The workshop identified initial thoughts on priority areas for research that may help fisheries and marine ecosystem management in the Torres Strait (**Attachment E**).

*Adaption of Commonwealth fisheries management framework to climate change project (FRDC 2016-059) (the climate adaptation project)*

9. The climate adaptation project is due for completion in 2021 and looked at the readiness of Commonwealth Fisheries Management Arrangements to the potential impacts of climate change and options to adapt to changes. Its key output is a climate adaption handbook that provides detailed steps for fisheries and other stakeholders to conduct climate risk assessment of their fishery management arrangements and operations. During the project, AFMA worked with the CSIRO, IMAS and other researchers to answer the following questions:
  - a. *What changes does AFMA need to make to its regulatory system so that it can effectively deliver its management objectives?*
  - b. *What are the consequences of those changes for the fishing industry and other fishery stakeholders?*
10. While AFMA's current management strategies have flexibility built in them, it was important to assess the extent to which the direct and indirect impacts of climate change will challenge Australian fisheries and the management framework that they are currently managed under. The climate adaptation project did this by developing a risk assessment approach that tests the adaptability of current and potential management arrangements to projected, climate driven, changes of fish stocks on three case study fisheries, the Northern Prawn, Heard and MacDonald Island and Southern Bluefin Tuna Fisheries as part of the project.
11. The project consulted with key stakeholders from those fisheries, as well as recreational, indigenous and state fishery stakeholders to develop the final approach.
12. The project considered is likely to give some guidance around future research investment into possible management responses to the impacts of climate change on Torres Strait Fisheries, RAG advice is sought on the benefit of extending the outputs of the project to Torres Strait Fisheries.

## **ATTACHMENT A - Torres Strait Scientific Advisory Committee 2019-20 financial year research project scope**

**Project Title:** Climate variability and change relevant to key fisheries resources in the Torres Strait — a scoping study.

### **Project Need:**

Key commercial species in Torres Strait fisheries, such as tropical rock lobsters, prawn, finfish and beche-de-mer, are likely to be influenced by current and future climate variability and change. Fisheries management and assessments will need to take account of the implications of future variability and change that may affect stocks. These may manifest through effects on recruitment pathways, mortality rates, and critical habitats among other processes. Previous reviews have qualitatively assessed the vulnerability of the Torres Strait to climate change effects; however, future assessments need to account for these in a quantitative manner for fisheries management to respond appropriately. A quantitative MICE model (Model of Intermediate Complexity) has already been completed in the Torres Strait region for tropical rock lobster, as a part of understanding annual variability in abundance. Separate fishery specific assessment models for multiple species, will all require essentially the same over-arching regional-scale data. This data should cover future climate and environmental variability, potentially including currents, winds, temperature, rainfall etc, at an appropriate spatial extent and grid-resolution.

The requirement is to scope a future project that can deliver the over-arching data requirements that are needed from e.g. global atmospheric and/or oceanographic models, down-scaled to the broader Torres Strait region. This can be used as a framework to derive separate fishery specific models that will evaluate the implications of future climate variability and change scenarios on these fisheries. The down-scaled atmospheric and/or oceanographic outputs will need to be produced in way that meets the input data needs of the various fishery specific sub-models.

The scoping study will need to consider previous reviews of climate implications for Torres Strait; consult with relevant fishery researchers, managers and key stakeholders regarding the necessary inputs; identify a range of potential sources of co-investment funds to support the main future project. The scoping study could potentially include a workshop, if cost-effective, with relevant fishery modelling expert end-users and stakeholders.

### **Desired Outputs:**

1. A detailed specification and costing for a future project that will produce the over-arching data framework at the appropriate spatial scales, as required to address future climate variability and change scenarios for Torres Strait fisheries.

### **Contacts**

**Selina Stoute** Senior Manager Torres Strait Fisheries 07 4069 1990  
selina.stoute@afma.gov.au

**Lisa Cocking** Executive Officer Torres Strait Scientific Advisory Committee 02 6225 5451  
torresstraitresearch@afma.gov.au

**ATTACHMENT B – Table 1. Summary of the main outcomes and recommendations of the project *Climate variability and change relevant to key fisheries resources in the Torres Strait — a scoping study***

Main outcomes/ recommendations	Estimated cost
1. Prioritise physical data collection and further strengthen and expand a large-scale monitoring program for Torres Strait that would support the identification of long-term trends and improve understanding about local and regional processes affecting habitats, species and fisheries, and to support the development of models.	Unknown. It is difficult to estimate costings for data collection programs, as some data is already being collected across fisheries. This issue can be discussed at the meeting. The PI will provide some estimates of cost associated with collecting hydrodynamic information.
2. Staged approach in the development of an integrated ecosystem modelling framework to investigate the impacts of climate and local changes on fisheries in Torres Strait, via coupling together:	
a) Development and implementation of data framework to support future modelling efforts in Torres Strait – approx. cost	Approximately 0.4-0.5 FTE for 1 year or rough estimate of A\$130k
b) Development of integrated ecological or socio-ecological models capable of integration with a regional hydrodynamic model:	
i. For example, combining existing data and models (Tropical Rock Lobster, beche-de-mer, and dugongs) into an integrated spatial MICE, which will form the basis for a hybrid MICE-ATLANTIS ecosystem model;	Approximately 0.5-0.7 FTE over each of 2 years, or rough estimate of \$460k.
ii. Dedicated regional hydrodynamic model, including physics and biogeochemistry for Torres Strait, for example similar to eReefs. Include the key findings – recommendations from each project, and the costs.	Approximately 0.3-0.5FTE over each of 2 years, or rough estimate of \$350k
<b>Total estimated costs for costed components of project (this excludes data collection components)</b>	<b>\$940k</b>

## Australian fisheries stocks under climate change

Over the next twenty years Australia's marine ecosystems are expected to exhibit some of the largest climate-driven changes in the Southern Hemisphere. These changes will extend from the ecosystems to the local communities and businesses of the Australian fisheries sector. The CSIRO and its collaborators have pulled together all available information on how climate may affect fished species in Australia – identifying those most sensitive to climate. This information helps highlight those species that may be at risk and those that might benefit, allowing fisheries to be better prepared.

### Climate Footprint in Commonwealth Fisheries

2020-2025

Experts were asked to judge the vulnerability of the main fisheries species  
Computer models were also used to explore potential futures for the main fished species & the effects on the gross value of fisheries

STOCK CHANGES  
↑ % increasing  
% unchanged  
↓ % decreasing

Level of Certainty

⓪ Low

✓ Moderate

NPF: All potentially vulnerable, but may benefit in short term



42% 29% 29%

\$ Value may increase by 20% but up to 45% drop possible



TROPICAL FISHERIES: All potentially vulnerable, apparently few 'winners'



50% 50%

\$ Value may increase by 20% but it may drop by 50%

ETBF: All potentially vulnerable, but many will likely still cope



20% 47% 33%

\$ Value likely to hold steady but up to 35% drop possible



8% 80% 12%

SESSF: 40% potentially vulnerable to further change, but may be slow to come. Recovery from past change unlikely

\$ Small change (±10%) in value most likely, but a slim chance of collapse exists, if sudden regime change occurs

60% Target species have a potential vulnerability

SPF: All potentially vulnerable, but many will likely still cope

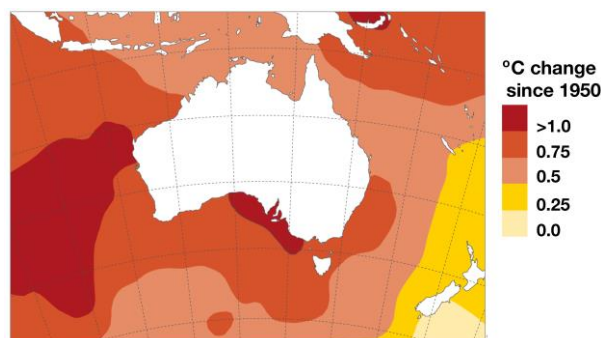
\$ Value may increase by up to 40%

The average may remain relatively stable, but variability will increase & species are already moving. State fisheries will likely be more heavily impacted.

## Climate change in Australian Waters

Australia's oceans are undergoing rapid change. The waters off south-east and south-west Australia are hotspots, warming much more rapidly than most of the world's oceans. Australia's tropical ocean is also warming rapidly, almost twice as fast as average for the rest of the world. It is important to understand what this means for the ecosystems in these warming waters if we are to continue to be sustainably manage Australian fisheries. Understanding the changes and being climate ready is important for both industry and management, because it allows them to plan their operations to avoid or mitigate negative impacts and to make the most of new opportunities that arise.

Australian fish species have already begun to move. Over 100 Australian species have already started migrating south towards cooler southern waters. There have also been a series of marine heatwaves and other extreme events that have harmed Australia's seagrass, kelp forests, mangroves and coral reefs. These changes in the distribution, abundance and species composition in Australia's marine ecosystems mean that Australia's commercial fisheries are being affected by climate change. It is unavoidable. The ocean also has a long memory, which means that the effects of past and present human activities have already locked the world in to a further 0.5-1 °C warming. This is why fisheries managers (e.g. at AFMA) have asked for a rapid and thorough update of information so that they can base their strategic planning on the latest and best information.



**Water temperature change around Australia since 1950.**  
Image updated from BOM data. These temperature increases mean water temperatures often record breaking.

## Sensitivity of Australian Fisheries Target Species

Australian fisheries catch more than 100 species. There is not enough data or resources available to perform fine scale assessments for each species. Instead experts on the fisheries and target species were asked identify the key target species in State and Commonwealth fisheries. The experts then had to rank each species in terms of how sensitive it was to climate change. This sensitivity was judged in terms of factors that affect:

- abundance (how old they are when they mature, how often they reproduce, number of eggs, diet and habitat needs);
- movement and spatial distributions (distance they can move, how widely spread they are already, available habitats);
- behaviour (needing special triggers for reproduction or migration, having special behaviours that only happen for short periods)

Across all Australia 70% of all key target species have moderate to high sensitivity in one of these factors. Within the AFMA managed fisheries at least 50% of the target species per fishery are moderately to highly sensitive and in many AFMA managed fisheries all the target species are sensitive in one way or another.

Most species were sensitive to factors determining their distribution or behaviour, while only about 25% were sensitive in terms of factors that directly influence abundance. The greatest sensitivity to the timing of key behaviours was along the coastline of eastern Australia (north and south), while shifts in distribution are the most likely responses in the west and in the tropical north. Invertebrates had higher sensitivity scores than other species. As a consequence, dive – and other gears targeting invertebrate – show the highest sensitivities. Purse seine fisheries for small pelagic species has the lowest sensitivities.

The sensitivity analysis suggests that fisheries should first consider how changes in distribution and the timing of key events affect them and their management and then consider potential than changes in abundance.



## Sensitivity of Species Targeted by Australian Fisheries

Summary of sensitivity per fishery. Low sensitivity is for those species with a low rating across all 3 factors – abundance, distribution and behaviour. Moderate sensitivity indicates that a species had 1 factor that was scored as being moderately sensitive to climate change. High sensitivity covered both the case where a species was rated as having a factor that was highly sensitive to climate change or they had multiple factors rated as moderately sensitive. Sensitivity does not automatically indicate a likely decline it indicates the potential for change (including possible increases)

Commonwealth Fishery	Low	Moderate	High
Bass Strait Scallop			Scallops: behaviour and distribution
Coral Sea			Coral trout: distribution and abundance
Eastern Tuna and Billfish		Behaviour of all target species	
Northern Prawn			Behaviour and distribution of all target species
South and Eastern Scalefish and Shark	Species already showing shifts (warehou, morwong, redfish, ling) show low sensitivity to further climate driven change	Gemfish: abundance. Trevalla, flatheads, and whiting behaviour.	<b>All/majority</b> of properties of squids, sharks, blue grenadier and orange roughy.
Small Pelagics		Behaviour of sardine and blue mackerel	Jack mackerel and red bait behaviour and distribution
Torres Strait			<b>All</b> properties of tropical rock lobster
<b>State Fisheries</b>			
New South Wales, Victoria, South Australia		Behaviour of snapper, tuna and some small pelagics.	Many small pelagic, estuarine and invertebrate species (mainly via behaviour and distribution). <b>All</b> properties of sharks and blue grenadier.
Queensland		Behaviour of estuarine and shelf fish, as well as Spanish mackerel and billfish.	Behaviour and distribution of all reef fish. <b>All</b> properties of the majority of invertebrates and sharks.
Gulf of Carpentaria (Queensland and Northern Territory)	Bream and sharks	Majority of mackerels, estuarine fish and mangrove associated species (due to a mix of factors).	<b>All/majority</b> of properties of snappers, emperors and all valuable invertebrate species (prawns, lobster, sandfish).
Northern Territory and Western Australia	Many sharks, estuarine and large pelagic fish	Large sharks: abundance. Behaviour or distribution of fish non-reef shelf fish	<b>All/majority</b> of properties of reef associated fish and all invertebrates.
Western Australia		Distribution or behaviour of herring, reef associated predators, some abalone, octopus and sandfish.	<b>All/majority</b> of properties of prawns, crabs, many small pelagics, some abalone, oysters, bream and dhufish.



## Fisheries projections

The other approach to consider the future climate change effects on Australia's fisheries was to take existing models of Australian marine ecosystems (which together cover the entire EEZ) and run them under the conditions that might exist over the next 40 years. The results of these models were then used to see how species abundance and distribution might change and how ecosystems might restructure.

The modelling work found that the different ecosystems around Australia face different types and levels of climate change – including temperature changes, changes in rainfall patterns, ocean acidification, shifting ocean oxygen levels. For fisheries as large as the SESSF different parts of a fishery will be undergoing different levels of change. In most instances, larger changes in the climate led to larger model responses. The tropics, however, might see some large changes despite only small shifts because those shifts will influence the productivity of phytoplankton that supports the entire food web.

Those models that only look at the physical environments preferred by species predicted there would be reasonably large declines for the majority of fish populations around Australia. However, once all the other processes that occur in ecosystems (e.g. feeding, movement, habitat use) were included in the models the picture is more complicated – some species decline, but others benefit and grow in abundance, though perhaps living in new locations.

The models also predict that the ecosystems will become more variable. The Tasman Sea, for example, could have strings of very productive years interspersed by series of years with exceptionally low production. This variability is reflected across the entire food web, with many of the species shifting their distributions in response – seeking out desirable habitats and food sources.

For many species the different models are in agreement, increasing confidence in the robustness of results. When the models disagree this highlights uncertainty and where more information is needed. Many of the species ranking highly in the sensitivity analysis also show enhanced responses to climate change in the models. In the short term many of the models predict little further change for most species (noting that this means that already depleted species do not show signs of recovery). Further in to the future (30-40 years) things become more uncertain, with the different models not always agreeing on whether species will increase or decrease in abundance. This is because simple physical responses alone may not dictate a species response to climate change. As abundances change, predation and competition within food webs will also change. This means that new or novel food webs may form, changing ecosystems unexpected ways. In some regions (such as south eastern Australia) the ecosystem may eventually shift into a new state that is quite different to today, though this will be dependent on exactly how the physical climate drivers interact with the many different responses of all the species making up the food web and habitats in that region.

## Implications of Climate Change

It is clear from the changes that have already occurred, and what the sensitivity and models predict, that there will be strong differences in the level of effects and responses across different species and food webs. Demersal food webs, those species that live near to or amongst habitats on the seabed, appear to be more strongly affected by climate change. Invertebrates, who are amongst Australia's most valuable target species, are particularly sensitive. Pelagic food webs, where species live up in the water column, appear less sensitive and may even benefit from the environmental changes.

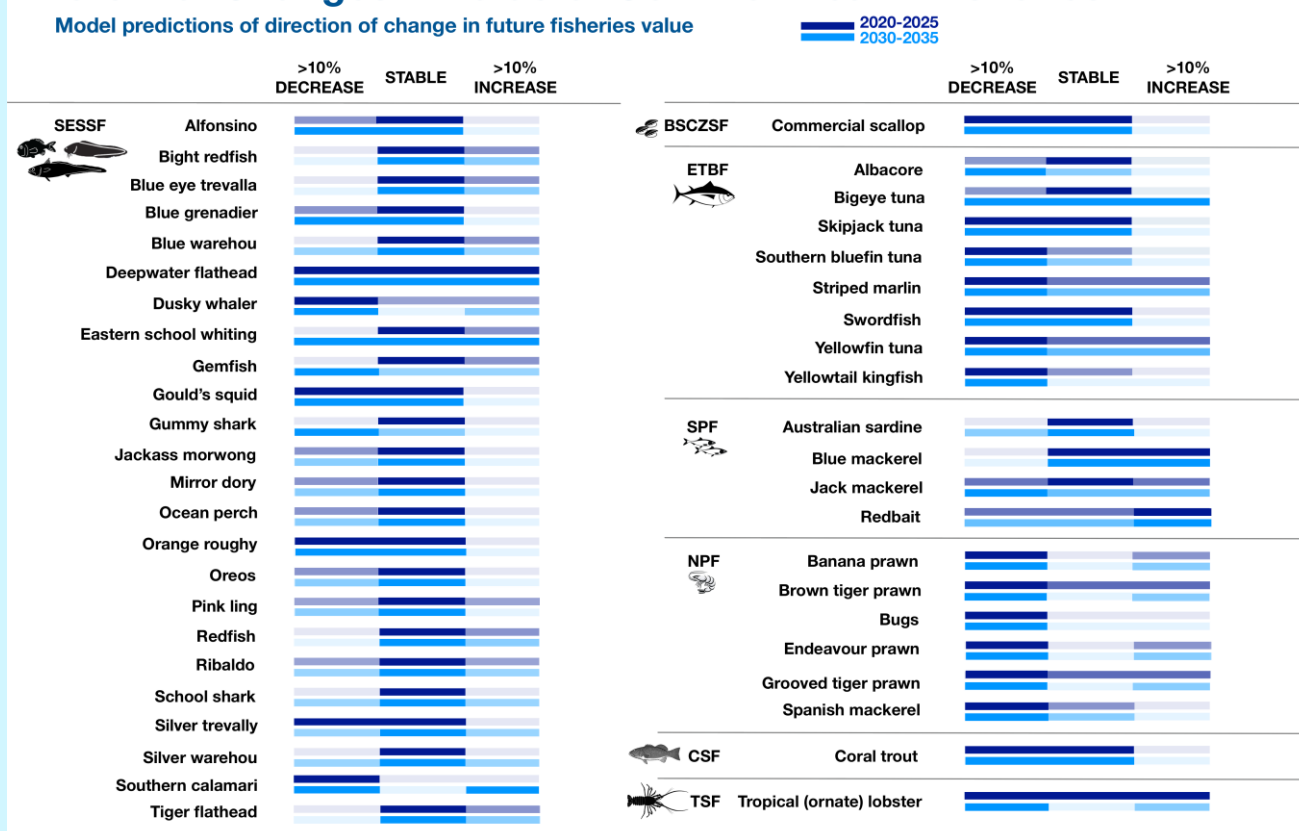
This is a concerning finding as much of Australia's seafood is sourced from species that are members of demersal food webs or reliant upon them. Individuals in shallower (more effected) waters, or already living on the edge of what they can tolerate, will be the first to respond and will show the greatest magnitude of response. Some of these changes have already begun. The decline of species such as abalone associated with marine heatwaves and tens of species already observed to be moving south (e.g. into Tasmania and other places where they have not previously been recorded).

Invertebrates may be among the most heavily impacted species. They are often highly productive, but with relatively short life spans; meaning they can respond quickly, but often have little buffering capacity (they cannot ride out many poor years before suffering significant decline at the population level). Many invertebrates also have specific habitat requirements. Altogether these characteristics mean that invertebrates are more volatile and are quite sensitive to variation in climate and extreme events.

Both Commonwealth and State fisheries will face changes in gross value as a result of climate change effecting both the fish stocks and (potentially) the behaviour of the fishers. While the majority of the model results suggest little change in the short term, some simulations did suggest that larger changes (both positive and negative) were possible.

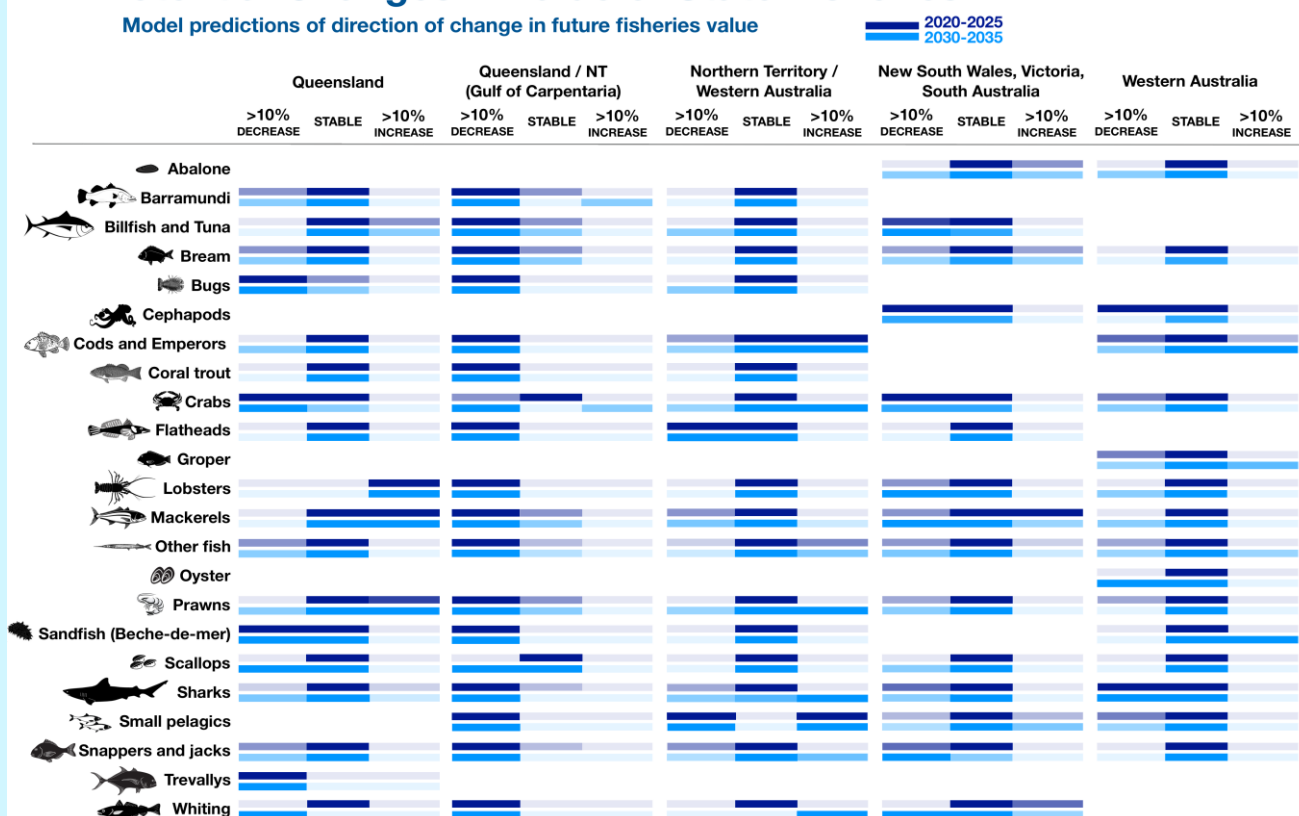
## Potential Changes in Value of Commonwealth Fisheries

Model predictions of direction of change in future fisheries value



## Potential Changes in Value of State Fisheries

Model predictions of direction of change in future fisheries value



Ecosystem responses will not only respond to changes in temperature, precipitation or to ocean acidification. Variability in primary production (i.e. production by the plants and algae at the bottom of the food web) will also be important. For instance, if there is little change in primary production then ecosystems will likely show little change (so long as temperatures do not shift beyond what may species can physically tolerate). Unfortunately, it is not yet clear what future primary productivity will look like around Australia – as some important processes are still not completely understood. This means that understanding and predicting future changes in primary production remains an active area of research and updates will be provided as rapidly as possible.

Many mechanisms can lead to changes in ecosystems – whether through behaviour, distribution or abundance of the species and habitats in them. The drivers causing the changes can be different species to species. For some it will be due to changes in environmental conditions, this can cause the timing of seasonal events (like spawning) to move which can affect the success of those behaviours. If environmental conditions move beyond preferred ranges species will move to more favourable conditions or dwindle in abundance. For many species change will result from a loss (or shift) in habitat but for others changes will occur because the availability of their prey changes. For still other species it could be due to a shift in what their predator(s) are doing – if a predator moves away the prey abundance might grow, whereas if a predator starts to eat more of the prey (due to a shift in diet) then the prey population might decline. As frustrating as it may be for managers, industry and researchers looking for simple explanations and a way to make things more straight forward, it will likely come down to a case-by-case basis (which may even vary spatially across a species' geographic range).

Human responses to all these changes could also complicate things. Well informed decisions are one of the best ways of avoiding negative outcomes and maximising opportunities. A nested approach – where models and vulnerability assessments are used to identify the most at risk species and locations – appears to be the best way of targeting monitoring and management responses.

Given existing understanding of ecosystems, climate change and the sensitivities highlighted in this project a small set of management recommendations can be made:

- i. A staged response might be necessary, where fishing activities are first adjusted due to shifts in behaviour (e.g. changing the timing of seasonal closures to make sure they continue to line up with seasonal behaviours like spawning or migrations), before looking to respond to changes in spatial distributions.
- ii. Not all fisheries and operators will be exposed to the same level of change. Likewise, not everyone will have the same capacity to adapt. This will compound the differential outcomes seen across species and fisheries. One option is to simply accept uneven social and economic consequences. A more attractive alternative is to have information services (websites, newsletters, radio updates) to help explain what is going on, what the options are and the need for change as well as to provide support mechanisms to help those that are struggling to adjust.
- iii. Successful management will require a diverse set of good scientific tools. No single approach will be sufficient due to existing uncertainty and the interplay of climate and fishing with the ecosystem components and processes. New management and assessment tools will also be needed. The complexity of possible species responses and the increasing importance of environmental drivers means that current models used in stock assessments to advise on acceptable catch levels may be insufficient for understanding stock patterns under climate change. Key interactions and dependencies may need to be included to better reflect how the species is responding. This means that models used in fisheries assessments will likely need to be extended along the lines of the approach known as "MICE", which are models that not only include the target species but also the most important environmental (and other) drivers that set the context for the species' responses.
- iv. Existing management strategies and objectives must be reviewed in terms of whether they help or hinder long term ecological and resources management objectives. Are they likely to deliver as desired into the future, if a stock is depleted can they rebuild it or help to recover degraded ecosystems? These considerations must go beyond focusing on fisheries to think about the structure of the whole ecosystem and which species are needed to maintain or rebuild them. Such a rethink will require a greater coordination between conservation and fisheries management.
- v. Fisheries policy, management and assessment methods need to allow for the concept of regime shifts and extreme events and for contextual management decision making. Taking lessons from locations that have already faced such challenges suggests that indicators that can track what state the environment is in can be used to let managers know when they need to adjust acceptable levels of fishing pressure and protection.
- vi. Fisheries management methods should be made as flexible as possible, so they can change as rapidly as need to respond to changing system state. The speed of change means a no (or at least minimal) regrets approach to management needs to be taken, with updates as new information comes to light. Management instruments may also need to be adapted. Reference points defining an overfished state or a desirable state for target species might need to be modified if there is a regime shift in ecosystem state or stock productivity. Fisheries closures may need to be based on water bodies (large areas of water of a specific temperature) rather than simply relying on the protection of fixed geographic locations.

- vii. Management decision making will need to (i) more explicitly prioritize resources and awareness around vulnerable/ sensitive species and fisheries or (ii) have a clear discussion around whether some species are beyond management (as the environment has made it impossible for the species to recover). Such decisions can't be taken lightly but might be necessary if large environmental changes occur.
- viii. Australia-wide coordination of management will be imperative as species shift or environmental changes span State and Commonwealth boundaries. Without such coordination (or centralised management) local stress for fishing communities could become significant and new opportunities will likely be missed.
- ix. Fisheries management will need to interlink with the management of other uses of the marine environment – that is Australia will need to use **integrated marine management**. The number of uses of the marine environment is rapidly expanding and growing to a scale not seen before in the oceans. Mining, energy generation, transport, aquaculture (farming), recreation etc. are now all competing for space and resources in the oceans and along increasingly crowded coastlines. It is important for fisheries to see themselves in the context of all of this activity so they respond appropriately given that bigger picture.

Providing information to industry operators and managers so they can address all these changes will require good data sources. There are still many things we do not know about Australia's ecosystems and how they respond. Fishers and managers (and the scientists helping them) will require as much information as possible if they are to understand what is happening and act wisely to mitigate undesirable outcomes and make the most of any new opportunities. Such a climate robust approach to fisheries will require the combination of a number of different sources of information, including:

- Measurements and forecasts of the physical environment (temperature, salinity, rainfall, storm patterns) extending what is already provided by the Bureau of Meteorology. Sharing the data from net net sensors (for example) can help provide a more accurate picture of the current conditions and the conditions fish prefer.
- Satellite images of ocean colour (which can be used to estimate how much plankton is in the water) can help predict where fish will be and can also forewarn of coming issues with stock productivity and recruitment. Plankton recorders voluntarily mounted on ships (e.g. tankers) can also help collect very useful information about what is happening at the bottom of the food web (this can help us understand how that effects the rest of the food web including those fish that are targeted by fisheries).
- Good quality catch and effort data is the longest and one of the best sources of information on target species in Australia.
- Survey data is also important as it helps give a more complete picture of what is going on. Catch data is very useful but having a second set of information from surveys helps to be sure about what is going on – catches don't always reflect what the fish are doing, especially if the fishers have changed their behaviour in response to markets (for example).
- Citizen science data collected by Australians using smart phones and cameras represents a new source of potential data. Nearly every Australian citizen now owns a 'smart phone' which has sensors and an on-board computer that is more powerful than what was available to scientists as little as a decade ago. Data collected via photographs and voluntary reporting can be a very valuable source of information once it has been processed and scientifically collated. Australians see themselves as an ocean loving people so we shouldn't turn down any help they are eager to provide.

## Looking Forward

Australian fisheries are in the midst of a period of rapid environmental change. This change is going to continue into the future and will differ place to place around Australia. Fishers and managers will need to be flexible if they are to cope with these changes. A failure to do so will bring economic (and likely social) hardship. Management will need to allow for spatial shifts and potentially for shifts in targeting and relevant management reference points. Management that is coordinated across State and Commonwealth fisheries and that links with the other users of marine waters is likely to do better than if those links are ignored. Healthy fisheries will also require good information services that are updated regularly with the latest understanding of what Australia's climate, fish, ecosystems and fisheries are doing. This is the summary of the latest (2018) update. If you would like more information please contact us (details below) or check out the websites listed below.



## Useful Websites

Redmap (Range Extension Database & Mapping project) – [www.redmap.org.au](http://www.redmap.org.au) – this website invites the Australian community to spot, log and map marine species that are uncommon in Australia, or along particular parts of our coast. This helps keep everybody up to date on how Australia's species are moving. The website includes useful summarise on what climate change is and what it means for Australia's oceans.

BOM – [www.bom.gov.au/climate](http://www.bom.gov.au/climate) – this website has a long list of climate time series and updates, including annual reports on what Australia's climate is doing.



Images: Shutterstock.com

### CONTACT US

t 1300 363 400  
+61 3 9545 2176  
e [csiroenquiries@csiro.au](mailto:csiroenquiries@csiro.au)  
w [www.csiro.au](http://www.csiro.au)

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### FOR FURTHER INFORMATION

**CSIRO Oceans and Atmosphere**  
Beth Fulton or Alistair Hobday  
t +61 3 6232 5222  
e [beth.fulton@csiro.au](mailto:beth.fulton@csiro.au)  
w [www.csiro.au](http://www.csiro.au)



WORKSHOP REPORT

# Climate change in the Torres Strait

## Implications for fisheries and marine ecosystems

June 2018

Earth Systems and Climate Change Hub Report No. 4



The Earth Systems and Climate Change Hub is supported by funding through the Australian Government's National Environmental Science Program. The Hub is hosted by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), and is a partnership between CSIRO, Bureau of Meteorology, Australian National University, Monash University, University of Melbourne, University of New South Wales and University of Tasmania. The role of the Hub is to ensure that Australia's policies and management decisions are effectively informed by Earth systems and climate change science, now and into the future. For more information visit [www.nespclimate.com.au](http://www.nespclimate.com.au).

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### Contact

Enquiries regarding this report should be addressed to:

Earth Systems and Climate Change Hub  
PMB 1  
Aspendale Vic 3195

[info@nespclimate.com.au](mailto:info@nespclimate.com.au)

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## AT A GLANCE

## Key messages from the workshop

The climate is changing in the Torres Strait. Research shows that it is changing, communities see it on country (land and sea) and fishers see it in the changing state of natural resources.

Marine impacts from climate change in the Western and Central Torres Strait will include coastal erosion and declines in reef health and diversity, loss of critical inshore habitat, increased sea temperatures and sea levels and changes to currents and water quality; all of which will have a variety of direct and indirect impacts on fish stocks and marine ecosystems. Climate change will affect fisheries productivity, species distributions and seasonality, so subsistence and commercial fishery practices will need to be able to adapt to shifting circumstances.

It is important that all relevant parties are engaged in conversations about what climate change means for fisheries and marine ecosystems in order to prepare for the changes. Local traditional knowledge and scientific knowledge from the research community are important tools which can and should be integrated to help understand and prepare for future changes.

### Torres Strait fisheries and marine ecosystems

- Torres Strait has diverse, productive and commercially, ecologically and culturally valuable fisheries and marine resources.
- There are complex traditional and regulatory management and resource sharing arrangements.
- Marine resources are likely to constitute a large proportion of protein for local communities.
- Traditional values of marine resources are very important to Torres Strait communities.

### Climate change and impacts

- Being island based and heavily dependent on their marine resources, Torres Strait communities have certain inherent vulnerabilities in relation to climate change impacts compared to other parts of Australia.
- Climate change will strongly impact the Torres Strait marine environments and fisheries due to increased frequency and intensity of extreme events such as marine heatwaves, sea-level rise and changes to ocean oxygen content and ocean pH.
- Possible changes to ocean circulation and currents could have major ramifications fisheries and marine ecosystems.

### Managing impacts

- Traditional fishers already practice many of the approaches needed to help ensure they can adjust to some of the likely impacts of climate change, such as providing

spatial flexibility in fishing effort by observing Traditional boundaries between each community's sea country.

- Community values have an important role to play in determining management and adaptive responses to the impacts of climate change.
- Traditional cultural spatial management of resources between Australia and Papua New Guinea, while effective when observed and well supported, could contribute to conflict between the haves and the have-nots as climate change impacts increase.

### **Information to support management and adaptation**

- There are already many climate projections data and information products available for the region, ranging from relatively large spatial scale (e.g. global and regional climate projections located at [www.climatechangeinaustralia.gov.au](http://www.climatechangeinaustralia.gov.au)) to smaller scale (e.g. downscaled CCAM projections for some parts of northern Australia and Papua New Guinea) and some regional ocean and fisheries modelling, but it is not necessarily accessible.
- Global model projections have limited value for the Torres Strait Islands because of the geography (small size and limited topography) of the islands and the poor resolution of El Niño–Southern Oscillation/Pacific Decadal Oscillation influences. Instead, higher resolution modelling (including ocean modelling and fisheries modelling) is needed to provide information at the appropriate spatial scale.
- Tidal dynamics need to be further taken into account to improve the climate downscaling in the Torres Strait region.
- Important oceanographic and environmental data are intermittent and/or absent, and there is a need for dedicated Torres Strait modelling across a range of applications related to fisheries.
- Although a lot of climate information is being continually generated, very little targeted information at required intervals is available to Torres Strait fishers to inform their seasonal fishing practices.
- Provision of regular climate, adaptation and management information via an annual forum or other updates may be useful.
- Managers seeking to adapt to climate/climate change issues in Torres Strait can glean valuable information from relevant projects around Australia and in the Pacific.
- Researchers need to have due diligence to present information appropriately for local communities so useful information can be placed in the hands of the local decision makers who are the traditional custodians of the resource.
- Communities in the Torres Strait are keen to be involved in discussions about how a changing climate affects fisheries.
- There is enough information now from studies in Torres Strait and adjacent areas (as proxies and examples) to make management decisions in the short term. Filling some key knowledge gaps and downscaling climate change projections will provide information to refine actions, but we don't need to wait for this information to act now.
- Consultation and engagement with traditional owners and fishers is paramount to appropriately target actions for key fisheries and vulnerabilities.

## Background

The National Environmental Science Program (NESP) Earth Systems and Climate Change (ESCC) Hub and Torres Strait Regional Authority (TSRA) jointly convened a workshop in December 2017 to bring together key researchers and managers to review the current state of relevant scientific knowledge about climate change impacts on communities of the Torres Strait Islands, with a particular emphasis on inshore fisheries and marine ecosystems. This is the first time that climate and fisheries researchers and managers working in the Torres Strait have come together in this way.

The workshop is the first in a series of engagements that aim to:

- build relationships and raise awareness and understanding of key stakeholders (including traditional owners/local fishers, natural resource managers, other local communities of interest and scientists)
- identify data and information gaps and needs where appropriate
- develop options for the delivery of relevant science-based products and services to target end-users to inform policy development, management/adaptation planning and associated decision-making.

The objectives of this workshop are to:

1. Assess current state of knowledge and understanding on climate projections and impacts as they relate to the marine environment in the Torres Strait.
2. Capture knowledge of any observed or reported shifts in environmental variables
3. Identify key data and knowledge gaps and assess priority areas and issues from a scientific and managerial perspective and make recommendations for further focus or investigation
4. Determine communication products that should be developed to increase awareness and understanding of key stakeholders of climate change impacts on Torres Strait marine fisheries and ecosystems
5. Improve coordination and collaboration across relevant agencies and stakeholders and scope next steps in the proposed series of engagements.
6. Determine the nature of ongoing engagement with traditional owners on this issue. In practice, it will likely be facilitated through the TSRA and the fisheries working groups/management forums.

The workshop program and participant list are included in the appendices of this report.

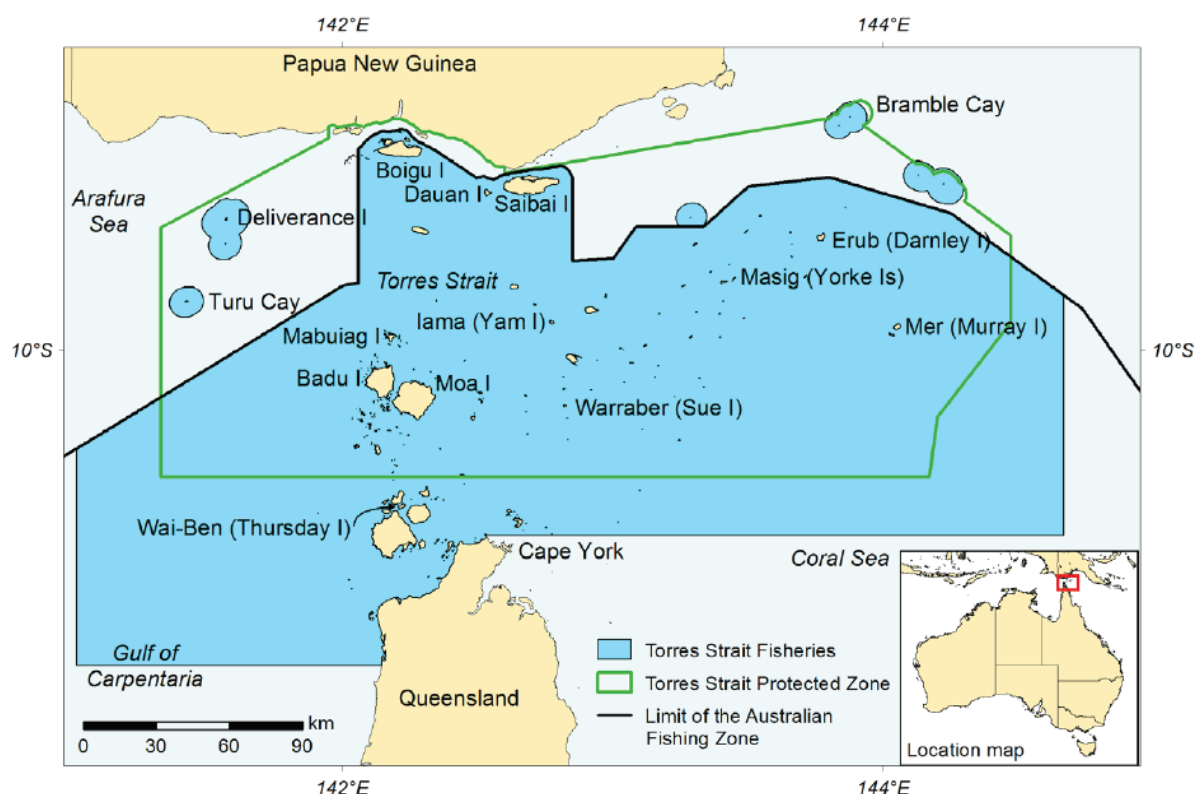
This report, which provides a brief synthesis of the workshop presentations and key discussion points, is the primary workshop output.

## Fisheries in Torres Strait

*Ian Butler, AFMA*

- Torres Strait fisheries have complex arrangements for resource sharing.
- Torres Strait fisheries cover a diverse range of species.
- Historical catch data have been difficult to obtain, but improvements are being made (fish receiver data).

### Region



The Torres Strait Protected Zone (TSPZ) is jointly managed by Australia and Papua New Guinea (PNG) through bilateral discussions. Within Australian waters in the TSPZ, traditional and commercial fishing are managed by the Protected Zone Joint Authority.

The fisheries in this region are shared between traditional inhabitant commercial fisheries, traditional artisanal fisheries, PNG fisheries and recreational fishers. Formal catch arrangements between Australian and PNG fishers are established under the Treaty.

The fisheries have commercial, cultural and lifestyle value.

## Key fisheries

<b>Torres Strait Finfish Fishery</b>	Spanish mackerel but some other species	Trolling lure	2016 catch: 86.9 t Value: n/a (total finfish \$1.2 m)
<b>Torres Strait Finfish Reef Line Fishery</b>	Mostly coral trout but also other groupers, snapper, emperor, barramundi and trevally	Hook and line, spear, nets and traps	2016 catch: 38.7 t Value: n/a (total finfish \$1.2 m)
<b>Torres Strait Tropical Rock Lobster Fishery</b>	Tropical rock lobster	Hand diving (surface air supply, free diving); 306 commercial licenses (294 traditional inhabitants); artisanal; shared resource with PNG	2015–16 catch: 445 t Value: \$14.3 m
<b>Torres Prawn Fishery</b>	Brown tiger prawns, blue endeavour prawns, also other prawn species, bugs, octopus and squid	Caught at night using demersal otter trawl	2016 catch: 412 t Value: \$8.9 m
<b>Torres Strait Beche-de-Mer Fishery</b>	Sea cucumber (e.g. black teatfish, prickly redfish, sandfish, white teatfish, surf redfish)	Collected by hand free diving or on reef flats; scuba and hookah banned; traditional inhabitant and artisanal fishers only	2016 catch: 14.9 t Value: not assessed Illegal fishing from other countries
<b>Trochus</b>	Trochus	Collected by hand free diving or on reef flats; scuba and hookah banned; traditional inhabitant and artisanal fishers only	Catch: 0 t Illegal fishing from other countries
<b>Pearl shell</b>	Gold-lipped and black-lipped pearl shells	By hand for use in farming (Qld); traditional inhabitants only (with PNG)	Catch: limited to small amounts
<b>Torres Strait Crab Fishery</b>	Mostly mud crabs, some blue swimmer	Hand or scoop net; traditional inhabitants and artisanal fishers	Value: unknown
<b>Turtle</b>		Traditional artisanal fishers	Culturally important for food
<b>Dugong</b>		Traditional artisanal fishers	Culturally important for food

## Understanding Torres Strait stakeholders

Charles David, TSRA

- The Torres Strait economy benefits significantly from the ocean. Jobs etc. often stem from the health of and access to fisheries – traditional fishing is commercial fishing.
- Climate change impacts shift movement patterns of fish and directly affect the health of coral and other less mobile aquatic resources.
- Wild stocks, in some cases, are at lower levels than recently observed and others are not recovering from past overfishing. To what degree these are attributed to or compounded by the impacts of climate change is unknown. Employment opportunities for Islanders could reduce as a consequence of continued decline in stocks.
- There are implications for ownership and management arrangements, aspiration and the current status of the fishery.
- Traditional knowledge considerations are important for management of Torres Strait Island fisheries.
- A summation of climate change in Torres Strait and what to expect in a given timeframe needs to be delivered to traditional owners and/or full-time commercial and community fishermen.

The Torres Strait Treaty and *Torres Strait Fisheries Act 1984* (Commonwealth) are in place to acknowledge and protect the traditional way of life in the Torres Strait and the traditional inhabitants.

The Protected Zone Joint Authority (PZJA) is responsible for management of commercial and traditional fishing in the Australian area of the Torres Strait Protected Zone (TSPZ) and designated adjacent Torres Strait waters.

The PZJA is comprised of the Commonwealth and Queensland Ministers with responsibility for fisheries and the Chairperson of the TSRA. The PZJA is advised by a framework of management advisory committees made up of Torres Strait Islander fishers, commercial fishers, fishery managers and scientists. Recreational fishing is managed under Queensland law.

The Torres Strait fisheries management structure does not exist anywhere else in the country. The structure can make it seem difficult to get things done; however, this is not the case – you just have to have the traditional owners at the table.

There are five cluster groups in the Torres Strait. Traditionally you seek permission to go into someone else's sea country, but commercial fishing licences are for the whole zone so there's a disconnect between the two systems.

### Roadmap to 100% fisheries ownership

The TSRA is working with key regional stakeholders and traditional inhabitants to achieve 100% ownership of the region's fisheries for traditional inhabitants. Both the finfish and bêche-de-mer fisheries are 100% owned by traditional inhabitants. The tropical rock lobster



fishery is 66.18% owned by traditional inhabitants (at 20 November 2017, as reported on the TSRA website).

### **Traditional management of Torres Strait fisheries**

Traditional areas and boundaries are important to traditional owners and their maintenance can be advantageous both culturally and for sustainability. Traditional owners want traditional boundaries and management to be recognised (which is why bringing traditional owners to the table is important).

Torres Strait Islanders have seen the changes, especially in fish stocks – and believe this is a strong reason why returning to traditional management (because it's more sustainable) is crucial. Turtle and dugong are success stories for traditional management.

Things in the past have resulted in some distrust of the science and 'westerners'; this is being overcome slowly.

## The climate context: variability, extremes, change and risk relevant to impacts on marine systems in the Torres Strait

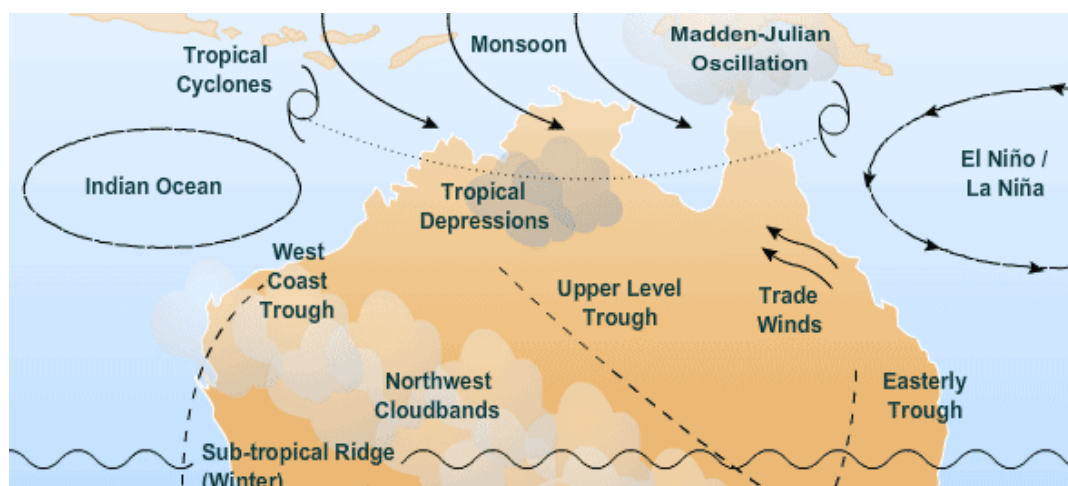
Neil Holbrook, ESCC Hub

- Torres Strait Islands are subjected to considerable ocean and climate variability (dominated by the monsoon and El Niño–Southern Oscillation) and extremes (including sea-level extremes, marine heatwaves, tropical cyclones and storms – and the associated winds, waves and storm surges – and extreme rainfall).
- Impacts of long-term changes in ocean temperatures (surface and deep), sea level and storminess will be both physical (e.g. inundation, erosion, coral damage) and ecological (affecting habitats, communities and species).
- Ocean acidification (reduction of ocean pH) affects calcifying organisms.

### Variability

The climate of the Torres Strait is characterised by the monsoon wet season (December–April) with north-westerly winds and the dry season (May–November) with south-easterly winds.

The El Niño–Southern Oscillation (ENSO) contributes to year-to-year variability. During El Niño events, northern Australia is drier than normal, while during La Niña events it is wetter than normal. ENSO also plays a strong role in year to year variability of sea level.



(Source: Commonwealth of Australia 2010, Bureau of Meteorology. <http://www.bom.gov.au/climate/about/>)

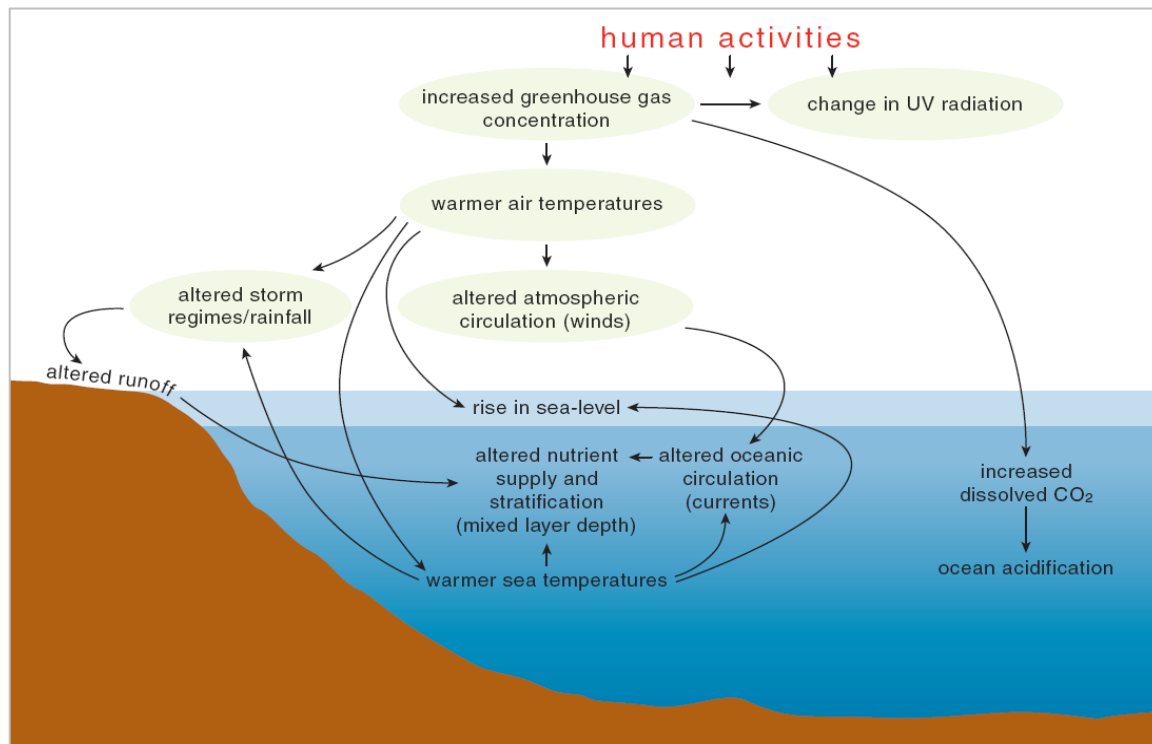
### Extremes

By definition, extremes are rare and intense. They include tropical cyclones, storm surge, heatwaves (including marine heatwaves) and heavy rainfall.

## Climate change, sea level rise and extremes

The impacts of sea-level rise will be felt most profoundly during extreme sea-level events. Increased sea level will increase the frequency of these events and the frequency of coastal inundation and erosion. Extreme sea levels may also change due to changes in storms (their frequency and intensity may change).

Climate change will also increase the frequency of extreme El Niño and La Niña events.









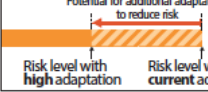

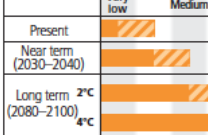
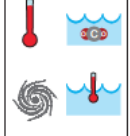
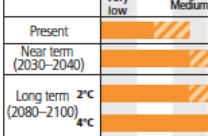

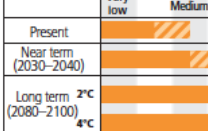


*Physical and chemical changes in atmosphere and oceans due to climate change (Source: Poloczanska et al. 2007)*

## Implications

Coastal systems are particularly sensitive to sea-level rise, warming oceans and ocean acidification. The Intergovernmental Panel on Climate Change Working Group 2 contribution to the fifth assessment report gives examples of key risks.

**Table 29-4** | Selected key risks and potential for adaptation for small islands from the present day to the long term.

Climate-related drivers of impacts								Level of risk & potential for adaptation			
 Warming trend	 Extreme temperature	 Drying trend	 Extreme precipitation	 Damaging cyclone	 Sea level	 Ocean acidification	 Sea surface temperature				
Key risk		Adaptation issues & prospects				Climatic drivers		Timeframe		Risk & potential for adaptation	
Loss of livelihoods, coastal settlements, infrastructure, ecosystem services, and economic stability ( <i>high confidence</i> )  [29.6, 29.8, Figure 29-4]		<ul style="list-style-type: none"><li>• Significant potential exists for adaptation in islands, but additional external resources and technologies will enhance response.</li><li>• Maintenance and enhancement of ecosystem functions and services and of water and food security</li><li>• Efficacy of traditional community coping strategies is expected to be substantially reduced in the future.</li></ul>						Present Near term (2030–2040) Long term 2°C 4°C			Very lowMediumVery high
Decline and possible loss of coral reef ecosystems in small islands through thermal stress ( <i>high confidence</i> )  [29.3.1.2]		Limited coral reef adaptation responses; however, minimizing the negative impact of anthropogenic stresses (i.e. water quality change, destructive fishing practices) may increase resilience.						Present Near term (2030–2040) Long term 2°C 4°C			Very lowMediumVery high
The interaction of rising global mean sea level in the 21st century with high-water-level events will threaten low-lying coastal areas ( <i>high confidence</i> )  [29.4, Table 29-1; WGI ARS 13.5, Table 13.5]		<ul style="list-style-type: none"><li>• High ratio of coastal area to land mass will make adaptation a significant financial and resource challenge for islands.</li><li>• Adaptation options include maintenance and restoration of coastal landforms and ecosystems, improved management of soils and freshwater resources, and appropriate building codes and settlement patterns.</li></ul>						Present Near term (2030–2040) Long term 2°C 4°C			Very lowMediumVery high

(Source: Table 29-4 in Nurse et al. 2014)

**References/more information**

- Nurse LA, McLean RF, Agard J, Briguglio LP, Duvat-Magnan V, Pelesikoti N, Tompkins E, Webb A (2014) Small islands. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [VR Barros, CB Field, DJ Dokken, MD Mastrandrea, KJ Mach, TE Bilir, M Chatterjee, KL Ebi, YO Estrada, RC Genova, B Girma, ES Kissel, AN Levy, S MacCracken, PR Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1613–1654.
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doi:10.1201/9781420050943

## Climate trends and projections for the Torres Strait Islands

Josephine Brown, ESCC Hub

- There is an observed warming trend in both air and sea-surface temperatures in the Torres Strait.
- Rainfall is highly variable, with a strong influence from the El Niño–Southern Oscillation. A trend due to global warming cannot be identified in the observations.
- Regional projections for the Torres Strait include warmer sea-surface temperatures and higher sea level. Rainfall will become more variable with more intense extreme events.

### Climate projections

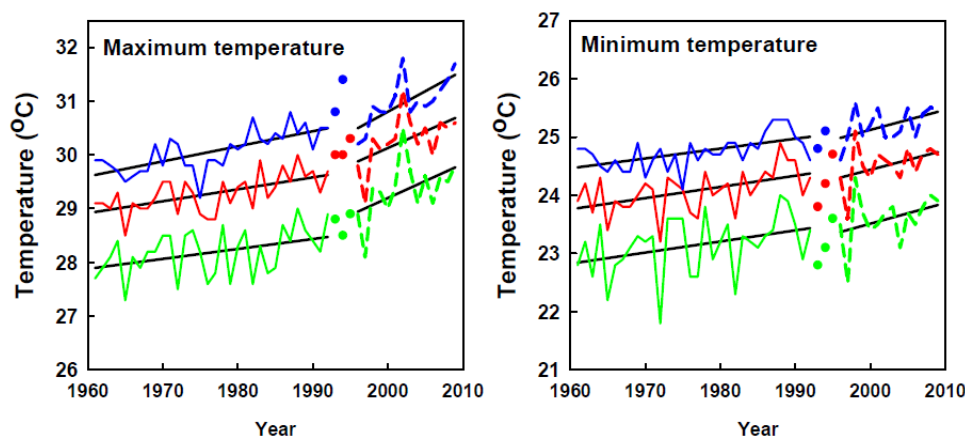
Projections based on global climate models generally cannot resolve the details of islands, topography or ocean currents in the Torres Strait. Global model information can be useful for some applications, while higher resolution (downscaled) model output may be needed for other applications. It is also important to evaluate whether the model can reproduce the observed present-day climate of the variable of interest (e.g. rainfall, temperature), and to consider the influence of model biases and errors on the climate of the Torres Strait.

### Climate drivers

Climate in the Torres Strait is heavily influenced by the monsoon and the El Niño–Southern Oscillation (ENSO). In the future, monsoon rainfall is likely to be more variable than it is now and the influence of ENSO on rainfall will be greater.

### Temperature

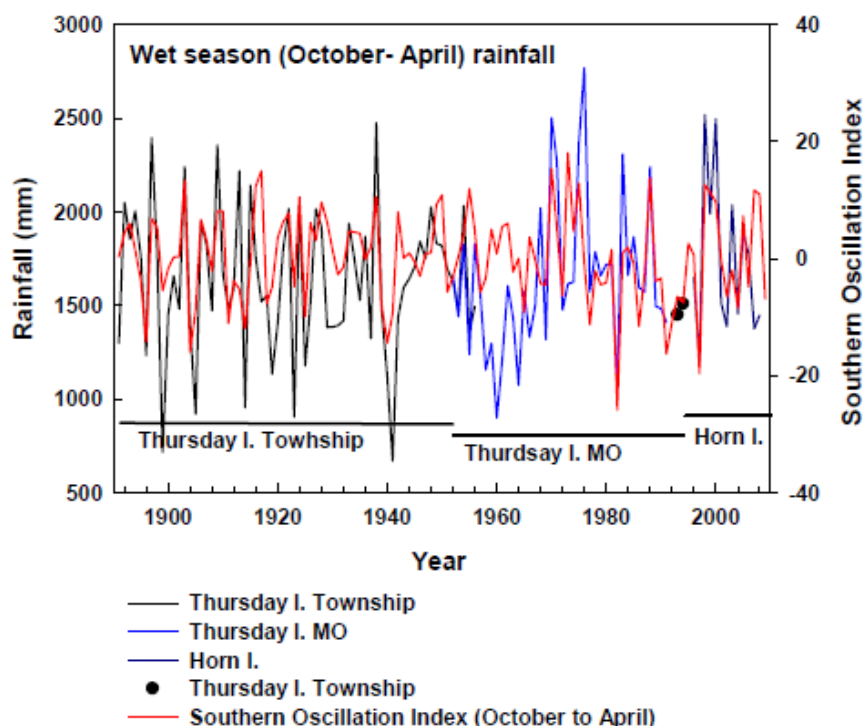
Mean temperature currently ranges annually from about 22–25 °C (min) to 28–32 °C (max). Temperatures have increased over the past century, with the rate of warming higher since 1960. Average temperatures will continue to increase in all seasons as a result of long term climate change, and there will be more hot days and warm spells.



Observed temperatures. Solid lines are records taken at Thursdays Island MO. The observation site changed to Horn Island (dotted lines).

## Rainfall

Rainfall has a strong seasonal cycle due to the influence of the monsoon. ENSO also influences rainfall, with drier years during El Niño events and wetter years during La Niña events. Changes to rainfall as a result of climate change are possible but unclear, but intensity of extreme daily rainfall events will increase.



## Sea-surface temperature

The oceans around Australia have warmed. In the Torres Strait, this warming has occurred at 0.08–0.12 °C per decade since 1950. Sea-surface temperature will continue to increase as a result of climate change.

## Ocean acidification

The pH of waters around Australia is decreasing (i.e. becoming more acidic). In the Torres Strait, the pH has dropped by 0.085–0.095 between 1880–89 and 2000–09, and ocean acidification will continue as a result of climate change.

## Tropical cyclones

Tropical cyclones are generally located south of Torres Strait, but six have tracked through Torres Strait since 1906 and many more over Cape York. Since the 1970s there has been an overall trend for fewer tropical cyclones in the Australian region, and it is expected that there will be fewer but more intense tropical cyclones in the future as a result of climate change.

**Sea level**

In the period 1993–2015, sea level has increased in the Torres Strait by 6–7 mm per year. Mean sea level will continue to rise as a result of climate change, and height of extreme sea-level events will also increase.

**References/more information**

- Climate Change in Australia <https://www.climatechangeinaustralia.gov.au/en/>
- State of the Climate 2016 <http://www.bom.gov.au/state-of-the-climate/index.shtml>
- CoastAdapt <https://coastadapt.com.au/>
- Pacific Climate Futures <https://www.pacificclimatefutures.net>



## Vulnerability of Torres Strait fisheries to climate change

*Johanna Johnson, Tropical Water Quality Hub*

- Torres Strait fishers already operate under climate variability and practice flexible approaches that will help with adaptation to future climate change impacts.
- There is enough information now from studies in Torres Strait and adjacent areas (as proxies and examples) to make management decisions immediately. Filling some key knowledge gaps and downscaling climate change projections will provide information to refine actions, but we don't need to wait for this information to act now.
- Consultation and engagement with traditional owners and fishers is important to target appropriate actions to key fisheries and vulnerabilities (and within the local/cultural context)

### Potential climate change impacts on species

Species	Key potential impacts of climate change (2030)
Coral trout – common/barcheek/passionfruit	<ul style="list-style-type: none"> <li>• Reduced catchability after intense storms</li> <li>• Reduced survival/development of early life stages due to increased sea-surface temperature (SST+)</li> <li>• Adult movements into deeper waters due to SST+</li> <li>• Impacts on coral reef habitat may affect juvenile survival</li> </ul>
Dugong	<ul style="list-style-type: none"> <li>• Declines in seagrass negatively impact dugong due to:               <ul style="list-style-type: none"> <li>◦ primary food source</li> <li>◦ preferred habitat</li> </ul> </li> <li>• Increased stranding mortality due to intense storms</li> </ul>
Blue endeavour prawn & brown tiger prawn	<ul style="list-style-type: none"> <li>• Impacts on seagrass may decrease juvenile growth and survival</li> <li>• Compromised growth and survival due to SST+ (near northern limit)</li> </ul>
Turtle	<ul style="list-style-type: none"> <li>• Female biased populations due to higher air temperatures during egg incubation</li> <li>• Decrease in available nesting sites/disrupt successful nesting due to sea-level rise (SLR), more intense storms and extremes in rainfall</li> <li>• Increased stranding mortality due to intense storms</li> <li>• Impacts on seagrass may decrease growth and survival</li> </ul>
Trochus	<ul style="list-style-type: none"> <li>• Unknown and previously assessed as minor</li> </ul>
Sandfish	<ul style="list-style-type: none"> <li>• Generally unknown</li> </ul>
Black teatfish	<ul style="list-style-type: none"> <li>• Reproductive success may be compromised (winter spawner) with SST+</li> </ul>

Species	Key potential impacts of climate change (2030)
Tropical rock lobster	<ul style="list-style-type: none"> <li>Faster growth and higher larval supply, but decreased juvenile survival due to SST+. Net result reduced spawning biomass</li> <li>Adult movement into deeper water due to SST+</li> <li>Settlement areas and recruitment rates may change due to altered north-west Coral Sea currents</li> </ul>
Mud crab	<ul style="list-style-type: none"> <li>Higher catch rates due to SST+</li> <li>Possible population increases due to increases in rainfall</li> </ul>
Spanish mackerel	<ul style="list-style-type: none"> <li>Possible links between SST and larval survival but generally unknown</li> </ul>
Gold-lipped pearl oyster	<ul style="list-style-type: none"> <li>Reduced larval growth due to increased rainfall/lower salinity</li> </ul>
Black-lipped pearl oyster	<ul style="list-style-type: none"> <li>Lower abundance due to upper thermal limits of ~32 °C for adults and reduced larval growth &gt;29 °C</li> </ul>

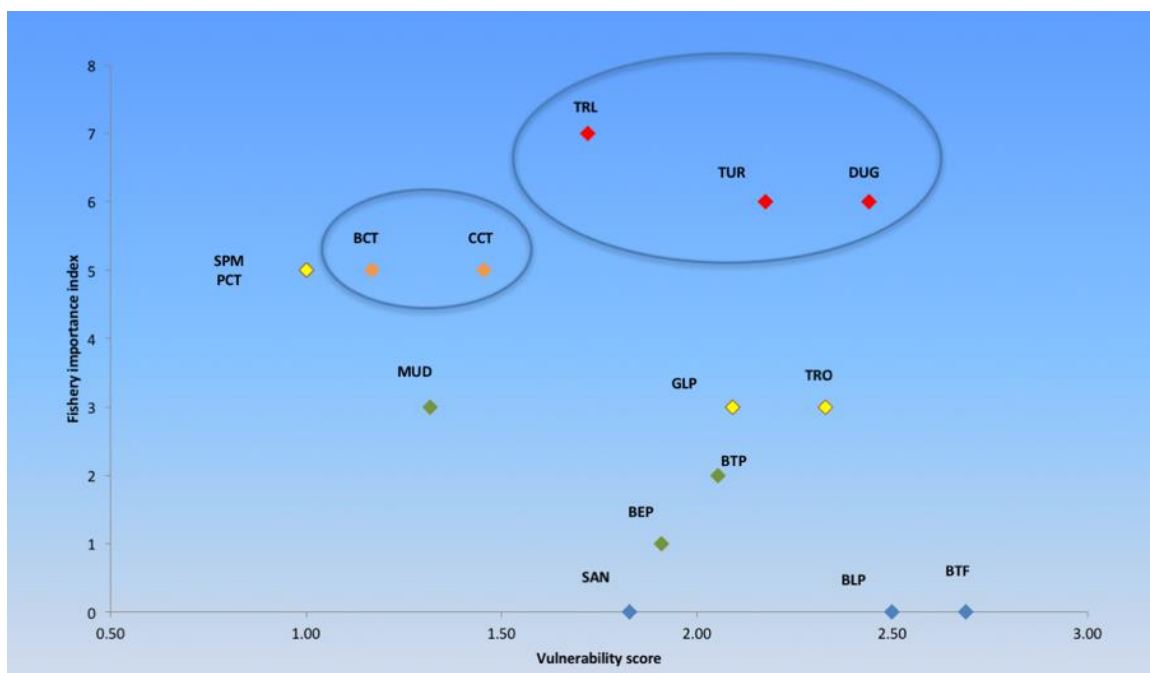
### Vulnerability of supporting habitats

	SST	Rainfall/ river flow	Sea level	Cyclones & storms	Ocean pH	Solar radiation	Productivity /circulation
Coastal wetlands	very low	moderate	high – very high	moderate	very low	low	moderate
Seagrass	high	moderate	moderate	high	very low	high	moderate
Coral reefs	very high	high	low	high	very high	low	moderate

### Prioritising species for management

Fisheries were ranked according to vulnerability and an 'importance' index that considered cultural and economic value. This process identified three species as management priorities – dugong, turtle and tropical rock lobster (red diamonds on the following figure). Second order priorities were coral trout (common and barcheek; orange diamonds on the following figure).

Importantly, any changes to fishing effort and therefore the pressure and value of fisheries could change the management priorities. For example, the reopening of the *bêche-de-mer* (specifically black teatfish) fishery since the assessment was conducted is likely to have increased the management priority of the main target species, and therefore requires a review and possible adaptations.



### References/more information

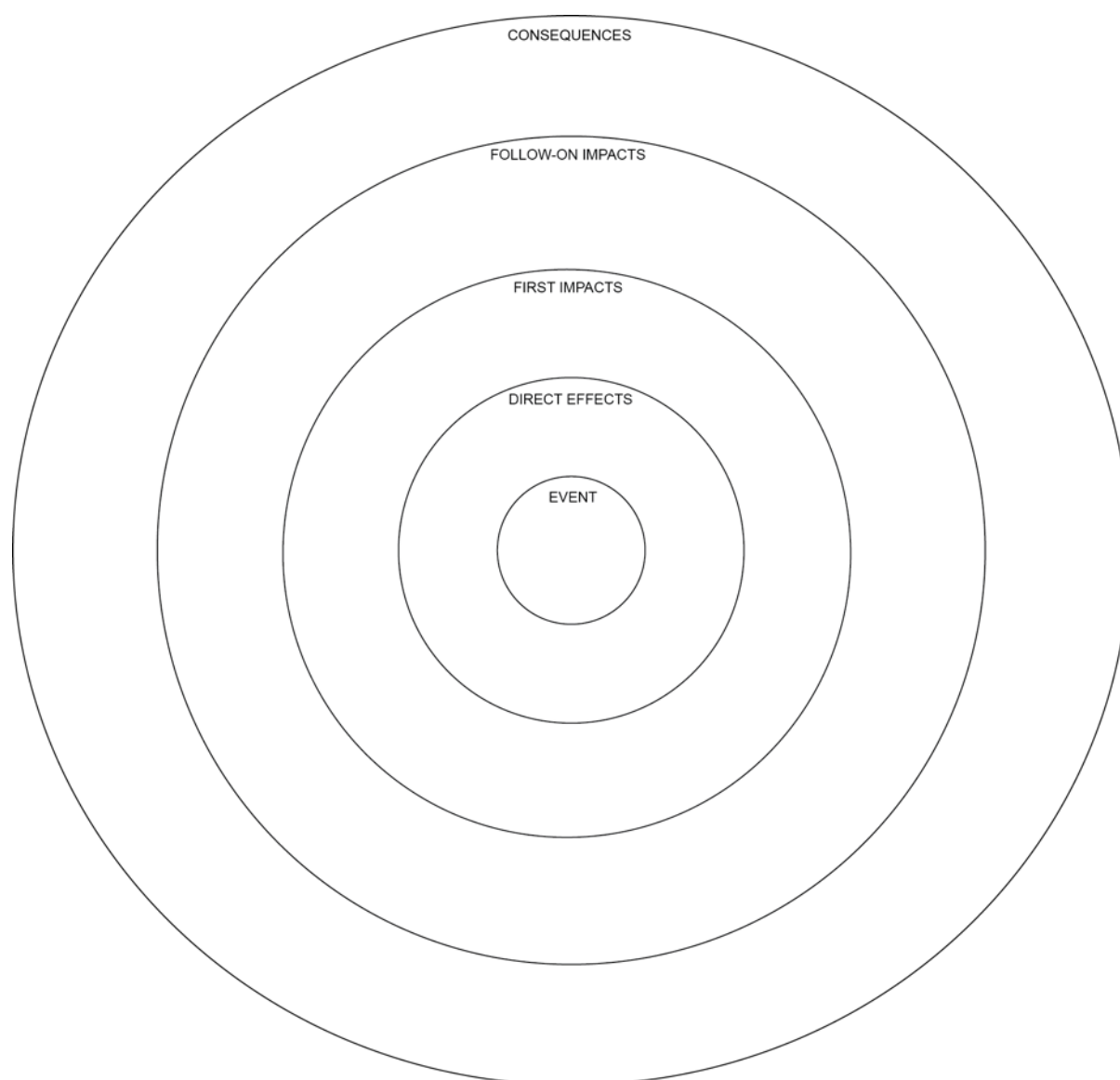
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## Cascading consequences

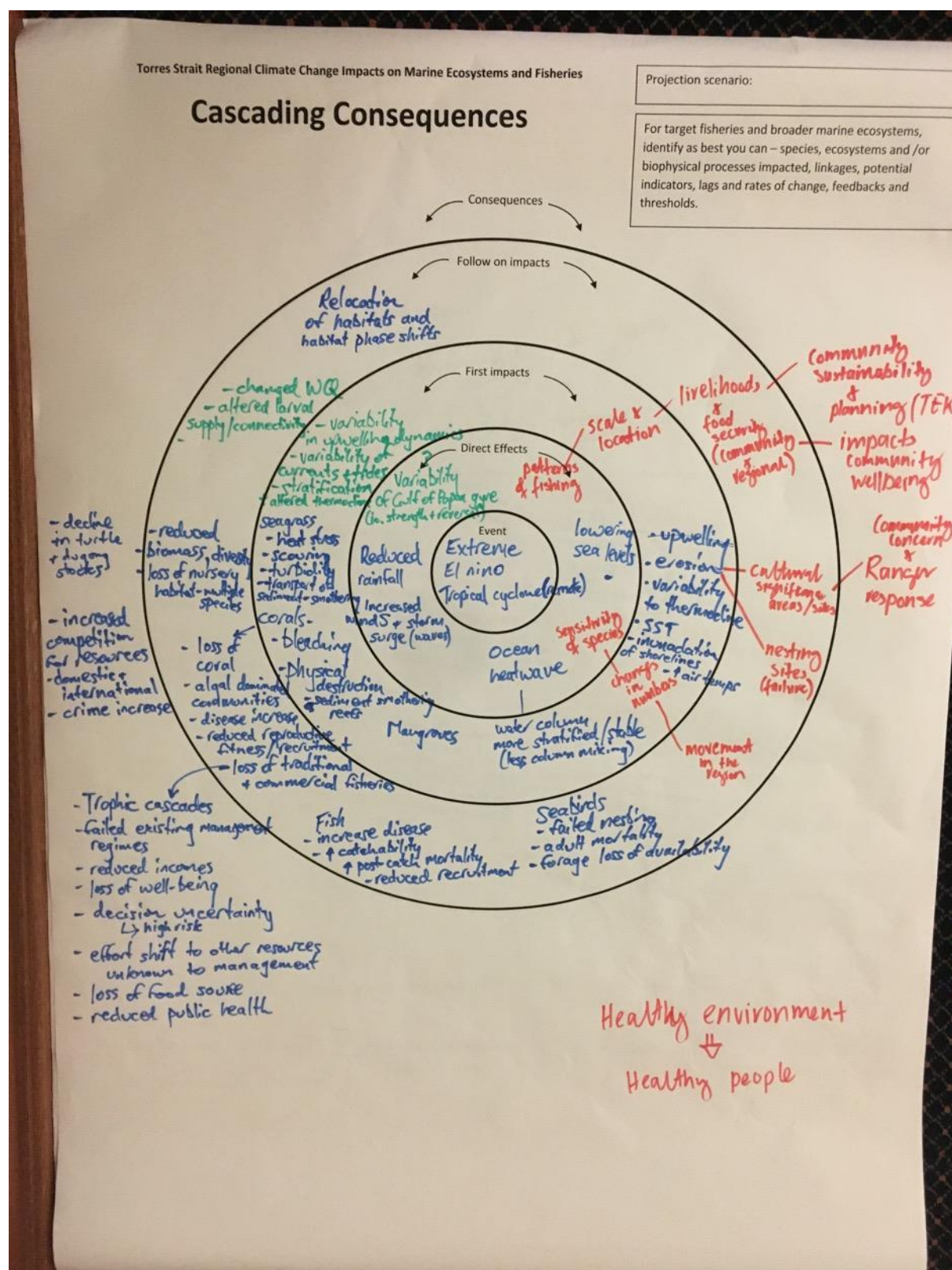
The impacts of climate change in the Torres Strait are not limited to the direct impact of climate events, and the ‘ripples’ or flow-on effects can be more significant than the primary impacts – particularly when considering co-incident climate events or impacts.

The consequences of two climate scenarios were explored in a ‘cascading consequences’ exercise, where workshop participants split into groups to map the impacts and consequences of climate change on Torres Strait fisheries and marine ecosystems. The following template was used.

(This template is also a useful community engagement tool and can serve as the basis of insightful discussions when communities think about the consequences of climate events in their context.)

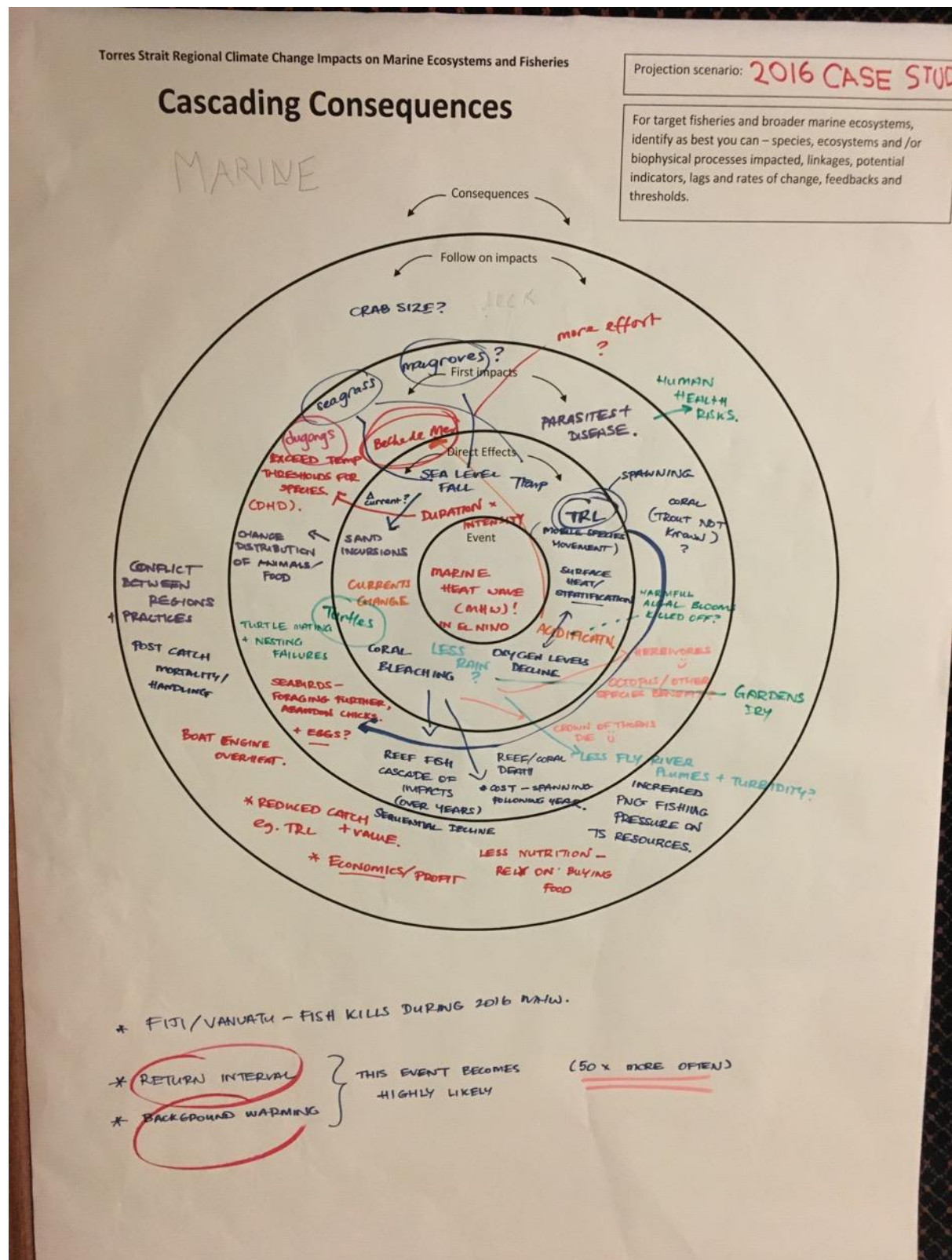


## SCENARIO 1: Tropical cyclone occurring during an extreme El Niño event





## SCENARIO 2: Marine heatwave during an El Niño event



This example was based on an event examined in this paper: Oliver ECJ, Perkins-Kirkpatrick SE, Holbrook NJ, Bindoff NL (2017) Anthropogenic and natural influences on record 2016 marine heat waves. *Bulletin of the American Meteorological Society*, 98(12), S44-S48, DOI:10.1175/BAMS-D-17-0118.1 (and 10.1175/BAMS-D-17-0118.2).

## Adapting to a changing environment: learning with the Torres Strait community to understand future impacts on wellbeing

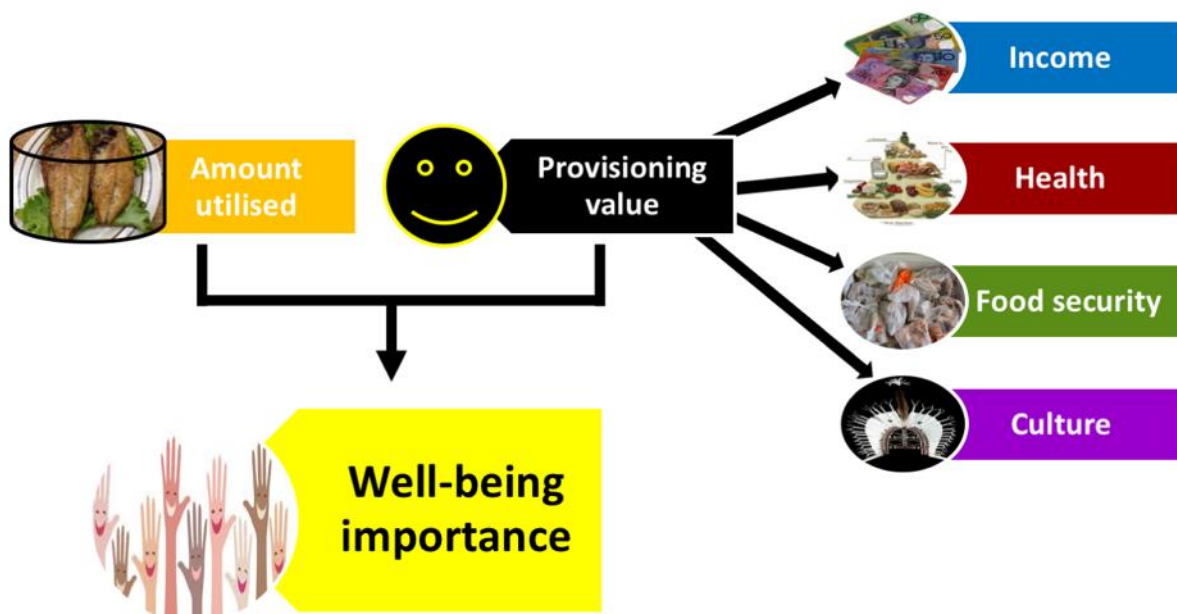
Cass Hunter, CSIRO

- Our science engagement and information needs to be relevant to communities by incorporating local views into the discussions
- Turning community visions about adaptation into reality involves being prepared to work across multiple sectors and the TSRA Climate Program
- Getting the right narrative for adaptation to climate change is about more than just our precision with science predictions.

### Understanding impacts

- What are the drivers of change for livelihoods?
- What are the desired possible futures?
- What impact will the 'business as usual' (climate) future have on well-being?
- What is the resilience of the community today?
- What are the priority adaptation strategies to build resilience?

### Understanding the importance of ecosystem goods and services

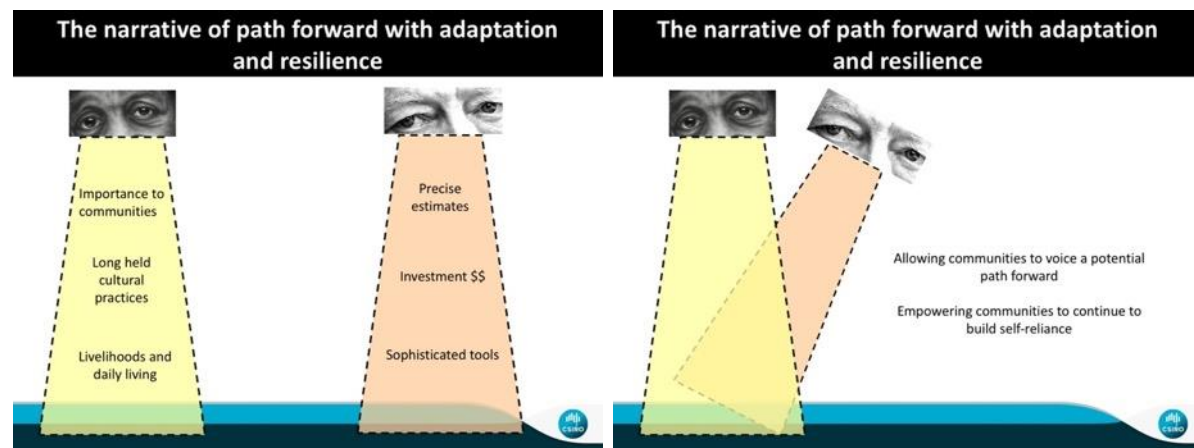




## Adaptation strategies

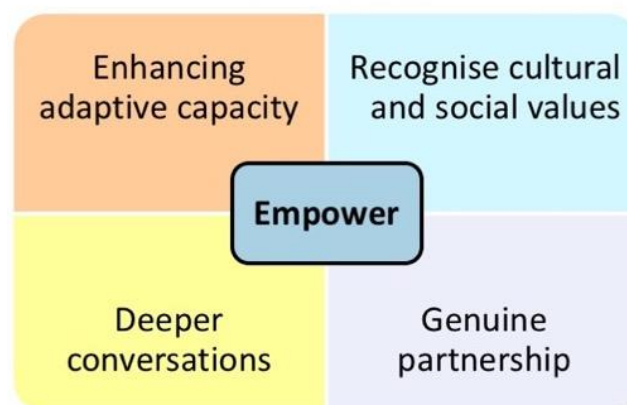
Make it relevant – communities want to see their views and importance factored into climate conversations.

Culture is key – keeping culture strong helps the community to be sustainable and self-reliant.



Need collaborative partnerships to advance forward – to turn visions into reality (conversations into actions) we need to work across sectors (e.g. land use planners, renewables, sustainable housing, employment)

## Local adaptation is based on empowering communities



## Lessons from the Pacific

*Johanna Johnson, TWQ Hub and Mandy Hopkins, ESCC Hub*

The Torres Strait is more like the Pacific than Australia – islands are geographically remote with decentralised and dispersed populations, and communities are critically dependent on marine resources for food and income.

In addition to the direct impacts, climate change is affecting habitats, which in turn affects fisheries, which in turn affects livelihoods and income, food security and economic development. It follows that Pacific Islands are highly exposed and vulnerable to climate change.

So, it is useful to consider how communities in the Pacific are using projections science to drive risk assessments, and how this informs adaptation planning and associated decision-making and on-ground actions.

### Case studies

#### *Food security*

Pacific per capita fish consumption (98–147 kg/person/year) is 3–5 times the global average. Projected climate-related habitat declines (loss of coral cover, reduced seagrass, reduced mangrove area) will affect fisheries. Some Pacific nations are better placed than others to deal with this.

## Food security implications

		
<p><b>Group 1:</b> Coastal fisheries are expected to meet the increased demand for fish</p> <ul style="list-style-type: none"> <li>• Cook Islands</li> <li>• Marshall Islands</li> <li>• New Caledonia</li> <li>• Palau</li> <li>• Pitcairn Islands</li> <li>• Tokelau</li> </ul>	<p><b>Group 2:</b> Difficult to distribute fish to urban centres from remote islands &amp; atolls</p> <ul style="list-style-type: none"> <li>• FSM</li> <li>• French Polynesia</li> <li>• Kiribati</li> <li>• Niue</li> <li>• Tonga</li> <li>• Tuvalu</li> <li>• Wallis &amp; Futuna</li> </ul>	<p><b>Group 3:</b> Coastal fisheries <u>cannot</u> meet the increased demand for fish</p> <ul style="list-style-type: none"> <li>• American Samoa</li> <li>• Fiji</li> <li>• Guam</li> <li>• Nauru</li> <li>• CNMI</li> <li>• PNG</li> <li>• Samoa</li> <li>• Solomon Islands</li> <li>• <span style="border: 2px solid red; border-radius: 50%; padding: 2px;">Vanuatu</span></li> </ul>

Vanuatu has undertaken a number of adaptation activities in response, including:

- Structured monitoring of coastal fish habitats (reefs, seagrass, mangroves) commenced in 2015/16
- National Fisheries Policy 2016–2031 (ecosystem-based approach to coastal fisheries management)
- Trial of solar dryers for improved post-harvest fish preservation in north Efate and Santo
- New freshwater pond aquaculture for tilapia in villages
- Transfer fishing effort to target nearshore pelagic species using fish attracting devices (FADs); mostly local 'Vatuika' ('Fish and Wealth') design; 30 FADS installed/replaced since 2014

### *Papua New Guinea Treaty Villages*

There are 13 Treaty Villages in the South Fly District of Papua New Guinea, where the low human development index is second only to the Congo. These villages are only 4 km from the northern Torres Strait Islands (Saibai and Boigu), and are highly exposed to climate variability and change.

Challenges for Treaty Villages include: water contamination, salinity intrusion, lack of sanitation, increasing demand/competition for natural resources (due to population growth), flooding and inundation during extreme sea level events, declining fisheries due to fish poaching, habitat loss and overfishing, high human disease prevalence (TB, malaria, cholera), isolation and lack of income opportunities – all serious cross-cutting issues that cannot be dealt with in isolation of climate change or each other.

A Community Ranger program is building a resilience platform for these villages with community-based and community-led activities to improve food security, water, health, livelihoods and well-being.

### **Outreach**

The Pacific-Australia Climate Change Science and Adaptation Planning (PACCSAP) program developed *The Pacific Adventures of the Climate Crab*, an animation and communication resource toolkit to raise awareness of the science and impacts of El Niño and La Niña to encourage Pacific Islanders to take early action in preparing for these extreme climate events.



The resource was developed in close consultation with in-country stakeholders, and its success as a community-level information tool demonstrates the importance of getting in the room and talking to people when developing content to facilitate outreach of the science.

The animation and toolkit are available on the Pacific Climate Change Science website at [www.pacificclimatechangescience.org](http://www.pacificclimatechangescience.org).

### References/more information

- Johnson JE, Basel B (2017) Vulnerability Assessment & Local Early Action Planning (VA-LEAP): Community-based Assessments on Rendova Island, Solomon Islands. Report to the Pacific-American Climate Fund (PACAM), USAID Program, March 2017.
- Johnson JE, Waterhouse J, Devlin, MJ, Hooper E (2016) Marine Ecosystem Assessment: North Efate, Vanuatu. Report to the Pacific Community (SPC), Noumea, New Caledonia, and Agence Francaise de Developpement, Paris, France. Vanuatu RESCCUE project.
- Johnson, JE, Welch DJ (2016) Climate change impacts and adaptation actions in North Efate, Vanuatu. Report to the Pacific Community (SPC), Noumea, New Caledonia, and Agence Francaise de Developpement, Paris, France. Vanuatu RESCCUE project.
- Pacific Climate Change Science – [www.pacificclimatechangescience.org](http://www.pacificclimatechangescience.org)

## Work being done in or relevant to Torres Strait fisheries and climate change

### Australian Fisheries Management Authority

*Ian Butler*

AFMA's has a three-phase approach for adapting Commonwealth fisheries management to climate change.

#### 1. Now

**Industry perspectives** – AFMA recently completed a survey of fishers in south-eastern Australia (Lakes Entrance) and found that climate change was not perceived as a major issue, even though the region is a climate change 'hot spot'. More important issues were economics, quotas, fishing costs and competition.

**Non-recovering undercaught species** – a collaboration between AFMA, Fishwell Consulting, CSIRO, the South East Trawl Fishing Industry Association and the Department of Agriculture and Water Resources is investigating the causes of undercaught total allowable catches (TACs) and non-recovering species in the Southern and Eastern Scalefish and Shark Fisheries.

**Updated modelling** – a CSIRO-led project involving AFMA, the University of Tasmania, the University of British Columbia and the Fisheries Research and Development Corporation is underway to update existing models to account for decadal and regional variation. The project will provide analyses of species sensitivity to climate change impacts and provide a set of recommendations based on findings.

#### 2. 2018–20: Adaptation project

The objectives of AFMA's adaptation project are to:

- Determine how well the existing Commonwealth fisheries management framework copes with climate change impacts (i.e. risk assessment)
- Develop methodology and approach for AFMA (and other fisheries) to adapt the regulatory environment to climate change impacts.
- Develop strategies and priorities to account for the effects of climate change in management of fisheries.

This project does not directly apply to Torres Strait, but can fit in with some effort.

#### 3. 2020+: Implementation

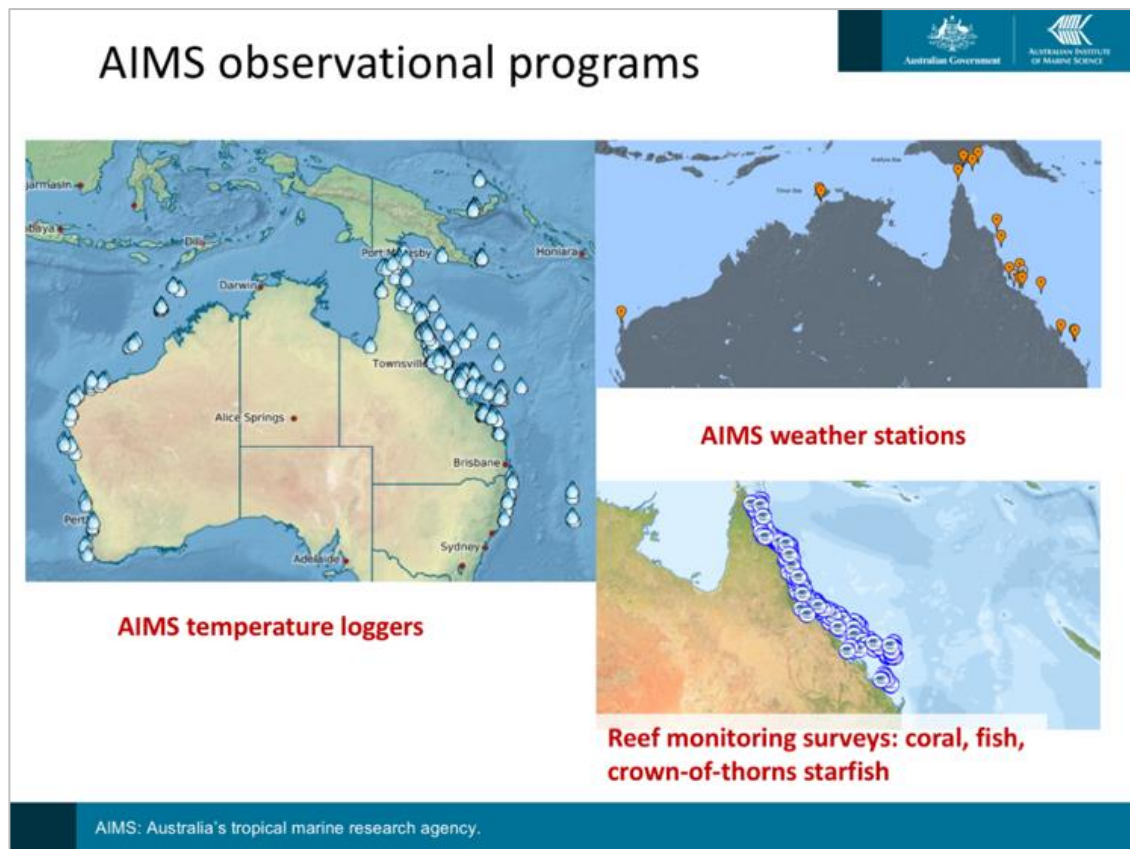
Flexible management is likely to be a key for future fisheries management with features such as a one-fishery approach (flexible management techniques with fewer boundaries) and mobile boundaries (e.g. Southern Bluefin tuna). Another feature is integration of forecasting of optimal fishing conditions.



## Australian Institute of Marine Science

*Craig Steinberg*

One of AIMS's strengths is in its observational programs, which includes temperature loggers, weather stations and surveys of coral, fish and crown-of-thorns starfish.



Modelling currents, sea surface temperatures and sea-level anomalies allows analysis of marine heatwaves and coral bleaching events. Some results to come out of this work:

- The 2016 bleaching event on the Great Barrier Reef was the most severe on record and heat anomalies persisted to the following winter
- Micro-climates created by small scale upwelling can create persistent thermal refugia for coral from a variety of oceanographic processes
- The Gulf of Papua current can reverse, and the current is predicted to intensify in winter in the future. The fate of larvae will be dependent on these changes.

An environmental data gateway has been developed to bring together existing near-realtime data from many sources – IMOS, eReefs, NOAA, AIMS – into one location. The gateway is at <http://eatlas.org.au/gbr-gateway-temp>.

## CSIRO

*Eva Plaganyi*

There is a long history of fisheries research in Torres Strait and several long time series of fisheries and habitat information collected as part of scientific surveys.

CSIRO has worked closely with traditional owners in the region for several decades in advancing fisheries science and management in the region, and there is a reasonably good two-way flow of information via workshops and meetings.

Torres Strait tropical rock lobster	<ul style="list-style-type: none"> <li>• Biological and climate data (CSIRO/AFMA surveys since 1989)</li> <li>• Mapping climate impacts on life history stages (2010 study)</li> <li>• Use of management strategy evaluation (2010–13)</li> <li>• Changes in oceanic currents and larval advection (current Environmental Influences project co-funded by AFMA &amp; CSIRO)</li> <li>• Model projections under future climate change (current project that links also with AFMA decadal projections project)</li> </ul>
Bêche de mer	<ul style="list-style-type: none"> <li>• Mapping climate impacts on life history stages (2011 study)</li> <li>• Examples of the use of management strategy evaluation to test the performance of alternative marine monitoring and management strategies to detect and respond to ecological changes caused by climate change (2009–11, part of RUSS project)</li> </ul>

There are gaps in some of the physical and oceanographic models that are needed to couple with the biological population dynamics for species of interest in order to reliably make predictions of impacts under climate change for fisheries and ecosystems (e.g. need to resolve tides in the region).

### Management strategy evaluation as a risk management tool

Climate-smart strategies build resilience to multiple stresses. Management strategy evaluation (MSE) has been and continues to be used as one effective risk assessment method for road-testing the ‘climate-smartness’ of management strategies. This involves:

- Using climate risk assessment as an input to dynamic models
- Using a reference set of models (ensemble rather than single model) to capture key uncertainties
- Demonstration of use of MSE to test the performance (and adaptability), especially in the face of uncertainty, of alternative harvest strategies in meeting fishery management objectives, such as ensuring:
  - low risk of stock depletion (overall and local)
  - high probability of good catch / average profits
  - low risk of changing the multi-species community composition
  - high probability of managing through climate variability and change.



## Torres Strait Regional Authority

*Andrew Simmonds*

Climate change is impacting vulnerable species and habitats in the Torres Strait and Great Barrier Reef.

**Seagrass meadows** to date have not shown a negative response to climate change as trends in biomass and species diversity remain consistently high across the region. Seagrass could be vulnerable to climate extremes in the future and this would then impact the Torres Strait **dugong** population – currently low risk. Aerial surveys indicate the population is stable. There is a need to maintain five-yearly survey effort.

Isolated locations of **mangroves** on Torres Strait islands have shown local-scale dieback from coastal erosion/sea-level rise.

**Hawksbill turtle** nesting population in Torres Strait is in severe decline mostly due anthropogenic impacts of overharvest in neighbouring nations and potential overharvest of eggs in Torres Strait and in neighbouring nations.

Northern Great Barrier Reef stock of **green turtles** is likely heading for a steep decline as a result of failing hatchling production at key index sites at Raine Island and Moulter Cay. Targeting of adult females for harvest and overharvest of eggs in some locations in PNG, Solomons and Torres Strait are also primary contributors. Climate change is drastically skewing the sex of marine turtle hatchlings (all species nesting in Torres Strait) to female via the effects of increased temperatures on incubating eggs. This may lead to negative population outcomes once current hatchling cohorts reach maturity. Funding to support ongoing monitoring of vulnerable marine turtle species in Torres Strait is at risk. If monitoring of key nesting index sites were to cease, this would be a bad outcome for these stock as community-based management would cease to have access to population trends.

Impacts on **coral reefs** from broad-scale severe bleaching will likely have an impact on supporting habitat for commercial fish species. A fisheries management response may be necessary in the future if harvest levels decline. However, there is a lack of information in Torres Strait fisheries regarding amount and value of catches which limits certainty in accurate management responses. There may be refugia for corals at the north-eastern corner of the Torres Strait where waters remain cooler and this may need special management arrangements for future conservation.

Certain low-lying islands in Torres Strait are experiencing **sea-level-related coastal erosion**, which TSRA LSMU is monitoring. There are real concerns in these communities.

There is ongoing **water quality** research into the implications of sediment-related pollution originating from the Fly River. Saibai, Dauan and Boigu are most affected, though results are currently inconclusive. Working with JCU TropWater. Future directions may include investigation of common food sources for metal contamination as well as work to determine historical levels of metals in sediment and corals.

## NESP Tropical Water Quality Hub

Johanna Johnson

### Previous water quality research

- Torres Strait baseline study (1993) – survey of trace metals in marine seafood, seagrass and sediments
- Apte & Day (1998) – first accurate data on trace metal concentrations in waters (Cu, Cd and Ni only)
- Haynes & Kwan (2002) – 28 sediment samples collected in 2000 and analysed for metals
- NERP WQ hazards (2011–13) – hydrodynamic modelling, predictions of water flow, hazard assessment based on previous data

### Current relevant Tropical Water Quality Hub projects

#### ***Influence of the Fly River on the Torres Strait region (Projects 2.2.1 and 2.2.2)***

Runoff from the Fly River in Papua New Guinea influences water quality conditions in the Torres Strait region; however, the extent and frequency of this influence, and the potential ecological impacts, are not well understood. This project builds on previous efforts to determine the spatial extent, temporal patterns and constituent pollutants of Fly River discharge, and assess the vulnerability of ecosystems in the Torres Strait exposed to the discharge.

A related project is using state of the art procedures to determine trace metal concentrations in marine waters and sediments at locations across the Torres Strait. Chemical signatures of mine pollution are being measured in Torres Strait waters and sediments and hotspots of contamination identified. The water quality data generated will allow informed management decisions to be made on how to best address trans-boundary mining related pollution and potential ecological impacts.

#### ***Connectivity and inter-dependencies of values in the northeast Australia seascape: Great Barrier Reef, Torres Strait, Coral Sea, Great Sandy (Project 3.3.3)***

This project is identifying and assessing the ecological, cultural, social and economic values of four marine jurisdictions – Great Barrier Reef, Torres Strait, Coral Sea, Great Sandy Straits – and characterising the processes and attributes that influence the values and their connectivity at a regional scale. In doing so, the project will deliver a resource that can inform cross-jurisdictional planning and management.

### References/more information

- NESP Tropical Water Quality Hub – [www.nesptropical.edu.au](http://www.nesptropical.edu.au)

## Science, data and research priorities

Workshop participants identified six priority areas for research that will help inform fisheries and marine ecosystem management in Torres Strait (and thereby to inform science-based adaptation response).

The following table summarises initial thoughts with regards to these priority areas. It is anticipated that ideas in this table will further refined over time.

Biological understanding	<ul style="list-style-type: none"> <li>• Limited understanding of species responses to combinations of changing environmental variables (e.g. bêche-de-mer) (lab, desktop, field)</li> <li>• Seagrass sensitivities</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Tidal gauges – to analyse and add</li> <li>• Drifters – inform on complexity</li> <li>• Integrated Marine Observing System</li> <li>• Moorings (upwellings) – strings of loggers</li> <li>• Himawari satellite information – 1 picture/10 minutes</li> <li>• Turbidity using Secchi discs (cheap and easy)</li> </ul>
Population modelling	<ul style="list-style-type: none"> <li>• Coupling with high-resolution current/climate</li> <li>• Follow similar approaches to those used for corals, crown-of-thorns starfish</li> <li>• Additional models for species (e.g. turtles, dugongs) at appropriate spatial scales</li> <li>• Coral trout correlations with coral abundance or habitat</li> </ul>
Climate modelling	<ul style="list-style-type: none"> <li>• Downscaling of projections for Torres Strait and in particular, tides</li> <li>• Produce regional rainfall projections from CMIP5 models selected for skill/low biases (and maybe CCAM model runs)</li> </ul>
Adaptation responses/communities	<ul style="list-style-type: none"> <li>• Communication</li> <li>• Community consultation regarding adaptation</li> <li>• Industry and traditional owner advice/experience with regard to fishing behaviour</li> <li>• Management of fisheries – parallel AFMA projects, fishery by fishery; adaptation</li> </ul>
Fly River	<ul style="list-style-type: none"> <li>• Plume prediction</li> <li>• Metals/health risks</li> </ul>

## Science-based information products and services

### Existing information and tools

While additional science will help inform management decisions in the Torres Strait, there is a great deal of information and a number of communication products and decision support tools currently available.

Data collected in the region	<ul style="list-style-type: none"> <li>• AIMS – in-situ collection (water temperature, weather) – online gateway</li> <li>• BoM – heatwave mapping</li> <li>• AMSA – tide gauges</li> <li>• AFMA – fisheries data</li> <li>• Climate Change in Australia – climate projections</li> <li>• PACCSAP – climate projections for Papua New Guinea and various technical and non-technical climate change communication products and resources</li> <li>• TSRA – reef monitoring, crown-of-thorns starfish monitoring, bleaching, beach profiling</li> <li>• TropWater (James Cook University) – in-situ seagrass surveys</li> <li>• CSIRO – annual habitat surveys (including numbers of pearl oyster, crown-of-thorns starfish and holothurians, and percent cover of standard substratum and biota (including seagrass and algae species) categories</li> </ul>
Tools/ programs that make use of the information	<ul style="list-style-type: none"> <li>• ADWIM (impacts and wellbeing) → CSIRO</li> <li>• Torres Strait vulnerability assessment</li> <li>• NESP ESCC Hub (<a href="http://www.nesplclimate.com.au">www.nesplclimate.com.au</a>)</li> </ul>

The challenge lies in identifying which information is most useful and delivering it to the people that need it in ways that they can use it.

### Communication and outreach ideas

It was agreed that a useful communication and outreach model is needed to develop information resources for the communities and stakeholder groups to provide information that can be easily understood and delivered to stakeholders. A number of ideas for ways this might occur were identified at the workshop.

As is the case with the ideas for science, data and research priorities, it is anticipated that these ideas will be refined over time as follow-up to the workshop.

Support	<ul style="list-style-type: none"> <li>• Outreach specialist in climate supporting TSRA in disseminating information</li> </ul>
Engagement/ outreach activities	<ul style="list-style-type: none"> <li>• TSRA staff discussing the outcomes of this workshop in fisheries working group meetings and canvassing interest in engagement</li> <li>• More targeted outreach effort to discuss key climate change messages in Torres Strait communities</li> <li>• Building local climate change capacity -&gt; drive local adaptation plans -&gt; climate champion -&gt; who wants to be involved in the communities</li> <li>• Annual event (pre-season gathering of key stakeholders) to provide timely climate information relevant to local communities/the fishery sector</li> </ul>
Communication/ knowledge brokering products	<ul style="list-style-type: none"> <li>• Workshop report</li> <li>• Climate change themed 'comic book' as a communication resource for local communities</li> <li>• Video – explain the science and communicate traditional knowledge (communities explain what they see)</li> </ul>

## Appendix 1: Workshop agenda

## Technical workshop

**CLIMATE CHANGE IN THE TORRES STRAIT: IMPLICATIONS FOR FISHERIES AND MARINE ECOSYSTEMS**

Pullman Cairns International, 17 Abbott Street, Cairns  
7–8 December 2017

**DAY 1: THU 7/12/17 13:00–17:30**

Time	Agenda item	Who	Session purpose
13:00	LUNCH		
<b>Introduction</b>			
14:00	Welcome	Geoff Gooley (ESCC Hub)	
14:05	Welcome to country	Gudju Gudju	
14:10	Introduction	Geoff Gooley (ESCC Hub)	
<b>Setting the context</b>			
14:20	Overview: Climate change impacts on oceans, fisheries and marine systems	Neil Holbrook (ESCC Hub)	To ensure all workshop participants understand what aspects of climate change impact oceans and marine systems and what the impacts could be (starting with the global 'big picture' and including all aspects of climate change relevant to TS including SLR, coastal hazards, ocean temp extremes, acidification, extreme events, coral bleaching risk)
14:50	Overview: Torres Strait fisheries and marine ecosystems	TSRA/AFMA	To ensure all workshop participants understand the nature and extent of TS fisheries and marine ecosystems, including and key features and related considerations (e.g. social, political, economic).
<b>Current and future climate in the Torres Strait</b>			
15:20	Climate trends and projections for Torres Strait Islands	Jo Brown (ESCC Hub)	To provide an overview of the current climate of the TS, how it has changed and how it could change in the future, drawing on the latest climate change science. This information will provide an important basis for later discussions in the workshop.

Time	Agenda item	Who	Session purpose
15:50	Climate change impacts on key TS resources – ADWIM model	Cass Hunter (CSIRO)	To share outputs from the CSIRO ecosystem goods and services model to show how climate change is likely to impact key marine resources for TS communities.
16:20	Vulnerability of fisheries to climate change – report summary	Jo Johnson (TWQ Hub)	To provide an overview of climate change hazards, vulnerability and risk specific to fisheries and marine ecosystems in the TS.
16:50	Day 1 wrap-up	Geoff Gooley (ESCC Hub)	
17:00	Close Day 1		

**DAY 2: FRI 8/12/17 9:00–16:30**

Time	Agenda item	Who	Session purpose
<b>Snapshots: Understanding climate change and impacts in the Torres Strait</b>			
9:00	Issues and impacts  Including: <ul style="list-style-type: none"><li>impacts of the last coral bleaching event</li><li>decadal scale projection of changes in fisheries stocks under climate change</li><li>adaptation of fisheries to climate change</li></ul>	Craig Steinberg (AIMS)  Eva Plaganyi (CSIRO)  Ian Butler (AFMA)  John Rainbird and Andrew Simmonds (TSRA)  Jo Johnson (TWQ Hub)	To provide a brief overview of current projects and monitoring activities that are helping us to understand climate change and impacts in the TS, as well as discussion of current issues and impacts. Each presenter will have 15 mins to talk about work from their respective organisations, with time for discussion at the end. Outcomes/findings reported here will feed into the following discussions.
10:40	Morning tea		
<b>Looking ahead: what does the future hold for TS fisheries and marine ecosystems?</b>			
11:00	Understanding TS stakeholders	Charles David (TSRA)	To identify TS stakeholder groups and their needs
11:30	Activity: Cascading consequences	Facilitator: John Rainbird (TSRA)	To identify possible consequences of climate change and coincident events in TS. Participants will break into two groups for this activity.
12:30	Discussion: Cascading consequences activity	Facilitator: John Rainbird (TSRA)	To discuss the outcomes of the previous activity. As well as being included in the workshop report, responses will inform post-workshop technical meeting discussions.
13:00	Lunch		
<b>Preparing for the future</b>			
13:30	Lessons from the Pacific	Jo Johnson (TWQ Hub) and Mandy Hopkins (ESCC Hub)	To share how communities in the Pacific are using projections/science to drive risk assessments, and how



Time	Agenda item	Who	Session purpose
			this feeds into adaptation planning and associated decision-making
14:00	Identified knowledge gaps and prioritised needs	Facilitator: Geoff Gooley (ESCC Hub)	To learn about some knowledge gaps and needs that have already been identified and prioritised. These will inform the following discussion.
14:20	Small group discussions: Knowledge gaps and knowledge products	Facilitator: Mariana Nahas (TSRA)	To identify knowledge gaps and needs in light of what has been presented at the workshop, and how they may be able to be addressed. What [information] resources/ knowledge products are needed to convey the learnings from this workshop to TS stakeholders (including TOs/local fishers, natural resource managers, other local communities of interest and scientists) and what information do we need from TOs?
15:00	Report back – Knowledge gaps and knowledge products	Facilitator: Mariana Nahas (TSRA)	To record ideas for management responses and information needs. As well as being included in the workshop report, responses will inform post-workshop technical meeting discussions.
15:30	Group discussion: Options for further engagement including priority actions and responsibilities	Facilitators: Geoff Gooley (ESCC Hub), John Rainbird (TSRA)	Emphasis on options for further strategic engagement, collaborative partnerships and delivery
<b>Workshop wrap-up</b>			
16:15	Closing remarks (including next steps)	Geoff Gooley (ESCC Hub), John Rainbird (TSRA)	To provide a brief recap of what has been covered and why, and what the next steps will be.
16:30	<b>Workshop close</b>		

## Appendix 2: Workshop participants

- Shaun BARCLAY, TSRA (Day 2 only)
- Josephine BROWN, ESCC Hub
- Ian BUTLER, AFMA
- Charles DAVID, TSRA
- Geoff GOOLEY, ESCC Hub
- Rohan HAMDEN, Consultant (Day 1 only)
- Neil HOLBROOK, ESCC Hub
- Mandy HOPKINS, ESCC Hub
- Cass HUNTER, CSIRO
- Johanna JOHNSON, TWQ Hub
- Phil LAYCOCK, GBRMPA
- Mariana NAHAS, TSRA
- Karen PEARCE, ESCC Hub (Day 2 only)
- Eva PLAGANYI, CSIRO
- John RAINBIRD, TSRA
- Andrew SIMMONDS, TSRA
- Selina SOUTE, AFMA (Day 2 only)
- Craig STEINBERG, AIMS



**Earth Systems and  
Climate Change  
Hub**

National Environmental Science Programme

<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting No.1 6-8 October 2021</b>
<b>FISHERY RESEARCH PRIORITIES</b>	<b>Agenda Item 8 For DISCUSSION &amp; ADVICE</b>

## RECOMMENDATIONS

1. That the Resource Assessment Group (the RAG):
  - a. **NOTE** the current status of identified research priorities and needs for the Torres Strait Beche-de-mer Fishery (BDM Fishery) as advised by the Hand Collectables Working Group (HCWG) (**Table 1**);
  - b. **NOTE** that at present (i.e. in the absence of securing further funding) expected AFMA and TSRA research funding available in the 2022/23 financial year is around \$100 000; and
2. That the RAG, having considered the above, **DISCUSS** and **PROVIDE ADVICE** on research priorities for a rolling five-year research plan 2022/23 - 2026/27 for Hand Collectable Fisheries (**Attachment A**) including advice on the feasibility, timing and indicative costing of essential, unfunded research project(s) to inform the Torres Strait Scientific Advisory Committee's (TSSAC) annual call for research funding proposals.

## KEY ISSUES

### Research priorities for Hand Collectable Fisheries

The HCWG met on 12 October 2020 to consider research priorities for the 2021-22 TSSAC research funding round and recommended that:

- a. the highest research and data needs for the BDM Fishery are the analysis of new catch data collected during the trial reopening of black teatfish to inform future openings and any follow up work from the stock survey. The exact scope of this work will be more evident once the stock survey project is finalised and after the black teatfish trial opening and advised that this did not require a dedicated research project to be identified at that point.
- b. that the newly established RAG would/should engage industry upfront to refine identified research priorities for the BDM Fishery and seek funding in the following (2022-23) TSSAC research round. This would also provide time to talk to industry, including Traditional Owners on Tudu about progressing future Sandfish stock surveys.
- c. it is important that research in the BDM Fishery is informed through a two-way exchange of knowledge between industry and researchers and this is anticipated to be achieved through the RAG.
- d. in making the recommendations above, the HCWG considered members advice on the research needs for the fishery as being (not in order of priority):
  - Development of curryfish conversion ratios.
  - Exploring sea ranching/re-seeding opportunities.

- Outstanding stock survey of Sandfish at Warrior Reef.
  - Socio-economic priorities.
3. A summary of the HCWG's discussions on the research and data needs for Torres Strait Hand Collectable Fisheries to date and the Five Year Research Plan 2020/21-2024/25 are provided as **Attachment B**. The Five Year Research Plan was last updated in September 2019.
  4. The final report for the project stock survey of sea cucumbers in East Torres Strait has identified research gaps, opportunities and needs for the BDM Fishery, an excerpt of which is provided as **Attachment C**.
  5. Given the RAG's discussions thus far under Agenda Items 3-7, it may wish to consider further analysis of the catch data (including black teatfish opening), follow up work from the stock survey results or further data collection and sampling as essential research priorities for the 2022-23 funding round.
  6. Further detail on the research funding cycle is provided in the Background section. The purpose of this agenda item is to get RAG advice on priorities for the hand collectables fisheries for the next five years (2022-27).

#### **Broader research priorities for Torres Strait Fisheries**

7. The TSSAC also funds projects that are applicable across Torres Strait Fisheries. Two such projects that were funded in 2019-20 are the *Climate variability and change relevant to key fisheries resources in the Torres Strait – a scoping study* and *Measuring non-commercial fishing (indigenous subsistence fishing and recreational fishing) in the Torres Strait in order to improve fisheries management and promote sustainable livelihoods*.
8. The RAG is invited to provide feedback to the TSSAC on the outcomes of the project, in particular recommendations from the projects for future research. The project outcomes and recommendations were considered by TSSAC at its meeting on 9-10 June 2021.
9. Below provides a brief overview of the measuring non-commercial fishing project. Information on the climate change project is provided under Agenda Item 7

*Developing an approach for measuring non-commercial fishing in Torres Strait in order to improve fisheries management and promote sustainable livelihood*

10. This scoping study was funded to quantify the subsistence and recreational (i.e. non-commercial) take of key commercial species and to gauge interest from Torres Strait communities in collecting information on the subsistence take of other non-commercial species, to identify the most culturally significant and important species to communities (including contribution to health and livelihoods)
11. The research need was identified the TSRA Finfish Fishery leasing quota committee. A committee at the time, comprising TSRA Board members and traditional inhabitant representatives from eastern island communities. Members identified the need to improve estimates of non-commercial catch of commercial species to inform stock assessment, the setting of sustainable catch levels and to determine the how much of the available catch needs to be reserved for traditional fishing.
12. The project found self-reporting using an app (or web-based approach indistinguishable from an app) was likely to be the best approach to monitoring non-commercial fishing,

paired with a data validation method of conducting household surveys. The project undertook consultation with stakeholders on this monitoring approach which would need to continue should the project recommendation proceed. This would ensure communities are on board with this approach and identify risks and concerns that would need to be managed around it.

13. The TSSAC considered the project's recommendations at its 79<sup>th</sup> meeting on 9-10 June 2021 and agreed that if the project proceeds beyond the scoping stage, it should do so in a phased approach as follows:
  - a. Phase 1:
    - i. Community consultation and sign on (re engaging community regarding the suggested monitoring method to gauge support).
    - ii. App design and development options (including data collection and storage options, and what data may be collected beyond non-commercial catch of commercial species (such as other species, environmental etc)). This process should be through co-design with communities and Government to meet stakeholder needs).
  - b. Phase 2:
    - iii. Develop App, database and data flow infrastructure
    - iv. Community rollout – pilot (on some communities).
    - v. Community rollout – full-scale (to all communities).
14. A summary of the TSSAC's agreed recommendations and actions regarding this project are provided in **Attachment D**.
15. Although, as AFMA understands it, there is no non-commercial catch of sea cucumbers, it may still be relevant for the RAG to provide feedback to TSSAC on the outcomes and recommendations from this project. This is because the project relates to developing a catch data collection method for the region.

## BACKGROUND

### TSSAC Research Funding Process

1. Each year the PZJA TSSAC invites applications for funding to undertake research to support the management of Protected Zone Fisheries. The TSSAC seek input from each fishery advisory committee to identify research priorities
2. PZJA fisheries research is generally funded by AFMA. The AFMA research budget is generally set at around \$420 000 each year. In addition to the AFMA research funding, however TSRA has recently committed in-principle to contributing \$150,000 each year for PZJA fisheries research. This allows around \$570 000 annually for Torres Strait research. Additional funding can also be sought from other bodies such as the Fisheries Research and Development Corporation, when needed, and when projects align with FRDC objectives
3. Assuming no change to available AFMA and TSRA funding, considering expected research commitments and in the absence of securing further funding, research funding across all Torres Strait Fisheries in the 2022/23 financial year will be around \$100 000. A

detailed breakdown of committed TSSAC funds for multi-year projects 2021-22 to 2024-25 is provided at **Attachment E**.

**TSSAC Fisheries Strategic Research Plan 2018-2023 and rolling five-year fishery-specific research plans**

4. TSSAC operates under a Strategic Research Plan (SRP) which guides priority setting for research in Torres Strait fisheries over a five-year period (**Attachment F**). The SRP specifies the research priorities and strategies summarised in **Table 2** that the PZJA intend to pursue in Torres Strait fisheries and provides background to the processes used to call for, and assess, research proposals. The research priorities can be broad, covering all topics within the SRP, some of which may be funded by AFMA, and some of which may require funding from other funding bodies.
5. There are 3 research themes within the SRP, under which the HCRAAG and HCWG could identify research priorities for Hand Collectable fisheries. There are several strategies under each theme and suggested ideas to help RAGs and Working Groups to think about the sorts of projects which may fit within these themes and strategies.
6. The TSSAC requires each fishery to develop a rolling five-year research plan, which fits into the themes identified in this SRP.
7. The TSSAC has an annual research cycle, which fits with the AFMA budgeting cycle (see page 14 of the SRP provided as **Attachment F**).



Table colour key	Completed	Scoped and/or costed	Not scoped/not costed
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**Table 1. Overview and status update of research needs identified or discussed for Hand Collectable Fisheries at previous HCWG meetings and the rolling five-year research plan (it does not include recommendations from survey or priorities that might be discussed during the HCRAAG meeting). HCRAAG is asked to review and prioritise the research needs for the fishery (inc. identifying any new ones) and if possible, provide indicative cost estimates.**

Research activity	Detail	Status	Comments/questions	HCRAAG priority
Stock Status Survey	To undertake a stock survey of all Torres Strait beche-de-mer species with a focus on deeper water species	Completed in 2019 - 2020	Final report identified research needs that the HCRAAG may want to consider further	N/A
Ecological Risk Assessment (ERA)	Conduct an ERA for the TSBDM Fishery	Draft completed on 30 June 2021.	Needs to be completed by January 2022 to meet WTO condition 5 for the fishery.	N/A
Climate Change impacts and vulnerability	Scoping study across all Torres Strait	Completed	Final report made recommendations for further research	N/A
Data analysis	Further analysis of catch data collected during the 2021 trial reopening of black teatfish to inform future openings and follow up work from the stock survey.	Not scoped/not costed	HCWG identified this as the highest research need for the BDM Fishery. CSIRO have undertaken some data analysis pertaining to the opening as discussed under Agenda Item 4.	TBA at HCRAAG1 meeting
Development of curryfish conversion ratios	Project to develop conversion ratios for curryfish with industry undertaking the sampling process.	Scoped and costed \$12,000	Full proposal developed and allocated funding in 2019/20 but did not proceed due to COVID-19.	TBA at HCRAAG1 meeting
Exploring sea ranching/re-seeding opportunities		Not scoped/not costed	Identified as a key research need for the fishery by HCWG traditional inhabitant members. Industry initiated pilot project currently underway on Ugar.	TBA at HCRAAG1 meeting

Research activity	Detail	Status	Comments/questions	HCRA priority
Sandfish stock survey	Outstanding stock survey of Sandfish at Warrior Reef to better understand its status	Not scoped/not costed	Identified as a research need for the fishery by HCWG17 at its meeting 12 October 2020. Was part of the 2019-20 stock survey but did not proceed.	TBA at HCRA1 meeting
Socio-economic	Need to better articulate the socioeconomic priorities for the fishery, including a data collection and analysis program, to complement the biological data in the fishery	Not scoped/not costed	Identified as a research need for the fishery by HCWG17 members.	TBA at HCRA1 meeting
Management Strategy Evaluation (MSE) of the Beche-de-mer Harvest Strategy	1. Collate all data and biological information; 2. Update and extend the spatial multispecies TS BDM operating model developed earlier (or construct a new model); 3. Use MSE to evaluate how well the HS achieves the pre-specified objectives; 4. In consultation with stakeholders, use the MSE framework to investigate ways to improve the current HS.	Not scoped  Est cost – \$130k	Identified as an essential research priority by HCWG in the rolling five-year research plan for Hand Collectable Fisheries.  Requires 3-5 years of BDM HS implementation.	TBA at HCRA1 meeting
Ecological Risk Assessment (ERA) – Torres Strait Pearl Shell Fishery	Conduct an ERA for the Torres Strait Pearl Shell (TSPF) Fishery	Not scoped Est cost - \$20,400	Identified as an essential research priority by HCWG in the rolling five-year research plan for Hand Collectable Fisheries	TBA at HCRA1 meeting
Understanding biological parameters of BDM species, including growth, mortality, size and breeding seasonality	Identifying gaps in knowledge of biological parameters of BDM species and investigating options for collaborative research	Not scoped/not costed	Identified as an essential research priority by HCWG in the rolling five-year research plan for Hand Collectable Fisheries Requires further scientific advice.	TBA at HCRA1 meeting

Table 2. Torres Strait fisheries strategic research themes, strategies and research activities

Theme 1: Protecting the Torres Strait marine environment for the benefit of Traditional Inhabitants	
<b>Aim:</b> Effective management of fishery stocks based on understanding species and their biology and ecological dependencies so it can support Traditional Inhabitant social and economic needs.	
Strategy 1a - Fishery stocks, biology and marine environment	<p>Possible research activities under this theme may include:</p> <ol style="list-style-type: none"> <li>Stock assessment and fishery harvest strategies for key commercial species.</li> <li>Ecological risk assessments and management strategies for fisheries.</li> <li>Minimising marine debris in the Torres Strait.</li> <li>Addressing the effects of climate change on Torres Strait fisheries through adaptation pathways for management, the fishing industry and communities.</li> <li>Incorporating Traditional Ecological Knowledge into fisheries management.</li> <li>Methods for estimating traditional and recreational catch to improve fisheries sustainability.</li> </ol>
Strategy 1b – Catch sharing with Papua New Guinea	<p>Possible research activities under this theme may include:</p> <ol style="list-style-type: none"> <li>Status of commercial stocks and catches by all sectors within PNG jurisdiction of the TSPZ.</li> <li>Good cross-jurisdictional fisheries management through better monitoring and use of technology.</li> </ol>
Theme 2: Social and Economic Benefits	
<b>Aim:</b> Increase social and economic benefits to Traditional Inhabitants from Torres Strait Fisheries.	
Strategy 2a - Promoting social benefits and economic development in the Torres Strait, including employment opportunities for Traditional Inhabitants	<p>Possible research activities under this theme may include:</p> <ol style="list-style-type: none"> <li>Models for managing/administering Traditional Inhabitant quota</li> <li>Understanding what influences participation in commercial fishing by Traditional Inhabitants.</li> <li>Understanding the role and contribution of women in fisheries.</li> <li>Capacity building for the governance of industry representative bodies</li> <li>Methods for valuing social outcomes for participation in Torres Strait fisheries.</li> <li>Identifying opportunities and take-up strategies to increase economic benefits from Torres Strait fisheries.</li> </ol>
Theme 3: Technology and Innovation	
<b>Aim:</b> To have policies and technology that promote economic, environmental and social benefits from the fishing sector.	
Strategy 3a – Develop technology to support the management of Torres Strait fisheries.	<p>Possible research activities under this theme may include:</p> <ol style="list-style-type: none"> <li>Electronic reporting and monitoring in the Torres Strait, including for small craft.</li> <li>Technologies or systems that support more efficient and effective fisheries management and fishing industry operations.</li> </ol>



# Five-year Research Plan 2022/23 – 2026/27 (DRAFT)

## Torres Strait Hand Collectable Fisheries

Beche-de-mer  
Pearl shell  
Crab  
Trochus



**COMPILED BY THE HAND COLLECTABLES WORKING GROUP**

**October 2020**

## ABOUT THIS PLAN

The Torres Strait Scientific Advisory Committee (TSSAC) seeks input from each fishery advisory body (Resource Assessment Group (RAG), Management Advisory Committee (MAC) or Working Group (WG)) to identify research priorities over five year periods from 2021/22 to 2025/26. This template is to be used by the relevant advisory body to complete their five-year plan. The plans are to be developed in conjunction with the TSSAC Five-year Strategic Research Plan (SRP) with a focus on the three research themes and associated strategies within the SRP.

All fishery five-year plans will be assessed by the TSSAC using a set of criteria, and used to produce an Annual Research Statement for all Torres Strait fisheries.

The TSSAC then develop scopes for the highest ranking projects in order to publish its annual call for research proposals. There are likely to be more scopes that funding will provide for so TSSAC can consider a number of proposals before deciding where to commit funding.

The fishery five-year plans are to be reviewed and updated annually by the Torres Strait forums to add an additional year onto the end to ensure the plans maintain a five year projection for priority research. Priorities may also change during the review if needed.

Table 1. Research priorities for Torres Strait Hand Collectable Fisheries for 2022/23 – 2026/27.

Proposed Project	Objectives and component tasks	Year project to be carried out and indicative cost				Other funding bodies		Evaluation		
		2022/23	2023/24	2024/25	2025/26	Notes on project timings		Priority essential /desirable	Priority ranking (1-5)	Theme
Understanding critical uncertainties for Torres Strait Beche-de-mer species and processing methods	Undertake field sampling of curryfish species ( <i>Stichopus herrmanni</i> and <i>S. vastus</i> ) to develop conversion ratios for boiled and salted weight to gutted weight.	\$12,000						Essential	1	1
Management Strategy Evaluation (MSE) of the Beche-de-mer Harvest Strategy	1. Collate all data and biological information; 2. Update and extend the spatial multispecies TS BDM operating model developed earlier (or construct a new model); 3. Use MSE to evaluate how well the HS achieves the pre-specified objectives; 4. In consultation with stakeholders, use the MSE framework to investigate ways to improve the current HS.		\$130k <sup>1</sup>			Will require 3-5 years of BDM HS implementation before MSE testing is achievable. However, can be undertaken sooner if external pressure requires (e.g. CITES Appendix II listing)		Essential	2	1
Ecological Risk Assessment (ERA)	Conduct an ERA for the Torres Strait Pearl Shell (TSPF) Fishery	\$20,400			Nil		CSIRO (in-kind)	Desirable	5	1
Understanding biological parameters of BDM species, including growth, mortality, size and breeding seasonality	Identifying gaps in knowledge of biological parameters of BDM species and investigating options for collaborative research	Not costed – pending further scientific advice						Desirable	5	1

<sup>1</sup> Advice from CSIRO: Rough costing takes into account time needed to collate all fishery-dependent and fishery-independent data, develop and refine existing operating model and MSE framework, costs of attending at least 2 meetings to consult with stakeholders

**Attachment B. Summary of advice from the Hand Collectables Working Group (HCWG) on research and data needs for Torres Strait Hand Collectables Fisheries**

Meeting	Description	HCWG Discussion
HCWG9 (June 2016)	<b>Harvest Strategy</b>	The HCWG agreed that future research priorities would be guided by the Harvest Strategy to be developed over the coming 18 months.(Harvest Strategy now developed and implemented)
HCWG11 (June 2017)	<b>Stock status of sandfish and the feasibility of a re-seeding program</b>	<ul style="list-style-type: none"> <li>Concern from industry that the status of the sandfish stock on Warrior Reef was not currently known with the last survey being carried out in 2010.(Planned for 2019-20 survey but did not proceed)</li> <li>Members and observers noted advice from the AFMA member that as part of the harvest strategy project, agreed minimum information requirements together with supporting management measures could be developed to guide any resumption of fishing. Fishery independent surveys may be one way to obtain an understanding of stock status. (Survey undertaken for eastern Torres Strait in 2019-20)</li> <li>Advice was sought on the potential benefit and feasibility of a re-seeding program to facilitate stock rebuilding. The Research Member advised that while there may be some benefit, any re-seeding program would need to be well designed to ensure that moving stock around the strait did not disrupt the natural spawning potential of this recovering species. (In progress)</li> </ul>
	<b>Harvesting larvae for ranching</b>	<p>Some industry members and observers queried whether juvenile beche-de-mer that washes up on the shoreline from time-to-time in large numbers, could be harvested and be grown-out for ranching and potentially used to restore depleted stocks.</p> <p>The research member advised that:</p> <ul style="list-style-type: none"> <li>this would be a challenging project.</li> <li>samples and juveniles should ideally be collected for research and identification; and</li> <li>the only grow-out in hatcheries at the moment is for sandfish and that small beche-de mer could potentially be used to seed reefs.</li> </ul>
HCWG12 (October 2017)	<b>General</b>	<p>The HCWG noted a presentation by the research member and acknowledged the following future research needs identified:</p> <ul style="list-style-type: none"> <li>Stock status (density, size, catch, areas fished, collaboration with PNG on shared stocks).</li> <li>Conversion ratios (Curryfish boiled and salted).</li> <li>Biology (growth, mortality, size and seasonality of breeding).</li> <li>Value adding, best practice processing and drying (particularly for lower value species).</li> </ul>



		<ul style="list-style-type: none"> <li>Requirements for harvest strategy implementation. (Research needs included in the Five Year Research Plan and partially addressed)</li> </ul>
HCWG13 (July 2018)	<b>Harvest Strategy</b>	<p>The HCWG agreed that progressing work on the Harvest Strategy would help to identify additional research priorities including:</p> <ol style="list-style-type: none"> <li>Standardising conversion ratios</li> <li>Understanding biological parameters (growth, mortality, breeding)</li> <li>(Harvest Strategy completed and implemented)</li> </ol>
HCWG14	<b>General</b>	<p>The HCWG recommended that the key research priority for Torres Strait hand collectable fisheries was to undertake an experimental fishing survey to understand the stock status of sandfish on Warrior Reef. Further, the HCWG noted a suite of current and potential research priorities that have been previously identified for the beche-de-mer fishery as outlined below:</p> <ol style="list-style-type: none"> <li>Harvest Strategy Development</li> <li>Stock assessments <ol style="list-style-type: none"> <li>Surveys</li> <li>Analysis of fishery data (all fishery species)</li> </ol> </li> <li>Conversion ratios <ol style="list-style-type: none"> <li>Curryfish boiled and salted to gutted weight</li> </ol> </li> <li>Biology and ecology <ol style="list-style-type: none"> <li>Habitat, reproduction, growth, recruitment to inform size limits; spatial and temporal management</li> <li>Taxonomy</li> <li>Ecological Risk Assessments</li> </ol> </li> <li>Value adding <ol style="list-style-type: none"> <li>Product handling, processing with training and reference material</li> <li>Alternative products (konowata and marine adhesives)</li> </ol> </li> <li>Climate change impacts/opportunities</li> <li>Enhancement/reseeding depleted populations</li> <li>CITES (non-detriment findings), Marine Stewardship Council Certification</li> <li>Economic analysis, marketing, value chain analysis, fishery capitalisation (Research needs included in the Five Year Research Plan and partially addressed)</li> </ol>
HCWG15	<b>General</b>	<p>The HCWG identified a number of key research areas that are also reflected in the Hand Collectable Fisheries Five Year Research Plan, including:</p>

		<ul style="list-style-type: none"> <li>• management strategy evaluation (MSE) testing of the BDM HS.</li> <li>• assessing the longer term socio-economic value of beche-de-mer, trochus and pearl shell fishery</li> <li>• assessment of the risks and impacts of discarded and wasted product on the integrity of TAC limits. Understanding and improving industry processing methods to achieve higher market prices (particularly for lower value species).</li> <li>• understand more about market chains and trends in supply and demand for beche-de-mer.</li> <li>• develop conversion ratios for boiled and salted weight to gutted weight.</li> <li>• identifying gaps in knowledge of biological parameters of BDM species including growth, mortality, size and breeding seasonality.</li> </ul>
HCWG16	<b>Curryfish conversion ratios</b>	<p>The HCWG discussed the pre-proposal <i>Determining weight conversion ratios for curryfish species Stichopus herrmanni and S. vastus</i> submitted by Nicole Murphy, CSIRO, and supported its progression to a full application noting that it:</p> <ul style="list-style-type: none"> <li>• addresses an identified research priority. Having species specific weight conversion ratios will improve the accuracy of total catch data for the fishery. Species specific weight conversion ratios would replace the conservative default conversion ratios currently used.</li> <li>• is value for money and seeks to engage two Traditional Owners to assist with data collection to provide an understanding of local conditions and processes.</li> <li>• Broader consultation with traditional owners on the full application will be undertaken through the TSSAC application process.</li> </ul>
HCWG16	<b>General</b>	<p>The Working Group discussed strategic research planning for the Fishery prompted by the concern expressed at the meeting that there is insufficient ongoing research in the BDM Fishery to:</p> <ul style="list-style-type: none"> <li>• support the expansion of the fishery in light of the TSRA's significant investment in fisheries infrastructure and training.</li> <li>• get better certainty on stocks such as sandfish.</li> <li>• understand the potential for reseeding and how best to maximise value through optimum utilisation of the resource and value adding.</li> <li>• develop a strategic research plan that focuses on maximising the return of benefits to Traditional Inhabitants across Torres Strait Fisheries overall (this is different to trying to maximise the benefits from each fishery) in light of funding constraints.</li> </ul> <p>The TSRA member highlighted the commitment from the Minister for Indigenous Australian's to increase economic and employment opportunities in the region and that this may be an avenue through which some of the research gaps can be addressed. (Partially progressed)</p>

<p>HCWG members meeting 7 August 2020</p>	<p><b>Black teatfish</b></p>	<p>Following her presentation of the outcomes of the modelling analyses, Dr Plaganyi outlined further research opportunities in exploring the potential uses of a revised and updated MSE (incorporating multispecies spatial operating model):</p> <ul style="list-style-type: none"> <li>• could model all key species, with age structure and spatial component and bound the range of uncertainties.</li> <li>• a tool to more comprehensively evaluate the risks of different TAC alternatives.</li> <li>• a tool to validate the new Harvest Strategy (HS) and help implement rules such as how best to use indicators to adjust TACs e.g. size measurements used to inform on age structure and hence available biomass.</li> <li>• can explore how adding data reduces uncertainty and hence consequences for management recommendations.</li> <li>• more broadly can contribute to aspirational development of an integrated ecosystem model that incorporates climate change.</li> </ul>
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## Attachment C – Excerpt from the final report for the project *Stock survey of sea cucumbers in East Torres Strait (Chapter 9, pg. 104-106)*

### 9 Research needs

This study has addressed a number of key data and research gaps relating to the Torres Strait Beche-de-mer Fishery (TSBDMF). We briefly summarise some remaining research gaps, opportunities and needs for the ongoing development of the fishery:

#### 9.1 Surveys

- The need for a dedicated sandfish (*Holothuria scabra*) survey on Warrior reef. This population was last surveyed in 2011 and the status is currently unknown. This includes collaboration with Papua New Guinea to look at opportunities to undertake a full scale survey (inclusion of northern Sandfish population).
- As part of discussions in response to preliminary survey results, it was recognised that there is the potential for better sharing of knowledge with Torres Strait Islander fishers and a need for a workshop/s for two-way sharing of information between fishers and scientists. This will help to inform future survey designs and gaps based on local knowledge. For example, further investigating the distribution of Prickly Redfish (*Thelenota ananas*) in regard to juvenile habitat areas.
- A desirable aspiration would be to further explore the potential of new more automated methods to survey deep water species, habitats and environmental variables - for example, drop down cameras or underwater gliders such as the Vertigo3 glider.
- Specialised/dedicated surveys for some species. Sea cucumbers such as Redfish (*Actinopyga echinites*) and Blackfish (*A. miliaris*) showed a possible decline from survey results, however these species also have a patchy distribution, so further research is needed to determine if the decline is real or the result of natural variability.

#### 9.2 Catch sampling:

- There remains a number of gaps in conversion ratios for commercially more important species. These include Curryfish (*Stichopus herrmanni* and *S. vastus*), as well as Greenfish (*Stichopus chloronotus*), with Redfish (*A. echinites*) also having some information gaps.
  - Two-way workshops (alongside surveys) could also be used to discuss how best to undertake the previously planned conversion ratio project to engage Islanders and accommodate new COVID-19 pandemic and workplace restrictions.
- There is a need for data to be collected from subsamples of catches to help fill gaps in biological data, such as size at maturity, as well as for input to the HS (for example, size distribution of catch).
- For high value targeted species such as Black teatfish (*H. whitmaei*), it would be advantageous to collect high resolution data using data loggers that could be worn by

- individual fishers/divers. This could provide (confidential) information on exact spatial locations of catches, as well as dive time spent on search versus capture etc.

### 9.3 Data analyses:

- There is a need for ongoing analyses of survey data to ensure best practise in terms of accounting for different habitats, averaging over larger areas, constructing standardised indices of abundance and analysing related environmental data.
- There is an ongoing need to analyse new data (especially for trial re-openings such as for Black teatfish (*H. whitmaei*) to inform application of the Torres Strait Beche-de-mer Harvest Strategy (TSBDMHS) rules.

#### 9.3.1 Modelling:

- There is a need to use the survey and other data as inputs to population models that can be used to help support implementation of the TSBDMHS. Data-poor methods are needed in most cases.
- A desirable aspiration would be to revise and update the multispecies operating models that were used as part of an earlier Management Strategy Evaluation (Plaganyi et al., 2013).
  - o The advantage of this framework is that (1) it included age-structure for the different species (e.g. this was recognised as an important consideration in analysing the size structure of a recovering population and hence what proportion is actually available to be fished); (2) it's a state-of-the-art approach for accounting for uncertainty (noting that this is a data-poor fishery); (3) it can be used to simulation test alternative ways in which data can be used to help inform setting of TACs; (4) it is the preferred tool for rigorously evaluating how well a Harvest Strategy meets its stated objectives; (5) it can be used to explore how adding data reduces uncertainty and hence implications for management recommendations; and (6) more broadly, it can contribute to the aspirational development of an integrated ecosystem model that incorporates climate change (see below).

#### 9.3.2 Social and Economic analyses:

- We recognise that the biological data are only one important consideration with respect to the TSBDMF, and that social and economic information are valuable also, and that there is a need to collect information on these dimensions to support management.
  - o In particular, it is also extremely important to collect regularly updated data on prices per species, both to help understand the fishery given that this drives demand, but also as a way of having this information transparently available to support fishers planning their operations.
- The TSBDMF is almost entirely an export fishery, and hence there is a need, which has been highlighted particularly during the COVID-19 pandemic, to map and analyse the

supply chain, identify critical elements and strengthen the resilience of the supply chain (see e.g. Plaganyi et al. 2013; Purcell et al. 2017; Purcell et al., 2018; Barclay et al., 2016; Busilacchi et al., 2018). This also includes considerations of value adding.

#### 9.4 **Climate Change:**

- Climate change is a major concern for Torres Strait Islanders and sea cucumbers have been highlighted as one of the most sensitive species (Johnson and Welch, 2016), hence there is a need for tools to support quantifying potential impacts as well as to evaluate alternative adaptation options.
  - The Climate Change impacts project currently led by Leo Dutra (CSIRO) is consolidating information and proposing a framework for future modelling.
  - We recommend that an integrated ecosystem model (i.e. linked with a regionally downscaled climate model for Torres Strait) be used for this purpose, with the added advantage that it can include all the major species and their biological and technical interactions as a basis for supporting ongoing management under a changing climate. Social and economic information as per above could also be incorporated in a model such as this.

#### 9.5 **Aquaculture:**

- Survey and community monitoring on Ugar Island are being used to inform planning for potential aquaculture developments, and future monitoring will also need to be able to discern between wild production and supplements from aquaculture program e.g. using genetics. The project also has the potential to inform on finer habitat information between juvenile and adult sea cucumbers, as well as predation.
  - The aquaculture project also presents a future opportunity where conversion ratio information may be obtained by researchers working with the local community on Ugar.

Attachment D – Summary of TSSAC 79 agreed recommendations and actions regarding the project  
*Developing an approach for measuring non-commercial fishing in Torres Strait in order to improve fisheries management and promote sustainable livelihood*

## RECOMMENDATIONS AND ACTIONS REGARDING THE NON-COMMERCIAL CATCH PROJECT

The TSSAC **AGREED** on the following recommendations and actions, if this project moves forward:

- The project should be split into two phases, and the project scope released in the call for research should only include step 1 and 2 (“phase 1”) of the five step process above. These two steps will cost out the rest of the project, at which time the relevant PZJA forums and TSSAC will consider the project for funding the remaining steps (pilot and full implementation). This is noting it is not possible for the project team to cost all five steps, until step 1 and 2 are complete, and it is difficult for a funding provider to support a project which has an undefined budget for parts of the work.
- That the focus of this project should remain with non-commercial catch of commercial species initially, however if communities wish to collect other information early on in the project, as their own initiative, this could be incorporated. This would be determined through step 1 and 2 of the project, using a co-design method with communities. In particular, communities should be consulted on whether they have any data they would like to collect (such as non-commercial species data) through this app for their purposes (not related to fisheries management as it isn't the PZJAs mandate), which would add value to it beyond non-commercial catch of commercial species. They also need to guide the data storage and access process, including the types of people they would want to share the data with (like family groups, island groups or broader).
- Community expectations need to be managed around the full project going ahead, noting only the first two steps will be funded initially, if the project goes ahead.



**Attachment D – Summary of TSSAC 79 agreed recommendations and actions regarding the project**  
*Developing an approach for measuring non-commercial fishing in Torres Strait in order to improve fisheries management and promote sustainable livelihood*

- All Torres Strait communities, and Northern Peninsula Area communities should be consulted as a part of any future project.
- The non-commercial catch monitoring project research scope should include a requirement to consider alternative tools to an app, that fulfil the same function (such as webforms) as the non-commercial take monitoring tool, to ensure value for money, including upkeep and maintenance costs.
- Ensure data biases are accounted for if the non-commercial catch monitoring project progresses, noting there will be some fishers reporting a lot and others not at all, skewing results. Statistically adjusting the data will account for this, and needs to be considered in this project.
- Ensure project team work alongside AFMA if the non-commercial catch monitoring project progresses, to ensure the data is collected in a way that will allow the data to be pulled into the AFMA database (if AFMA was chosen to be used to store the data).
- Draft scope for the non-commercial catch data collection project to be developed for TSSAC 80 meeting in November, for scoping discussions.
- Data ownership and intellectual property for the non-commercial catch data collection project needs to be discussed and managed effectively based on community needs. This can be established during the consultation phase of the project.
- Non-commercial catch data collection project team to consider what environmental (or other) data that could be collected through the app, which would be useful for managing climate change or other factors relevant to managing commercial fisheries.

**The TSSAC NOTED:**

- That the first two steps may take longer than a year, given their complexity (including deciding what data to collect beyond commercial species, and where and how to house the data) and the level of consultation required. However undertaking the work as quickly as possible is a priority.

## Attachment E. Committed Torres Strait Scientific Advisory Committee (TSSAC) funds for multi-year projects 2021-22 to 2024-25

Research priority from ARS	Project Title	Cost \$ 21/22	Cost \$ 22/23	Cost \$ 23/24	Cost \$ 24/25
1a - Fishery stocks, biology and marine environment.	Fishery independent survey, stock assessment, Harvest Strategy and Recommended Biological Catch calculation for the Torres Strait Tropical Rock Lobster Fishery	\$291,000 (contracted)	yet to be scoped (estimate \$290 000)	yet to be scoped (estimate \$290 000)	yet to be scoped (estimate \$290 000)
1a - Fishery stocks, biology and marine environment.	Finfish Fishery: Coral Trout and Spanish Mackerel Biological Sampling 2021-2024	\$122,000	\$128,000	\$135,000	
1a - Fishery stocks, biology and marine environment.	Finfish Fishery Spanish mackerel stock assessment	\$57,000	\$59,000	\$61,000	
1a - Fishery stocks, biology and marine environment.	Designing a close-kin mark-recapture study for Torres Strait Spanish mackerel	\$93,000			
<b>Total cost for ongoing (TRL) and new project commitments</b>		<b>\$563,000</b>	<b>477,000</b>	<b>\$486,000</b>	<b>\$290,000</b>
<b>Remaining funding available (if TSRA funding continues at \$150 000 and AFMA at \$415 000 per year)<sup>1</sup></b>		NA – funding round complete	\$565 000	\$565 000	\$565 000
<b>Funding remaining if TRL project continues funding in future</b>			~\$88,000	~\$79 000	\$275 000

<sup>1</sup> The TRL stock assessment and surveys is ongoing work generally funded each year. This work usually costs around \$290 000 a year. Although this project proposal will be assessed against all others, its considered a high priority for Torres Strait research and is likely to be funded. This can be taken into account when looking at the likely funding available for 2022-23 and beyond.

# Torres Strait Fisheries Strategic Research Plan 2018-2023

TORRES STRAIT  
**PZJA**  
PROTECTED ZONE  
JOINT AUTHORITY



Australian Government  
Australian Fisheries  
Management Authority



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## **Torres Strait Scientific Advisory Committee**

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The Torres Strait Scientific Advisory Committee (TSSAC) includes members from each of the three main Protected Zone Joint Authority (PZJA) agencies (the Australian Fisheries Management Authority, the Torres Strait Regional Authority and Fisheries Queensland), industry members and scientific research members. TSSAC is responsible for providing advice to the Australian Fisheries Management Authority (AFMA) Executive on the use of AFMA research funds for Torres Strait fisheries research. This Torres Strait research provides critical information to the Minister and the Protected Zone Joint Authority (PZJA) for the management of Torres Strait commercial fisheries.

As part of its role the TSSAC:

- develops research priorities for PZJA fisheries in conjunction with the Resource Assessment Groups (RAGs) (or Management Advisory Committees (MACs) and Working Groups (WG)) and addresses PZJA's management needs and objectives as specified in the *Torres Strait Fisheries Act 1984* (the Act) and this plan;
- reviews and advises (where required) on individual fishery research plans for PZJA managed fisheries;
- advises the AFMA Executive on the allocation of research funds, and provides milestone reports and accounts against the use of funds.
- informs Torres Strait communities of project outcomes.

AFMA provides the TSSAC secretariat duties, including organising meetings and managing research contracts and projects milestones.

The TSSAC relies on the assistance of the various PZJA advisory groups (MACs, RAGs and Working Groups) to develop fishery-specific research plans and priorities based on this Strategic Research Plan (SRP). These groups provide current and up to date scientific and operational advice to the TSSAC as it relates to research proposals and fishery. More information about the advisory groups is provided at section 2.4 below.



The Terms of Reference for the TSSAC is at ([Appendix A](#))

## About this plan

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This plan specifies the research priorities and strategies that the PZJA intend to pursue in Torres Strait fisheries, and provides background to the processes used to call for, and assess, research proposals.

This SRP has been developed by AFMA in consultation with TSSAC to assist the PZJA to pursue the objectives of the *Torres Strait Fisheries Act 1984* (the Act) through research.

This document sets out the five year strategic plan (2018-2023) for research in Torres Strait fisheries to support a framework for fishery-specific, five-year research plans, and a TSSAC annual research statement.

1. Part one sets out the research planning and priorities, including the current research themes, strategies and possible research activities (Part 1 and [Appendix B](#)). It also provides guidance to researchers developing applications for research funding.
2. Part two provides guidance for the TSSAC and PZJA advisory groups when assessing research applications (see [Appendix C](#)).

Supporting information for the TSSAC and researchers can be found in appendices and referenced documents, which are useful when developing research applications.

It is intended that the SRP be a living document that responds to a changing environment. In line with this intent, this plan will be reviewed by the TSSAC as needed, but not later than 2022.

## **Part 1 Research planning and priorities**

### **1.1 Role of five year fishery research plans and link to the TSSAC Strategic Research Plan**

The three research themes described in this section are strategic priorities for Torres Strait and provide a basis for advisory forums (RAGs, MACs and working groups) when developing their five-year fishery research plans (see section 2.3.2).

The five year fishery research plans will vary between fisheries depending on the status of the fishery, its information requirements and particular knowledge gaps. Although it is a five year plan, the advisory forums are required to review and update the fishery plan annually so the plan will always have a five year projection.

The TSSAC uses both the strategic priorities in the SRP and the specific priorities within individual fisheries research plans to compile the TSSAC Annual Research Statement (ARS). The ARS is the list of priority research for a given year that researchers will focus on when developing research proposals. The ARS is also the key document for RAGs, MACs and WGs in their prioritisation of research applications for TSSAC funding consideration. All groups including TSSAC and researchers should refer to the 'criteria for assessing research investment' ([Appendix C](#)) when developing, assessing and ranking research proposals.

### **1.2 Torres Strait Fisheries Research Themes, Strategies and Research Activities**

The TSSAC has identified three research themes, related strategies and possible research activities (basis for proposals) for the next five years that will help the PZJA to pursue the objectives of the *Torres Strait Fisheries Act 1984* (Appendix A) and improve fisheries management in the Torres Strait.

Researchers are encouraged to use this SRP and the five year fishery plans when considering and planning their proposed research in the Torres Strait, regardless of where they may seek funding. The TSSAC process ensures



robust consultation with a broad range of stakeholders regarding funding priorities through the PZJA advisory forums.

## **Theme 1: Protecting the Torres Strait marine environment for the benefit of Traditional Inhabitants**

### **Aim**

Effective management of fishery stocks based on understanding species and their biology and ecological dependencies so it can support Traditional Inhabitant social and economic needs.

### ***Strategy 1a - Fishery stocks, biology and marine environment***

Possible research activities under this theme may include:

- Stock assessment and fishery harvest strategies for key commercial species.
- Ecological risk assessments and management strategies for fisheries.
- Minimising marine debris in the Torres Strait.
- Addressing the effects of climate change on Torres Strait fisheries through adaptation pathways for management, the fishing industry and communities.
- Incorporating Traditional Ecological Knowledge into fisheries management.
- Methods for estimating traditional and recreational catch to improve fisheries sustainability.

### ***Strategy 1b – Catch sharing with Papua New Guinea***

Possible research activities under this theme may include:

- Status of commercial stocks and catches by all sectors within PNG jurisdiction of the TSPZ.
- Good cross-jurisdictional fisheries management through better monitoring and use of technology.

## Theme 2: Social and Economic Benefits

### Aim

Increase social and economic benefits to Traditional Inhabitants from Torres Strait Fisheries.

***Strategy 2a - Promoting social benefits and economic development in the Torres Strait, including employment opportunities for Traditional Inhabitants***

Possible research activities under this theme may include:

- Models for managing/administering Traditional Inhabitant quota
- Understanding what influences participation in commercial fishing by Traditional Inhabitants.
- Understanding the role and contribution of women in fisheries.
- Capacity building for the governance of industry representative bodies
- Methods for valuing social outcomes for participation in Torres Strait fisheries.
- Identifying opportunities and take-up strategies to increase economic benefits from Torres Strait fisheries.

## Theme 3: Technology and Innovation

### Aim

To have policies and technology that promote economic, environmental and social benefits from the fishing sector.

***Strategy 3a – Develop technology to support the management of Torres Strait fisheries.***

Possible research activities under this theme may include:

- Electronic reporting and monitoring in the Torres Strait, including for small craft.
- Technologies or systems that support more efficient and effective fisheries management and fishing industry operations.

## **Part 2      Research management and administration**

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The PZJA, established under the Act, is responsible for the management of fisheries in the Australian Jurisdiction of the Torres Strait Protected Zone (Figure 1). The PZJA members comprise the Commonwealth and Queensland Ministers responsible for fisheries, and the Chair of the Torres Strait Regional Authority.

Fisheries research findings are critical to the PZJA exercising its functions, and in particular, for monitoring the condition of the Torres Strait fisheries. Good research more broadly assists the PZJA to pursue the legislated objectives. For more information about the PZJA or the PZJA agencies responsible for the day to day management of Torres Strait fisheries see annual reports on the PZJA website ([www.pzja.gov.au](http://www.pzja.gov.au)).

The TSSAC is the only committee that is solely focused on Torres Strait fisheries research, although other committees or agencies (see below) may sometimes fund and manage research projects relevant to Torres Strait fisheries. The different funding sources and management are discussed below.

Research in the Torres Strait comes with a unique set of challenges. The traditional way of life and Torres Strait Island culture are critically important to the communities residing across the many remote islands in the Protected Zone. Consequently, research needs to pay special attention to the social and economic contexts which are unique to the region. This includes consideration of the potential impacts that research may have on Torres Strait communities, both overt through direct interaction with communities and the more subtle emotional or psychological impacts of research activities taking place in and around culturally significant places.

### **2.1 Research Funding Environment**

Torres Strait fisheries operate in a complex management environment with social, economic and cultural objectives being pursued alongside contemporary environmental and fisheries management objectives.

Therefore, the scope of potential fisheries research is necessarily broad. Research ranges from assisting Traditional Inhabitants to pursue their aspirations within local fisheries, undertaking routine science stock assessments and surveys, adaptation to the effects of climate change and ways to improve sustainability of, and economic and social benefits from the Torres Strait fisheries.

## **2.2 AFMA research funds**

The TSSAC primarily funds research through AFMA's annual research contribution (currently at \$410 000 annually).

These funds are allocated at the discretion of the AFMA executive, based on recommendations of the TSSAC. The TSSAC considers research proposals based on the priorities set in this SRP and the ARS. When the TSSAC is unable to recommend funding for a project due to funding constraint, it may recommend that researchers go to other funding bodies. Depending on the priority and degree of funding constraint the TSSAC may support the project but ask the researcher to seek co-funding from another body.

Research priorities identified by the TSSAC in its SRP are also intended to implicitly influence other funding agencies in the research they may fund as it relates to Torres Strait fisheries. Equally, the TSSAC should be mindful of research being funded by other bodies, particularly where it may overlap with TSSAC priorities.

It is not possible to meet all Torres Strait research needs through the AFMA funds. Funding constraints are not likely to change and it would be beneficial for the TSSAC to play a greater role in supporting researchers to find other funding opportunities in order to broaden research delivery in the Torres Strait. This could be achieved through improved collaboration among research providers with an interest in the Torres Strait region. AFMA will actively engage in seeking greater collaboration between the TSSAC and other bodies.

## 2.3 Other funding bodies

Funding for Torres Strait fisheries related projects is sometimes provided by other government agencies or external funding bodies for Torres Strait research. This can take the form of contributions towards AFMA funded TSSAC projects, or be completely funded external to TSSAC and AFMA. In these cases, the funding body will manage the project themselves with little or no TSSAC comment. Information on some of these funding bodies and agencies is provided below. Further information about their role and research programs can be found on the agency websites.

### 2.3.1 Government Agencies

The Department of Agriculture and Water Resources, along with the Torres Strait Regional Authority and the Queensland Government may provide funding support for certain Torres Strait fisheries projects based on the relevance to their jurisdiction and their current priorities. Sometimes these projects and funds are managed by the TSSAC. TSRA in particular inject significant funds for Torres Strait fisheries research on a regular basis. TSRA funded projects generally have a focus on capacity building and traditional fisheries, or commercial fisheries with an indigenous interest, and generally compliment the TSRA core program work.

### 2.3.2 The Fisheries Research and Development Corporation (FRDC)

The FRDC is a statutory authority within the portfolio of the Federal Minister for Agriculture and Water Resources, jointly funded by the Australian Government and the commercial fishing industry. The FRDC may fund projects in the Torres Strait if such projects fit within the FRDC's Research, Development and Extension (RD&E) plan. The FRDC uses Commonwealth, State and Territory research advisory committees to assess and recommend projects for funding in line with the RD&E Plan.

#### ***The Indigenous Reference Group (IRG), FRDC***

The IRG is the FRDC's Indigenous Fishing sub-program advisory partner. The IRG was established by the FRDC in 2012 to assist in working towards a

RD&E plan for indigenous Australians to improve economic, environmental and social benefits to Australia's indigenous people. The current priorities for the IRG, can be found at the FRDC website ([www.frdc.com.au](http://www.frdc.com.au)) Some of these priorities are highly relevant to Torres Strait fisheries, including;

- Primacy for Indigenous People
- Acknowledgement of Indigenous Cultural Practices
- Self-determination of indigenous rights to use and manage cultural assets and resources
- Economic development opportunities arising from Indigenous peoples cultural assets and associated rights
- Capacity building opportunities for Indigenous people are enhanced.

***Human Dimensions Program, FRDC***

The FRDC also has a new Human Dimensions Program, focusing on social-science and economic research related to fisheries. Information on this program can also be found on the FRDC website ([www.frdc.com.au](http://www.frdc.com.au)).

**2.3.4 The Commonwealth Scientific and Industrial Research Organisation (CSIRO)**

The CSIRO has a long history of contributing funding support for CSIRO-led Torres Strait research. This generally occurs as a co-funding of project managed through the TSSAC.

**2.3.6 Collaboration among research providers**

There are both formal and informal links between staff from many of these external funding bodies and agencies that contributes to successful funding of research in the Torres Strait. Improved collaboration among research providers may lead to more efficient use of research funds.

AFMA, as a key funding agency for Torres Strait fisheries research, will consult with external research providers and key research stakeholders in an

effort to improve collaboration among these groups and transparency about proposed Torres Strait fisheries research.

## 2.4 MACs, RAGs and Working Groups

MACs, RAGs and WGs are actively involved in the PZJA's research planning process for the Torres Strait.

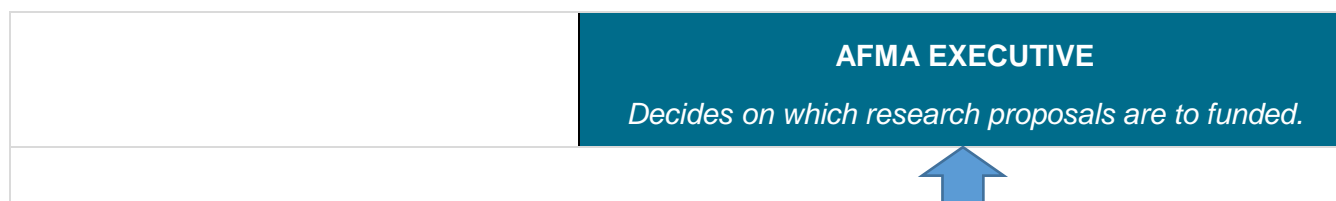
The roles of these different groups are less distinct than in the AFMA Commonwealth fisheries forums, as the working groups and MAC (there is currently only one MAC operating in Torres Strait) have a very similar function. There are now two RAGs within Torres Strait fisheries. Both Torres Prawn MAC and the hand collectible working group also perform RAG functions (primarily scientific advice).

The collective scientific functions of these groups are to review scientific data and information and provide advice to the PZJA on the status of fish stocks, sub-stocks, species (target and non-target species) and the impact of fishing on the marine environment. This advice assists the Minister and PZJA in the role of managing commercial fishing within PZJA fisheries, particularly in relation to monitoring the condition of the Torres Strait fisheries.

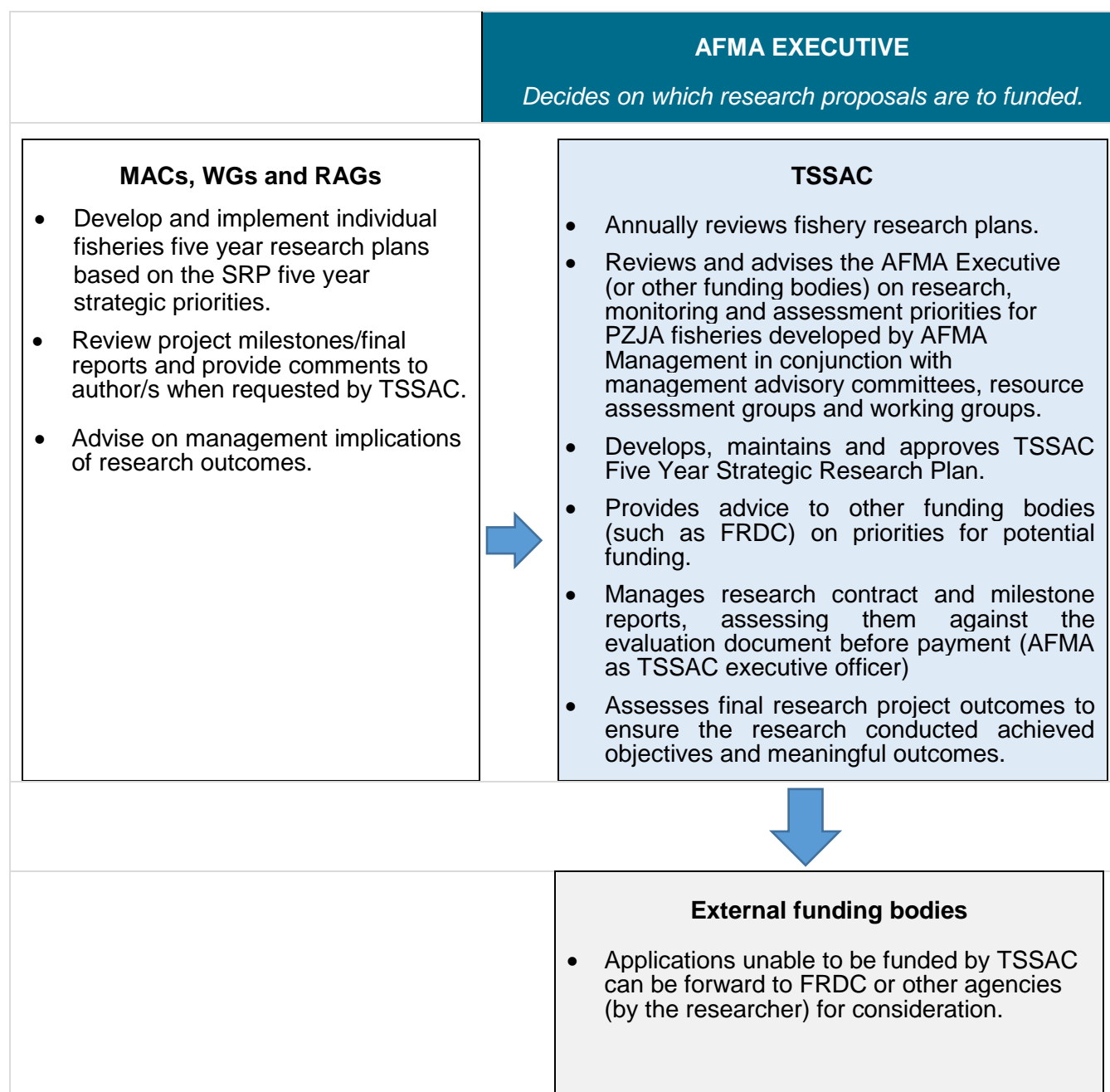
The collective management advisory function is to provide advice on fishery-specific management policies and plans to assist the Minister and PZJA in the role of managing commercial fishing across the PZJA fisheries.

In relation to the TSSAC function, each of these groups will lead the preparation of the rolling five year, fishery-specific research plans which are underpinned by the SRP. See Figure 2 below for a map of roles and responsibilities during the TSSAC funding application process.

**Figure 2.** Roles and responsibilities of key participants in the PZJA's annual research cycle for Torres Strait fisheries







## 2.4 Confidentiality of community fishing data and intellectual property

Data collected during research projects can be regarded as confidential to local communities, or non-indigenous fishers. Confidentiality requirements should be considered for all research projects that may generate intellectual property related to traditional knowledge, or contain data, such as fishing grounds or catch data, of individual communities or fisheries. This data should be treated in the same way as commercial in confidence commercial fishing data. Researchers should consider the types of data they will be

collecting, and gain prior agreement from each community or relevant stakeholder/s as to how the data will be used for example. only for decision making or to be published in the public domain.

## TSSAC's annual research cycle

**Table 1.** TSSAC funding Cycle

	<b>TSSAC PROCESS</b>
February	<p>Research providers submit pre-proposals for assessment, which meet the scopes provided by TSSAC in November.</p> <p>EOIs submitted are circulated to fisheries managers/ RAGs &amp; MACs for comment; Fisheries Managers, RAGs/MACs identify any additional research priorities for potential FRDC funding.</p>
March	<p><b>TSSAC meets via teleconference to assess pre-proposals and Management/RAG/MAC comments.</b></p> <p>Applicants notified of TSSAC comments on their pre-proposals and asked to develop the consultation package (for review by AFMA by end of March) for use during full proposal development.</p>
April	<p>Researchers to complete full proposal (6 weeks total with consultation period)</p>
May	<p><b>Late May/ early June. TSSAC meet face to face</b> to review full proposals and endorse final applications, or suggest necessary changes before endorsement.</p> <p>Applicants advised of the TSSAC's final evaluation.</p>
June	
July (START)	<p>TSSAC confirm the research budget for the new financial year (it doesn't generally change from year to year - \$410 000).</p> <p>New contracts and variations for essential research projects prepared and put in place, confirming forward budgets.</p> <p>RAGs, WGs and MACs to identify <b>THEIR PRIORITY RESEARCH NEEDS</b> for funding in the next financial year by updating their <i>five year rolling fisheries research plan</i>. This should be framed around strategies in the 5 year strategic research plan. Provide to TSSAC EO by end August.</p>
August	<p>RAGs/MACs submit their five year rolling fishery research plan to the TSSAC</p>

	Executive Officer, currently lisa.cocking@afma.gov.au, by end August.
September	TSSAC EO drafts the TSSAC Annual Research Statement (ARS) with each fisheries priorities for the current year.
October	<p>TSSAC meets (face to face or via teleconference) to finalise the PZJA ARS and agree on priorities for the TSSACs call for applications in November.</p> <p>AFMA develop scopes for the priority research projects and send to TSSAC out of session for consideration.</p>
November	The annual research call opens in November. Scopes sent to researchers seeking pre-proposals.

## Appendix A: TSSAC Terms of Reference

### Terms Of Reference

- i. Identify and document research gaps, needs and priorities for fisheries in the Torres Strait in conjunction with the PZJA advisory groups.
- ii. develop, maintain and approve the Torres Strait Five Year Strategic Research Plan. This includes balancing tactical short term needs and strategic needs to identify research gaps and priorities.
- iii. review rolling five (5) year research plans for Torres Strait fisheries
- iv. provide advice to the AFMA executive on priorities for the allocation of AFMA research funds and potential risks to achieving intended outcomes.
- v. Provide advice on effective consultation strategies with communities regarding research projects to ensure engagement throughout the project.
- vi. Consider the level of community support for research proposals and advise researchers on any actions needed to improve community consultation before a project is supported.
- vii. ensure research outcomes are communicated to community stakeholders.
- viii. provide advice to FRDC or other research providers on Torres Strait research priorities for potential funding consideration.
- ix. assess research investment and outcomes for the Torres Strait fisheries to measure the extent to which intended sustainability, social and economic needs are being met.
- x. provide a forum for expert consideration of scientific issues referred to the TSSAC by the Torres Strait advisory groups.
- xi. provide other advice to the Torres Strait advisory groups on matters consistent with TSSAC functions.
- xii. review research / consultancies, stock assessments, and other reports and outputs relevant to Torres Strait fisheries and advise the Torres Strait advisory groups on their technical merit.
- xiii. convene Fisheries Assessment workshops as appropriate to review and address assessment needs for Torres Strait fisheries.

## **Appendix B: Key factors influencing Torres Strait fisheries research needs**

In developing this plan and the drivers for research in the Torres Strait, there are a number of factors which have been taken into account. This includes whole of Government policies and objectives relevant to the Torres Strait. These are explained in some detail below.

### ***The Torres Strait Fisheries Act 1984 (the Act)***

The PZJA is created under the Act; the legislation used by the Australian and Queensland Governments when managing Torres Strait fisheries.

The Act makes the PZJA responsible for monitoring the condition of the fisheries under its control and formulating policies and plans for their good management. In performing these functions, the Act requires the PZJA to have regard to the rights and obligations conferred on Australia by the Torres Strait Treaty' (<https://www.legislation.gov.au/Details/C2016C00677>), and in particular, 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.

## Australian Government priorities

The Australian Government has identified priorities for research that are significant in shaping fisheries research effort and its reporting, namely:

- Global trends
- National Research Priorities
- Rural Research and Development Priorities

### Global Trends

The five major trends that are expected to influence primary industries globally during the next 20 years, as identified by the Rural Industries Research and Development Corporation in its report *Rural Industry Futures – Megatrends impacting Australian agriculture over the coming twenty years*, include:

**A hungrier world:** Population growth will drive demand for food and fibre

**A bumpier ride:** Globalisation, climate change and environmental change will reshape the risk profile for agriculture

**A wealthier world:** A new middle class will increase food consumption, diversify diets and eat more protein

**Transformative technologies:** Advances in digital technology, genetic science and synthetics will change the way food and fibre products are made and transported

**Choosy customers:** Information-empowered customers of the future will have expectations for health, provenance, sustainability and ethics

### National RD&E Strategy for Fishing and Aquaculture

The National Fishing and Aquaculture RD&E Strategy 2015-20 provides direction to improve the focus, efficiency and effectiveness of RD&E to support Australia's fishing and aquaculture industry.



The identified goals and key strategies are:

- Australia's fisheries and aquaculture sectors are managed, and acknowledged, to be ecologically sustainable.
- Security of access and resource allocation.
- Maximising benefits and value from fisheries and aquaculture resources.
- Streamlining governance and regulatory systems.
- Maintain the health of habitats and environments upon which fisheries and aquaculture rely.
- Aquatic animal health, and biosecurity (inclusive of pests) Aquaplan 2015-2019.

#### FRDC Research Development and Extension Plan 2015-20

The FRDC's RD&E Plan 2015-20<sup>1</sup> is focused on maximising impacts by concentrating on knowledge development around three national priorities:

1. Ensuring that Australian fishing and aquaculture products are sustainable and acknowledged to be so.
2. Improving productivity and profitability of fishing and aquaculture.
3. Developing new and emerging aquaculture growth opportunities.

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<sup>1</sup> [http://frdc.com.au/research/Documents/FRDC\\_RDE-Plan\\_2015-20.pdf](http://frdc.com.au/research/Documents/FRDC_RDE-Plan_2015-20.pdf)

## Appendix C: Criteria for assessing research investment in Torres Strait fisheries

The TSSAC will apply these criteria in assessing and ranking research proposals. Researchers should use the criteria as a guide when developing research applications and RAGs, MACs and WGs should also use these criteria when assessing proposals.

	Strongly disagree -----> strongly agree											Notes
Attractiveness	1	2	3	4	5	6	7	8	9	10	N/A	
1. Is there a priority need for the research (does it align with the Torres Strait Strategic Research Plan and Annual Research statement)?												
2. Is/are the end-user/s identified?												
3. Do the outcomes have relevance and are they appropriate to the end-users?												
4. Do the outputs contribute towards outcomes and are they measureable?												
5. Does the proposal actively engage Traditional Inhabitants and Torres Strait Islanders in the research?												
6. Are there employment opportunities for Traditional Inhabitants and Torres Strait Islanders?												
7. Does the research contribute to the knowledge that underpins ecosystem based fisheries management (EBFM) to improve the quality of decisions made?												

8. Does the project involve capacity development for Communities? If so, TSSAC to discuss if there is funding from other agencies such as the IRG or TSRA that could support this project.												
<b>Feasibility</b>												
9. Does the applicant and their team / resources have the capacity to produce the outputs?												
10. Is the budget appropriate to meet the outputs and outcomes?												
11. Does the proposal outline a coherent strategy surrounding data collection, analysis, and storage?												
12. Does the proposal include appropriate plans (for example, adoption, communication and/or commercialisation plans) to ensure that the full potential of the research is realised through adoption of research outputs by end-users?												
13. Are the methods scientifically sound, well described and consistent with the projects objectives?												

14. Research will be most effective when there is effective engagement with fishery stakeholders, particularly Traditional Inhabitants of the Torres Strait, and where the research has widespread stakeholder support (refer to procedural framework for undertaking research in the Torres Strait and the TSSAC research proposal application).  Does the project identify the key stakeholders and how they will be engaged regarding the project in a culturally appropriate way?												
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<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting No. 1 6-8 October 2021</b>
<b>OTHER BUSINESS</b>	<b>Agenda Item 10 For DISCUSSION</b>

**RECOMMENDATIONS**

1. That the Resource Assessment Group **NOMINATE** any further business for discussion.

<b>TORRES STRAIT HAND COLLECTABLES RESOURCE ASSESSMENT GROUP</b>	<b>Meeting No. 1 6-8 October 2021</b>
<b>HCRAG PRIORITIES AND DATE FOR THE NEXT MEETING</b>	<b>Agenda Item 10 For DISCUSSION &amp; ADVICE</b>

## 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

1. Having agreed priorities (RAG issues to focus on) and a corresponding work plan aims to achieve a more efficient RAG process.
2. The RAG may have a standing item at its meetings to discuss assessment, data collection and research needs for Torres Strait Hand Collectables Fisheries. This may be informed by the RAG's meeting discussions, advice from individual members of the RAG and/or advice from the Hand Collectable Working Group (HCWG).
3. Where possible, the RAG should aim to prioritise and set a timeline for any identified items, having regard for resourcing.
4. In considering its priorities, the RAG may wish to note the summary of management priorities identified by the HCWG provided in Table 1 and their progress to date.
5. Having regard for the outcomes of this meeting (including the assessment and management requirements stipulated in the WTO conditions) and the draft outcomes of the ERA for the BDM Fishery, the RAG may recommend an alternate list of priorities. Table 2 provides a summary of key due dates for the BDM fishery that the RAG may wish to consider in developing its work plan.
6. As far as practical AFMA proposes that a work plan be developed in-session.
7. AFMA proposes the next meeting be held in the second half of 2022.

**Table 1. Comments relating to any progress against each management priority previously identified by the HCWG. Management priorities are listed chronologically and not in order of importance.**

Management Priority			Progress to date and comments
1	HCWG9 June 2016	Development of a harvest strategy and recovery plans for overfished species	<b>Complete.</b> CSIRO, together with AFMA, the HCWG and broader industry stakeholders have developed a Beche-de-mer Harvest Strategy.

Management Priority			Progress to date and comments
			The BDM Harvest Strategy was endorsed by the PZJA in November 2019 and implemented on 1 January 2020.
2	HCWG9 June 2016	Future management arrangements for Black Teatfish and White Teatfish	<p><b>Ongoing.</b></p> <p>The TSRA supported PZJA Traditional Inhabitant members to undertake cluster consultations in late 2019 which sought feedback from communities on the use of hookah to fish for white teatfish. Given the strongly divided community views on this matter, the HCWG recommended that it be further discussed at a Malu Lamar led broader industry workshop which was scheduled for April 2020 but did not proceed due to COVID-19 related restrictions.</p> <p>See also management priority #9</p> <p><b>Completed</b></p> <p>Fishing for black teatfish occurred on a trial basis during 30 April – 3 May 2021 in accordance with the BDM Harvest Strategy.</p>
3	HCWG9 June 2016	Review the size limits set for the Torres Strait Beche-de-mer Fishery taking into consideration the size limits in place for the Queensland and the Commonwealth Coral Sea Fishery	<p><b>Complete.</b></p> <p>This work was progressed under the Harvest Strategy project. Proposed changes to minimum size limits of beche-de-mer will be considered by the PZJA as part of the Harvest Strategy.</p>
4	HCWG9 June 2016	Review weight conversion ratios for gutted and dried beche-de-mer species	<p><b>Ongoing.</b></p> <p>This work was progressed under the Harvest Strategy project. Updates to weight conversion ratios are captured within the new Beche-de-mer Species Identification Guide.</p> <p>CSIRO is continuing to work with industry on understanding weight conversion ratios for curryfish species. A full proposal was developed and allocated funding in 2019/20 but did not proceed due to COVID-19.</p>
5	HCWG9 June 2016	Develop communication materials to assist industry members with the requirements of the new Fish Receiver System being implemented on 1 December 2017	<p><b>Complete.</b></p> <p>As part of the 2019 Fish Receiver System community visits, AFMA developed some educational material such as fact sheets and</p>



Management Priority			Progress to date and comments
		and on current management arrangements and proposed future management priorities for the fishery.	<p>and frequently asked questions (FAQs) sheets on the FRS and harvest strategies for industry, as well as consulting on the draft BDM Harvest Strategy. A number of PZJA Traditional Inhabitant (TI) members also accompanied AFMA during the community visits and assisted in communicating the importance and benefits of the FRS.</p> <p>During the TSRA cluster visits in late 2019 and January 2020, PZJA TI members presented on each fishery, including management priorities and the FRS.</p> <p>AFMA and PZJA TI members undertook further community visits in late 2020 – early 2021 leading up to the black teatfish trial opening during which the FRS was also discussed and communication material provided.</p>
6	HCWG13 July 2018	Developing a Beche-de-mer management plan.	<p><b>Not progressed.</b></p> <p>The development and implementation of the BDM Harvest Strategy and mandatory fish receiver system was progressed as the highest immediate priority.</p> <p>Further consideration by the HCWG on the need on intend purpose of developing a statutory management plan for the BDM Fishery. A key purpose for implementing such a plan is to implement quota (or effort unit) management.</p>
7	HCWG13 July 2018	Continuing education and awareness training with the Fish Receiver System	<p><b>Ongoing.</b></p> <p>AFMA undertook a round of community visits in April and May 2019 to discuss the Fish Receiver System with industry and communities and AFMA continues to liaise with industry on how to improve reporting through the FRS.</p>
8	HCWG13 July 2018	Improving communication and engagement with industry on current management arrangements and proposed future management priorities for the fishery.	<p><b>Ongoing.</b></p> <p>In addition to the comments provided at #5 above, AFMA Thursday Island is continuing to work with the AFMA communications team to improve</p>

Management Priority			Progress to date and comments
			communications on a range of fisheries topics, including segments on Radio 4MW, the PZJA website and a fisheries notice board outside the AFMA Torres Strait office.
9	HCWG14 October 2018	Some industry members expressed support for Malu Lamar to develop their own proposal on the use of hookah to fish for white teatfish and fast track the issue to the PZJA for consideration, separate to the work that the TSRA is undertaking in this regard.	<b>Ongoing.</b> AFMA stands ready to consider Malu Lamar's proposal and will work with Malu Lamar to undertake further industry consultation, and/or workshops similar to that undertaken in the lead up to the trial opening of black teatfish in 2021. See also management priority #2
10	HCWG15 August 2019	AFMA to arrange a half/full day future management priorities workshop in conjunction with the next Hand Collectables Working Group meeting. Participants to the meeting should include HCWG members, other industry stakeholders including factory processors and/or buyers, and should also include discussions on pearl shell and trochus fisheries.	<b>Ongoing.</b> The highest priority for 2020-21 was the trial opening of black teatfish which occurred on 30 April – 3 May 2021. AFMA will continue to work with the HCWG and industry to progress discussions on future management priorities for Hand Collectables Fisheries. AFMA considers this a high priority.

**Table 2. Key dates for the BDM Fishery in 2022.**

Key date	Activity
1 January 2022	Start of BDM fishing season
1 January 2022	Due date for final BDM ERA in order to meet WTO Condition 5.
January 2022 (date TBA)	PZJA January meeting
February – March 2022	Industry consultation round
April 2022 (very tentative)	Black teatfish opening (subject to PZJA approval and industry advice on opening time/date)
September 2022 (date TBA)	RAG/WG advice on annual and five-year research priorities.