Australian Government

Australian Fisheries Management Authority

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP 35

TRLRAG 35

12 December 2023 | 830am – 5pm
13 December 2023 | 830am – 2pm

TSRA Boardroom, Thursday Island

Meeting Papers

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Thursday Island	MEETING 35 12-13 December 2023
PRELIMINARIES Welcome and apologies	Agenda Item 1.1 For NOTING

RECOMMENDATIONS

1. That the RAG **NOTE**:
    a. an acknowledgement of Traditional Owners;
    b. the Chair's welcome address;
    c. apologies received from members unable to attend.

BACKGROUND

2. As at 5 December 2023 no apologies had been received.

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Thursday Island	MEETING 35 12-13 December 2023
PRELIMINARIES Adoption of agenda	Agenda Item 1.2 For DECISION

RECOMMENDATIONS

1. That the RAG consider and **ADOPT** the agenda.

BACKGROUND

2. This meeting was noted by members at TRLRAG 33 (14 December 2022) with key agenda items including:
    a. consideration of the results of the November 2023 pre-season survey;
    b. consideration of the CPUE analyses for the 2022-23 fishing season; and
    c. consideration of the recommended biological catch (RBC) estimates derived through the application of the empirical harvest control rule (eHCR) under the TRL Harvest Strategy and provision of advice on a RBC for the 2023-24 fishing season.
3. A draft agenda was circulated to members on 31 October 2023.
4. Comments were received and included and a revised version 2 agenda was circulated on 28 November 2023. No further comment was received.

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Video Conference	MEETING 35 12-13 December 2023
PRELIMINARIES Declaration of interests	Agenda Item 1.3 For Decision

RECOMMENDATIONS

1. That RAG members and observers:
    a. **DECLARE** all real or potential conflicts of interest in the Torres Strait Rock Lobster Fishery at the commencement of the meeting (**Attachments 1.3a** and **1.3b**);
    b. **DETERMINE** whether the member may or may not be present during discussion of or decisions made on the matter which is the subject of the conflict;
    c. **ABIDE** by decisions of the RAG regarding the management of conflicts of interest; and
    d. **NOTE** that the record of the meeting must record the fact of any disclosure, and the determination of the RAG as to whether the member may or may not be present during discussion of, or decisions made, on the matter which is the subject of the conflict.

BACKGROUND

2. Consistent with the *Protected Zone Joint Authority (PZJA) Fisheries Management Paper No. 1* (FMP1), which guides the operation and administration of PZJA consultative forums, members are asked to declare any real or potential conflicts of interest.
3. RAG members are asked to confirm the standing list of declared interests (**Attachments 1.3a** and **1.3b**) is accurate and provide an update to be tabled if it is not.
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.

TRLRAG Declarations of interests from most recent meetings

Name	Position	Declaration of interest
Members		
Ian Knuckey	Chair	Chair/Director of Fishwell Consulting Pty Ltd and Olrac Australia (electronic logbooks). Chair/member of other RAGs and MACs. Conducts various AFMA and FRDC funded research projects including FRDC Indigenous Capacity Building project. Nil interests in TRL Fishery and no research projects in the Torres Strait. In 2019, delivered components of TSRA Induction Program for Traditional Inhabitant members on PZJA advisory committees. Full declaration of interests provided at **Attachment 1.3b.**
Eva Plaganyi	Scientific Member	Lead scientist for PZJA funded TRL research projects conducted by CSIRO. Contribute to other Torres Strait research projects that receive research funding, including currently Shared science and Indigenous knowledge to support fisheries capacity building in Torres Strait. No other interests in the fishery. Independent scientific member of HCRAG and NPFRAG.
Andrew Penney	Scientific Member	Director of Pisces Australis Pty Ltd, an Australian registered marine/coastal research and management consultancy based in Canberra - interests in any opportunities in this regard. Currently Principal Investigator on FRDC Projects Nos 2017-180: Design and implementation of an Australian National Bycatch Report: Phase 1 – Scoping; and 2019-036: Implementation of dynamic reference points and harvest strategies to account for environmentally-driven changes in productivity in Australian fisheries, potentially red leg banana prawns or TRL. Independent scientific member on the AFMA Southeast RAG, the Tropical Rock Lobster RAG and the Small Pelagic Fishery RAG. Member of the AFMA ERA Technical Working Group. No shareholding and hold no positions relating to any other companies, including any fishing companies or industry associations.
Les Pitt	Traditional Inhabitant Member – Kemer Kemer Meriam	Traditional Inhabitant Member Kemer Kemer Meriam, TIB licence holder and runs an independent freezer facility on Erub Island. Board member of Zenadth Kes Fisheries.
Charles David	Traditional Inhabitant Member - Kulkalgal	Traditional Inhabitant Member Kulkalgal, TSRA Fisheries Advisory Committee and Zenadth Kes Fisheries member.

Patrick Mooka	Traditional Inhabitant Member – Guda maluylgal	Traditional Inhabitant Member, Guda maluylgal. Zenadth Kes Fisheries representative.
Jermaine Reuben	Traditional Inhabitant Member - Maluyilgal	Traditional Inhabitant Member Maluligal. TIB licence holder, GBK employee.
Thomas Fujii	Traditional Inhabitant Member - Kaiwalalgal	Traditional Inhabitant Member Kaiwalalgal. Queensland East Coast TRL and TIB license holder. Zenadth Kes Fisheries member.
Brett Arlidge	Industry Member	General Manager MG Kailis Pty Ltd. MG Kailis Pty Ltd is a holder of 5 TVH licences. Seafood buyer from Torres Strait, QLD and PNG TRL fisheries.
Ken McKenzie	Industry Member	TVH license and quota holder. Queensland East Coast TRL license and quota holder.
Adam White	Acting TSRA Member	TSRA Fisheries Project Manager, TSRA holds multiple TVH TRL fishing license on behalf of Torres Strait Communities but dos not benefit from them. No personal pecuniary interest.
Jenny Keys	QDAF Member	Queensland TRL Fishery Manager.
Rosemary Millward	AFMA Member	To be declared.
Elissa Mastroianni	Executive Officer	Nil.
Observers		
Joseph Posu	PNG National Fisheries Authority	Works in the Fisheries Management Unit responsible for managing the prawn and lobster fisheries in the Western Province. No personal pecuniary interest in the fishery.
Terrence Kedemwana	PNG National Fisheries Authority	To be declared.
Ned David	Malu Lamar	To be declared.
Yen Loban	TSRA Board Member and Portfolio Member for Fisheries	TSRA Board member and TSRA Fisheries Portfolio member. Chair of Zenadth Kes Fisheries.
Richard Takai	Active TRL fisher	Holds a TIB licence.
Brooke D'Alberto	ABARES	Nil.
Quinten Hirakawa	TSRA	TSRA employee, TIB license holder with a TRL endorsement.
Leo Dutra	CSIRO	Contributes to Torres Strait research projects that receive research funding, including currently Shared science and Indigenous knowledge to support fisheries capacity building in Torres Strait. No other interests in the fishery.

Laura Blamey-Crous	TRL WG Scientific Member	Contributes to Torres Strait research projects that receive research funding, including currently Shared science and Indigenous knowledge to support fisheries capacity building in Torres Strait. No other interests in the fishery.
Steph Brodie	CSIRO	To be declared.
Roshni Subramanian	CSIRO	To be declared.
Marjoleine Roos	CSIRO	To be declared
Peter Frazis	TRL WG Industry Member	Employee of MG Kailis Pty Ltd. MG Kailis Pty Ltd is a holder of 5 TVH license. Seafood buyer from Torres Strait, QLD, and PNG TRL fisheries.

Declaration of interests
Dr Ian Knuckey – October 2022

Ian Knuckey positions:

Director –	Fishwell Consulting Pty Ltd
Director –	Olrac Australia (Electronic logbooks)
Chair –	Northern Prawn Fishery Resource Assessment Group
Chair –	Tropical Rock Lobster Resource Assessment Group
Chair –	Victorian Rock Lobster and Giant Crab Assessment Group
Chair –	Victorian Central Zone Abalone Fisheries Resource Advisory Group
Chair – Committee	Gulf of St Vincent's Prawn Fishery MAC Research Scientific
Scientific Member –	Northern Prawn Management Advisory Committee
Scientific Member – Committee	Gulf of St Vincent's Prawn Fishery Management Advisory
Scientific Member –	Tropical Tuna Resource Assessment Group
Scientific Member –	SESSF Resource Assessment Group
Councillor –	Victorian Marine and Coastal Council
Member –	The Geelong Agri Collective

Fishwell current projects:

DAWE Project	Multi-sector fisheries capacity building
AFMA 2022-	Annual monitoring, reporting and assessment of SPF marine mammal interactions, including effectiveness of mitigation measures
AFMA 2020-0807	Bass Strait Scallop Fishery Survey – 2020-22
AFMA project	Design sea cucumber fishery-independent survey for Coral Sea
FRDC 2019-027	Improving and promoting fish-trawl selectivity in the SESSF and GABTS
FRDC 2018-021	Development and evaluation of SESSF multi-species harvest strategies
Traffic Project	Shark Product Traceability
Sea Cucumber Ass.	Design and implementation of various sea cucumber dive surveys.
Australia Bay	Queensland Gulf of Carpentaria Developmental Fin Fish Trawl Fishery
Expert Witness	Gladstone Harbour development impacts

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Thursday Island	MEETING 35 12-13 December 2023
PRELIMINARIES Action items from previous meetings	Agenda Item 1.4 For Discussion and Advice

RECOMMENDATIONS

1. That the RAG:
    a. **NOTE** the progress against actions arising from previous meetings (**Attachment 1.4a**)
    b. **NOTE** the final meeting record for TRLRAG 34 (**Attachment 1.4b**) held on 6 July 2023.
    c. **PROVIDE ADVICE** on any new key events to be added to the TRL Management History timeline (**Attachment 1.4c).**

BACKGROUND

Actions arising

2. Updates are provided on the status of actions arising from previous TRLRAG meetings and relevant TRLWG meetings at **Attachment 1.4a**.

Meeting records

3. The draft meeting record for TRLRAG 34 held on 6 July 2023 as a hybrid meeting face to face and via video conference was provided out of session for comment on 18 September 2023. No comments were received.
4. The record was finalised out of session following the closure of the comment period and circulated to members on 3 October 2023.
5. The final meeting record is provided at **Attachment 1.4b** for information and is also available on the PZJA website.

TRL Management History Timeline

6. As an action arising from TRLRAG 14 (25-26 August 2015), AFMA and CSIRO were tasked with preparing a timeline of key events that have occurred in the Torres Strait Tropical Rock Lobster Fishery.
7. The timeline is intended to be a living document, to be updated as relevant management events in the fishery occur. AFMA proposed at TRLRAG 32 that this document be a standing agenda item under Agenda Item 1.4 Actions Arising for the RAG to be updated as required.
8. The RAG is asked to provide advice on any new key events to be added to the Management History timeline since the last RAG meeting (provided at **Attachment 1.4c**).

Action items from previous TRLRAG meetings

#	Action Item	Meeting	Responsible Agency/ies	Due Date	Status
1.	CSIRO to investigate the length frequency conversion factors from the catch weight data provided by MG Kailis.	TRLRAG25 (11-12 December 2018)	CSIRO	2019	**Ongoing** This work is budgeted as part of the current TRL research project. CSIRO will provide a verbal update on this action at the meeting.
2.	Considering assessment timelines, PNG NFA to provide CSIRO with a best estimate of PNG catches by mid-November. CSIRO to liaise closely with PNG regarding reporting timeframes and provision of catch data. In parallel, the RAG data sub-group to examine ways to adjust the stock assessment model to account for delayed catch data from PNG.	TRLRAG25 (11-12 December 2018)	PNG NFA CSIRO AFMA RAG Data Sub-Group	2019	**Ongoing** PNG will provide a summary of TRL catch by month and processed weight from the PNG TRL fishery at or prior to the TRLRAG35 meeting. The RAG may need to consider using an extrapolation approach to estimating total PNG catch in the absence of complete data sets on an ongoing basis – for discussion under **Agenda Item 3.** AFMA continues to liaise with PNG NFA to obtain best estimate catch data and logbook data as inputs to the eHRC calculations and stock assessment models.
3.	That the TRL RAG data subcommittee discuss which TVH CPUE series are the best to use within the model.	TRLRAG25 (11-12 December 2018)	AFMA RAG Data Sub-Group	2019	**Ongoing** The RAG Data Sub-Group last met on 18 June 2019, however this item was not considered. This item remains on the agenda for the Data Sub-group. – to be discussed under **Agenda Item 11.**
4.	AFMA and CSIRO to work closely with industry to develop an index or key of diver names and 'clean up' the data diver name dataset to feed in to the next seasons' CPUE standardisation.	TRLRAG27 (10-11 Dec 2019)	AFMA CSIRO	TRLRAG29	**Ongoing.** CSIRO will provide an update on this action at the meeting – necessity and feasibility to be discussed by the RAG.

#	Action Item	Meeting	Responsible Agency/ies	Due Date	Status
5.	That the RAG (or RAG Data Sub-Group) determine whether there are better measures of effort in the fishery (hours vs days; time spent travelling, searching and actively fishing), and clarifying "number of fishers/divers" on TDB02 catch disposal record book.	TRLRAG27 (10-11 Dec 2019)	TRLRAG Data Sub-group	TRLRAG29	**Ongoing.** This item remains on the agenda for the Data Sub-group. The next RAG Data Sub-group meeting will be discussed under **Agenda Item 11.**
6.	AFMA to approach known TRL buyers and request the sharing of price data to support CSIRO's catch and effort data analysis.	TRLRAG29 (6 Oct 2020)	AFMA	TRLRAG30	**Complete.** AFMA contacted key buyers in 2020 however no responses were received. AFMA has contacted buyers again in mid-November 2022 and requested that any data be provided directly to CSIRO if buyers are willing. Advice to be provided by the RAG/CSIRO on whether AFMA should continue to pursue this.
7.	PNG NFA to follow up on reports of the PNG TRL Fishery hookah closure being lifted and report back to AFMA.	TRLRAG 32 (15 Dec 2021)	PNG NFA	TRLRAG 33	**Complete.** NFA provided an update on this at TRLRAG 33, informing the RAG that the temporary pause on the hookah ban introduced during COVID has now ended, with the ban once again in place from December to April.
8.	The TRL RAG Data Sub-group to look at ways to facilitate the reporting of discards and mortality on CDRs and Logbooks	TRLRAG 32 (15 Dec 2021)	TRLRAG Data Sub-group	2023	**Not commenced.** To be placed on the agenda for the next RAG Data Sub-group meeting – to be discussed under **Agenda Item 11.**
9.	RAG Chair to share a copy of the presentation on the TRLRAG roles and responsibilities Add in TRL 33 action items	TRLRAG 33 (13-14 Dec 2022)	TRLRAG Chair	2023	**Complete.** The TRLRAG Chair shared the presented with AFMA

#	Action Item	Meeting	Responsible Agency/ies	Due Date	Status
10.	All members to review the Management History Timeline out of session and provide any updates and comments to AFMA for inclusion. AFMA to include two key changes in the timeline.	TRLRAG 33 (13-14 Dec 2022)	All members AFMA	2023	**Complete.** AFMA included changes to QLD East Cost Fishery closures and size limits in the early 2000s, and the impacts of COVID and export difficulties in the timeline at **Attachment 1.4c.** No additional updates have been provided by members out of session.
11.	CSIRO to circulate flyer for the project on building resilience in supply chains.	TRLRAG 33 (13-14 Dec 2022)	CSIRO	2023	**Complete.** CSIRO provided the flyer OOS on 14 February 2023. Further information, including a paper and update on a workshop, was provided during TRLRAG34 on 6 July 2023. A workshop relating to this project will be held on 15 December 2023.
12.	NFA to be invited to the next data sub-group meeting	TRLRAG 33 (13-14 Dec 2022)	AFMA	2023	**Not commenced.** The RAG Data Sub-group did not meet as planned in 2023, but an invitation will be extended to NFA for the next meeting – to be discussed under **Agenda Item 11**
13.	CSIRO to discuss potential survey with NFA	TRLRAG 33 (13-14 Dec 2022)	CSIRO/NFA	Ongoing	**Ongoing.** Update to be provided at the meeting.
14.	AFMA to look at how discards are captured in the East Coast, and pass this along to the data sub-group to be considered on their agenda	TRLRAG 33 (13-14 Dec 2022)	AFMA/QDAF	2023	**Ongoing.** QDAF informed AFMA that discards are not recorded in the QLD logbook. The RAG Data Sub-group were not able to meet in 2023 as planned, but this will be provided ahead of the next RAG Data Sub-group meeting – to be discussed under **Agenda Item 11.**
15.	CSIRO to write to the Chair of Malu Lama to help identify and	TRLRAG 33 (13-14 Dec 2022)	CSIRO	2023	**Complete.** CSIRO wrote to the Chair of Malu Lamar in February 2023 but did not receive a response.

#	Action Item	Meeting	Responsible Agency/ies	Due Date	Status
	facilitate participation in morphometric data collection				
16.	Ben Liddell to provide further information to CSIRO on two migrations of TRL in the year.	TRLRAG 33 (13-14 Dec 2022)	AFMA		**Ongoing.** Update to be provided at the meeting.
17.	AFMA to confirm the post capture mortality rate from Clive Turnbull's 1980's study and provide this to the group.	TRLRAG 33 (13-14 Dec 2022)	AFMA		**Complete.** Only 5 out of 527 lobsters were in poor condition upon trawling. A total of 2,456 lobster were tagged, with 191 tagged lobsters recaptured up to a year after tagging. Details can be provided to members out of session if desired.
18.	AFMA to follow up on prioritising data entry times on TSPF observer data to avoid a time lag to better support these analyses.	TRLRAG 33 (13-14 Dec 2022)	AFMA		**Complete.** AFMA have discussed the issue with our data team. AFMA's data team are implementing a number of changes to how data is entered and recorded across all fisheries, including TSPF.
19.	Members to review the draft Climate and Ecosystems Status Report out of session and provide comment back to CSIRO.	TRLRAG 33 (13-14 Dec 2022)	All members	2023	**Complete.** Members have had the opportunity to review the Climate and Ecosystem Status Report. To be discussed under **Agenda Item 3.**
20.	TRLRAG EO to provide graphs and data for June year on year catches, and links to sea surface temperature maps.	TRLRAG34 (6 July 2023)	AFMA	2023	**Complete.** Graphs and maps were circulated to members on 7 July 2023.
21.	TRLRAG EO to update the research priorities table and 2023/25 – 2029/30 TRL	TRLRAG34 (6 July 2023)	AFMA	2023	**Complete.** The updated research plan was circulated to members on 20 July 2023, and subsequently provided to the TSSAC EO.

#	Action Item	Meeting	Responsible Agency/ies	Due Date	Status
	Research Plan and provide to members and the TSSAC EO.				

Relevant action items from previous TRLWG meetings*

#	Action Item	Meeting	Responsible Agency/ies	Due Date	Status
1.	Discard reporting and estimation be considered by the RAG (possibly by the RAG data subgroup)	TRLWG8 (8 November 2018)	AFMA RAG Data Sub-Group	2019	**Ongoing** This item remains on the agenda for the Data Sub-group to be discussed under **Agenda Item 11.**
2.	RAG to consider the merit and options for improving the index of 0+ lobster abundance, through logbooks or other means. The Working Group noted that this would may be relevant to the RAG data sub-committee.	TRLWG8 (8 November 2018)	AFMA RAG Data Sub-Group	2019	**Ongoing** This item remains on the agenda for the Data Sub-group to be discussed under **Agenda Item 11.**

*TRLWG actions not relevant to TRLRAG have not been included in the above.

Torres Strait Tropical Rock Lobster Resource Assessment Group Meeting 34

Final Meeting Record

6 July 2023

Hybrid Videoconference/Thursday Island

Note all meeting papers and record available on the PZJA webpage: www.pzja.gov.au

Australian Government
Australian Fisheries Management Authority

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Contents

Meeting participants

Members

Name	Position	Declaration of interest
Ian Knuckey*	Chair	In addition to the declaration of interests provided at **Attachment A,** the Chair also declared that he has been commissioned to design a fishery independent survey for the Commonwealth Coral Sea Sea Cucumber Fishery.
Andrew Penney*	Scientific member	Director of Pisces Australis Pty Ltd, an Australian registered marine/coastal research and management consultancy based in Canberra - interests in any opportunities in this regard. Currently Principal Investigator on FRDC Projects Nos 2017-180: Design and implementation of an Australian National Bycatch Report: Phase 1 – Scoping; and 2019-036: Implementation of dynamic reference points and harvest strategies to account for environmentally-driven changes in productivity in Australian fisheries, potentially red leg banana prawns or TRL. Independent scientific member on the AFMA Southeast RAG, the Tropical Rock Lobster RAG and the Small Pelagic Fishery RAG. Member of the AFMA ERA Technical Working Group. No shareholding and hold no positions relating to any other companies, including any fishing companies or industry associations.
Éva Plagányi*	Scientific member	Lead scientist for PZJA funded TRL research projects conducted by CSIRO. Contribute to other Torres Strait research projects that receive research funding, including currently Shared science and Indigenous knowledge to support fisheries capacity building in Torres Strait. No other interests in the fishery. Independent scientific member of HCRAG and NPFRAG.
Les Pitt#	Traditional Inhabitant Member – Kemer Kemer Meriam	Traditional Inhabitant Member Kemer Kemer Meriam, TIB licence holder and runs an independent freezer facility on Erub Island. Board member of Zenadth Kes Fisheries.
Charles David	Traditional Inhabitant Member - Kulkalgal	Apology
Patrick Mooka#	Traditional Inhabitant Member – Guda Maluligal	Traditional Inhabitant Member, Guda Maluligal. TIB licence holder. Zenadth Kes Fisheries representative.

Name	Position	Declaration of interest
Jermaine Reuben#	Traditional Inhabitant Member - Maluligal	Traditional Inhabitant Member Maluligal. TIB licence holder, GBK employee.
Thomas Fujii#	Traditional Inhabitant Member - Kaiwalalgal	Traditional Inhabitant Member Kaiwalalgal. Queensland East Coast TRL and TIB license holder. Zenadth Kes Fisheries member.
Brett Arlidge	Industry Member	Apology
Ken McKenzie#	Industry Member	TVH license and quota holder. Queensland East Coast TRL license and quota holder.
Damian Miley	TSRA Member	Apology
Nicholas Richards#	Acting TSRA Member	TSRA Fisheries Project Manager, TSRA holds multiple TVH TRL fishing license on behalf of Torres Strait Communities but dos not benefit from them. no personal pecuniary interest.
Jenny Keys	QDAF Member	Apology
Emma Freeman#	AFMA Member	Nil.
Elissa Mastroianni#	Executive Officer	Nil.

*Attended online via MS Teams
#Attended in person at TSRA

Observers

Name	Position	Declaration of interest
Joseph Posu*	PNG National Fisheries Authority	Works in the Fisheries Management Unit responsible for managing the prawn and lobster fisheries in the Western Province
Bonny Koke*	PNG National Fisheries Authority	Works in the Fisheries Management Unit responsible for managing the prawn and lobster fisheries in the Western Province
Brooke D'Albertto*	ABARES	Nil

*Attended online vis MS Teams

1 Preliminaries

1.1 Welcome and apologies

1. The 34th meeting of the Tropical Rock Lobster Resource Assessment Group (the RAG) was opened in prayer at 9:08am on Tuesday 13 December 2022. The Chair welcomed participants and acknowledged the Traditional Owners of the various lands on which members were participating from and paid respect to the elders past, present and emerging.
2. Attendees at the RAG meeting are detailed in the meeting participant tables at the start of this meeting record. The following apologies were received:
    a) Charles David, Kulkalgal Traditional Inhabitant member
    b) Jenny Keys, Queensland Department of Agriculture and Fisheries (QDAF) member
    c) Brett Arlidge. Industry member
    d) Damian Miley, TSRA member. Nicholas Richards attended as acting TSRA member.

1.2 Adoption of agenda

3. The RAG considered draft agenda which was circulated to members on 28 June 2023.
4. The draft agenda was adopted by the RAG and is provided at **Attachment B**.

1.3 Declaration of interests

5. The Chair advised members and observers, that as provided in PZJA Fisheries Management Paper No. 1 (FMP1), all members of the RAG must declare all real or potential conflicts of interest in the 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.
6. The Chair requested that members update the record of declarations. These are detailed in the meeting participant tables at the start of this meeting record.
7. The Chair noted the value in having the experience, knowledge and opinions of all members present during discussions. However, the Chair also noted the conflict for scientific members associated with determining research priorities under Agenda Item 3.
8. Scientific members were asked to leave the meeting. The Chair then proposed that the RAG agree for all members to participate in discussions across all agenda items, but ask that scientific members leave the meeting during the final research prioritisation.
9. There were no objections to the Chair's proposed approach. The scientific members returned to the meeting.

2 Updates from members

Industry and scientific members

10. The RAG noted verbal updates provided by industry members on the trends and observations in the TRL fishery during the 2022-23 season so far, in particular:
    a) Operating costs, particularly fuel prices, remain high across the fishery and market prices have been low. Fuel prices have restricted fishers ability to access grounds. These factors continue to put economic pressure on the fishery, and fewer operators are fishing due to this reduced profitability.
    b) Freight and transport logistics continue to be a challenge for the fishery.
    c) Observations indicate there are not as many small lobsters as would be expected this time of year. The number of lobsters is average at best.
    d) New and increasing sand incursions have also been observed across the Torres Strait.
11. The RAG noted verbal updates provided by scientific members, in particular:
    a) The morphometric sampling project is well underway. This will provide further information on growth rates, which may be related to the reports of sand incursions and lobster food availability. CSIRO will provide an update at the December RAG meeting.
    b) The 12th International Conference on Lobster Biology is being held in Western Australia in October, with Scientific Member Eva Plaganyi and Traditional Inhabitant Member – Guda Maluligal Patrick Mooka presenting. The RAG congratulated these members on the opportunity to present at the conference.

c) The annual pre-season survey is scheduled for 2-16 November.
d) The CSIRO project on building resilience in supply chains is ongoing with a workshop still planned to be held in the Torres Strait.
e) A project on dynamic reference points, which used TRL as a case study, is close to complete. Results indicate that although there is large variability in abundance in the TRL fishery due to environmental factors, there has been no clear shift towards overall higher or lower abundance. However, with the influence of climate change in the future good years are likely to be better and bad years likely to be worse.

Government agencies

12. An update from the AFMA member was provided which covered:

a) Year on year catch comparison for the month of June indicate this season is tracking similarly to the past two years, with below average catches across the fishery overall.

b) The PZJA will meet in person on Thursday island later in July. Discussions will include the TRL TIB quota allocation process. AFMA, TSRA and QDAF have developed Terms of Reference for a consultant to identify an appropriate framework for this process, which will be considered by the PZJA. AFMA and TSRA welcomed further discussion and feedback from members on this issue out of session.

c) Preparation is underway for the upcoming Torres Strait Treaty Bilateral meetings between Australia and PNG which will held in PNG this year.

d) The Bureau of Meteorology have provided advice that heatwave conditions are likely in the coming months, and advised government and industry may need to prepare for hotter than average temperatures.

13. The RAG also noted the following update provided by the TSRA member:

a) A project on climate change impacts and mitigation with CSIRO has been included int he 2023-24 budget and is now progressing through the TSRA procurement process.

b) The WAPIL (Fishing for our Future) project continues to progress. With a redesign completed TSRA are looking to have a project plan and budget developed implemented in September. The project continues to aim to improve fishing capacity and safety, access to finance and gear, cold storage and infrastructure.

Action Item 1.

TRLRAG EO to provide graphs and data for June year on year catches, and links to sea surface temperature maps.

Papua New Guinea National Fisheries Authority

14. The RAG noted the following updates from the PNG National Fisheries Authority representative:

a) There has been some change in the PNG industry operating environment, with one company undergoing a restructure

b) NFA are also preparing for the Torres Strait Treaty Bilateral meetings.

c) NFA continue to try an improve logbook data collection and data sharing with Australia.

d) The MSC accreditation process for the PNG TRL fishery is ongoing, as is the TRL fishery review which is in its final stages.

e) Similar market, pricing and export problems to those in Australia are also being are being experienced in the PNG TRL fishery.

15. The Chair noted that unfavourable market factors are also present in the southern rock lobster fishery, as well as the Torres Strait and PNG TRL fisheries, indicating widespread price and logistical issues beyond just the Torres Strait.

Native Title

16. The RAG noted that there is a standing invitation extended to Malu Lamar to attend the RAG, but it was not taken up for this meeting and no written update was provided.

3 TRL Fishery Research Priorities

17. The RAG discussed the research priorities and need identified or discussed at previous TRLRAG and TRLWG meetings to provide advice on the research priorities for the 2024/25 – 2029/30 five-year period.

18. The RAG noted there are several projects already underway or scheduled for funding which will address some of the identified research priorities. Although these will not require funding consideration by the TSSAC the RAG agreed it would be good to have these included in the research plan. These include:

    a) TSRA's WAPIL project which will contribute to **understanding fisher behaviour**

    b) CSIRO's *Modelling climate change impacts on key fisheries resources in the Torres Strait to co-develop adaptation and mitigation strategies***,** which is the final stages of funding confirmation through TSRA's procurement process which will contribute to **understanding connectivity, environmental drivers and adaptation strategies.**

19. The RAG agreed that the significance of climate change across all Torres Strait fisheries, including TRL, warrants having it listed as its own priority. It was suggested it be separated out from understanding connectivity and placed as a higher priority.

20. The RAG recommended that:

    a) The highest 'essential' priority for the fishery remains the need to undertake **fishery independent surveys, stock assessment, harvest control and Recommended Biological Catch** (RBC) work.

    a) Undertaking an update to the 2007 **Ecological Risk Assessment** (ERA) for the TRL Fishery remains an essential priority. Assessment by CSIRO this financial year is dependent on prioritisation against other high priority fisheries. Funding can be sourced from the AFMA TRL Fishery budget (~$20,400).

    b) **Improvement of data collection** (to be pursued by the TRL RAG data sub-group) remains an essential priority.

    c) **Impact and mitigation of climate change effects in Torres Strait fisheries** should be an essential priority, noting the CSIRO project on this will benefit all Torres Strait fisheries, including TRL.

    d) **Understanding fisher behaviour**, including capturing information on the impacts of COVID-19 on thing like effort levels, spatial effort distribution and economically driven changes in behaviour in the fishery, remain essential priorities.

    e) **Understanding connectivity, environmental drivers and adaptation strategies** can now be prioritised as desirable rather than essential, as climate change has been separately identified as a priority and is higher than understanding connectivity implications between jurisdictions.

    f) As per previous RAG advice u**nderstanding changes to fishing power** remains desirable.

g) As per previous RAG advice the **science peer review** remains desirable.

21. An industry member suggested checking presence of tar spots during morphometric sampling. The RAG agreed that how this, and other suggestions, could fit into current sampling and survey projects could be discussed in greater detail out of session.

Action Item 2.

TRLRAG EO to update the research priorities table and 2023/25 – 2029/30 TRL Research Plan and provide to members and the TSSAC EO.

4 Other Business

22. The RAG discussed the possibility of higher than average water temperatures which are forecast for the coming summer at the start of the next season. Impacts on the fishery could include impacts on spawning and higher mortality with stocking or holding of lobsters. This will be important to discuss at the December meeting.
23. The Chair highlighted that with catches and economic factors looking similar as previous years the RAG may face similar challenges in applying the empirical Harvest Control Rule (eHCR) when setting an RBC for the next season.
24. The independent scientist reiterated an earlier suggestion that the eHCR be amended to use the TAC as the default. Another scientific member informed the RAG this was being looked into, and although the answer may not simply be to use the TAC, they hope to have more information to present and discuss in December.
25. PNG NFA reiterated they remain supportive of further research on TRL in PNG waters, including the possibility of extending the survey. The RAG noted there are some difficulties in practically achieving this, such as costs and the logistics of dual jurisdiction permits and operations.
26. The 34th TRLRAG meeting was closed at 1146 on Thursday the 6th of July 2023.

Declaration of interests

Dr Ian Knuckey – October 2022

Ian Knuckey positions:

Director –	Fishwell Consulting Pty Ltd
Director –	Olrac Australia (Electronic logbooks)
Chair –	Northern Prawn Fishery Resource Assessment Group
Chair –	Tropical Rock Lobster Resource Assessment Group
Chair –	Victorian Rock Lobster and Giant Crab Assessment Group
Chair – Group	Victorian Central Zone Abalone Fisheries Resource Advisory
Chair – Committee	Gulf of St Vincent's Prawn Fishery MAC Research Scientific
Scientific Member –	Northern Prawn Management Advisory Committee
Scientific Member – Committee	Gulf of St Vincent's Prawn Fishery Management Advisory
Scientific Member –	Tropical Tuna Resource Assessment Group
Scientific Member –	SESSF Resource Assessment Group
Councillor –	Victorian Marine and Coastal Council
Member –	The Geelong Agri Collective

Fishwell current projects:

DAWE Project	Multi-sector fisheries capacity building
AFMA 2022-	Annual monitoring, reporting and assessment of SPF marine mammal interactions, including effectiveness of mitigation measures
AFMA 2020-0807	Bass Strait Scallop Fishery Survey – 2020-22
AFMA project	Design sea cucumber fishery-independent survey for Coral Sea
FRDC 2019-027	Improving and promoting fish-trawl selectivity in the SESSF and GABTS
FRDC 2018-021	Development and evaluation of SESSF multi-species harvest strategies
Traffic Project	Shark Product Traceability
Sea Cucumber Ass.	Design and implementation of various sea cucumber dive surveys.
Australia Bay	Queensland Gulf of Carpentaria Developmental Fin Fish Trawl Fishery
Expert Witness	Gladstone Harbour development impacts

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP 34

(TRLRAG 34)

Thursday 6 July 2023 | 9am – 11am

Video Conference

DRAFT AGENDA

1 PRELIMINARIES

1.1 Welcome and apologies

The Chair will welcome members and observers to the 34th meeting of the RAG.

1.2 Adoption of agenda

The RAG will be invited to adopt the draft agenda.

1.3 Declaration of interests

Members and observers will be invited to declare any real or potential conflicts of interest 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.

2 UPDATES FROM MEMBERS

Industry, scientific and government agency members and observers will be invited to provide verbal updates on matters concerning the TRL Fishery.

3 TRL FISHERY RESEARCH PRIORITIES

The RAG will discuss and provide advice on research priorities for the 2024/25 – 2029/30 five-year period.

4 OTHER BUSINESS

The RAG will be invited to raise any other matters for consideration.

The Chair must approve the attendance of all observers at the meeting. Individuals wishing to join the meeting as an observer must contact the Executive Officer – Elissa Mastroianni (elissa.mastroianni@afma.gov.au)

Attachment 1.4c

Timeline of key events in the Torres Strait Tropical Rock Lobster Fishery[1]
Last updated November 2023

Commonly used acronyms and terms:

- **FMN** means Torres Strait Fisheries Management Notice.
- **FMI** means Torres Strait Fisheries Management Instrument.
- **LN** means Logbook Notice
- **PZJA** means Protected Zone Joint Authority.
- **TRL** means Tropical Rock Lobster.
- **TRL Fishery** means the Torres Strait Tropical Rock Lobster Fishery.
- **Instrument** means the *Torres Strait Fisheries (Tropical Rock Lobster) Management Instrument 2018*
- **Management Plan** means the *Torres Strait Fisheries (Quotas for Tropical Rock Lobster (Kaiar)) Management Plan 2018*

Time period	Topic/Keywords	Description
Late 1960's	Fishery development	Commercial fishing for TRL by the non-Traditional Inhabitant sector began in the Torres Strait
1970s-1980s	Fishery development	Traditional Inhabitant fishers begin to enter the fishery.
Dec-1978	Treaty, PNG	Torres Strait Treaty signed
Feb-1985	Legislation, regulations, PZJA	Torres Strait Treaty entered into force, *Torres Strait Fisheries Act 1984* and *Torres Strait Fisheries Regulations 1985* commenced and the PZJA is established
Feb-1985	Regulations	Under FMN 1: • Method restrictions introduced - only diving, collection by hand and use of spear permitted
Feb-1985	PNG, catch sharing	Agreement between PNG and Australia for the joint management of the TRL fishery concluded.

[1] This is intended to be a living document and is to be updated as key events happen.

Time period	Topic/Keywords	Description
Jul-1985	Regulations	Under FMN 9 (replaced FMN 1): • Method restrictions amended to introduce a time period within which the method restrictions are in place – only diving, collection by hand and use of spear permitted between 15 Jul-31 Oct
Jan-1986	Management arrangements	Introduction of prohibition on prawn trawlers taking TRL during the annual migration period (1 Jul-31 Oct) in order to reduce fishing pressure on the lobster population - in place until 1987, when all prawn trawlers were prohibited from taking TRL
Jun-1986	Regulations	Under FMN 12 (replaced FMN 9): • Method restrictions amended to change the dates between which methods are restricted – only diving, collection by hand and use of spear permitted between 1 July - 31 October only
Mar-1988	Regulations	Under FMN 19: • Introduction of prohibition on the take, processing or carrying of TRL by boats with a prawn endorsement
Jun-1988	Regulations	Under FMN 22: • Minimum size limit introduced - 100 mm tail length
Oct-1988	Regulations	Under FMN 24 (replaced FMN 12): • Method restrictions amended - only diving, collection by hand and use of spear permitted, no underwater breathing apparatus except hookah, no underwater mechanical propulsion • Introduction of exemption which can be sought for some method restrictions, specifically the use of underwater breathing apparatus and underwater mechanical propulsion • Traditional fishing bag limits introduced - 3 per person up to 6 per boat
October 1988	Management objectives	PZJA agrees to six key management objectives for the fishery: - To conserve the stock of tropical rock lobster - To maximise the opportunities for traditional inhabitants of both countries to participate, including by managing the fishery for tropical rock lobster as a dive fishery - To promote the dive fisheries for tropical rock lobster in Torres Strait - Encouragement and facilitation of participation by Australian traditional inhabitants for whom future expansion of the fishery should be reserved - Containment of the capacity of the existing commercially licensed fleet and elimination of entrepreneurial speculation and subsequent upgrading/replacement of commercially licensed dinghies with large boats

Time period	Topic/Keywords	Description
		- To minimise impact of any new management measures on existing operators.
March 1989	Traditional Inhabitant access, identification, definition	Tropical Rock Lobster Working Party agrees to Island Coordinating Council suggestion that "amnesty" Papua New Guineans be considered Traditional Inhabitants for fisheries management purposes. Following this, PZJA agrees to "measures to be used for identifying those Papuans resident in Torres Strait who should be treated as Australian traditional inhabitants for all fisheries management and enforcement purposes, including community fishing rights" in the fishery.
Aug-1989	Regulations	Under FMN 31 (replaced FMN 24): • No substantive changes to FMN 24
November 1989	PNG, catch sharing, cross-endorsement	Catch-sharing arrangements for the fishery agreed by PNG and Australia. 27 PNG lobster dinghies to be allowed to operate in Australian TSPZ waters, while Australian operations in PNG waters are precluded.
1989	Management arrangements, fishery surveys	Fishery independent surveys commence in the TRL Fishery
February 1990	PNG, catch sharing, cross-endorsement	Catch-sharing arrangements come into effect 15 February, but no PNG boats begin fishing.
Oct-1990	Regulations	Under FMN 34 (replaced FMN 22): • No substantive changes to FMN 22
1991-1992	Traditional Inhabitant access, identification, definition	PZJA establishes a working group to consider the involvement in PZJA fisheries of Torres Strait Islanders and Aboriginals living in the Northern Peninsula Area of Cape York and Australian citizens of Papua New Guinean origin.
June 1991	PNG, catch sharing, cross-endorsement	Cross-endorsements issued to 4 PNG mother ships with 18 dinghies on 14 June. PNG boats agreed to respect home reefs closures, not go ashore on Australian territory, and make no contact with Australian inhabitants, Australian vessels, or PNG traditional fishers.
Jun-1992	Native title	Mabo High Court decision recognises existence of native title (Aboriginal and Torres Strait Islander rights and interests to land and waters according to their traditional law and customs)

Time period	Topic/Keywords	Description
1993	Community licensing	Concerns about the current licensing systems run by the PZJA and Queensland for community fishing begin to be raised by Island Coordinating Council. Concerns include that Traditional Inhabitants living outside the Island Coordinating Council area are excluded from obtaining licences, the administrative and financial burden placed on island councils by the systems, a lack of detailed information to inform fisheries management decisions, and the fact that island chairmen rather than individual fishers are legally responsible for any fishing violations.
February 1993	PNG, catch-sharing, cross-endorsement	New PNG catch-sharing arrangements commence on 15 February 1993 for a three-year period to 14 February 1996. Allow for cross-endorsement of 27 PNG dinghies and associated freezer boats. Nominations received for cross-endorsement of 3 PNG TRL freezer boats with 27 associated dinghies.
Oct-1993	Regulations	Under FMN 38 (replaced FMN 31): • Introduction of prohibition on taking TRL using hookah between 1 Oct-30 Nov • Traditional fishing bag limits amended - 3 without a boat, 3 with 1 person in a boat, 6 with more than 1 person in a boat • All other requirements remained unchanged - method restrictions
Dec-1993	Native title, legislation	*Native Title Act 1993* commences, legislating the framework for recognition of native title (including over maritime areas) in Australia following the High Court's Mabo decision. The Act covers the determination of whether native title exists, acts affecting native title, and compensation for acts affecting native title.
1994	Logbooks	Noted under LN 8: • Tropical Rock Lobster Logbook TRL02 implemented – voluntary, records frozen tails only
1994	Legislation, TSRA	Torres Strait Regional Authority established under the *Aboriginal and Torres Strait Islander Commission Act 1989*
April-June 1995	Single jurisdiction, licensing	PZJA establishes Task Force to investigate the feasibility of introducing single jurisdiction fisheries management and to advise on matters such as eligibility criteria for entry to the newly created fisheries. Investment warning is issued.
Jul-1995	Regulations	Under FMN 42 (amended FMN 38): • No changes to regulation of fishing provided under FMN 38. Amendments made to correct a drafting error that excluded several words from the section relating to bag limits for traditional fishing.
October 1996	Single jurisdiction, licensing,	PZJA endorses single jurisdiction (the management of all Torres Strait fisheries by the PZJA, rather than a division of responsibility between the PZJA and the Queensland government) and the Task Force's

Time period	Topic/Keywords	Description
	community licences, TIB licensing	recommendations for licensing reform. Due to opposition from Islander representatives, related to broader issues such as autonomy and the desire for a regional agreement for Islander control over Torres Strait waters, the implementation of these reforms was delayed and then boycotted until agreement was reached in 1999.
Mar-1997	Regulations	Under FMN 44 (amended FMN 38): • Method restrictions amended - only collection by hand, use of spear or other handheld implement permitted, no underwater breathing apparatus except hookah, no underwater mechanical propulsion
May-1997	Logbooks	Under LN 8: • Tropical Rock Lobster Logbook TRL03 implemented – both TRL02 and TRL03 mandatory for boats with freezing capacity, records both live and frozen tails
Apr-1998	Regulations	Under FMN 48 (replaced FMN 34): • Minimum size limits amended - 80 mm carapace length, 100 mm tail length
1999	Traditional Inhabitant access, identification, definition	PZJA agrees that children of “amnesty” Papua New Guineans be considered Traditional Inhabitants, following the 1989 decision to include “amnesty” people within the definition of Traditional Inhabitants.
July-December 1999	Single jurisdiction, licensing, community licences, TIB licensing	Islander representatives propose a series of principles to underlie community licensing, consistent with the previously proposed system.
Apr-2000	Single jurisdiction, licensing, community licences, TIB licensing	Following a meeting between the PZJA and Islander representatives, the Traditional Inhabitant Boat (TIB) licence is introduced for a one year trial period.
Nov-2001	Regulations	Under FMN 58 (replaced FMN 38, 42, 44, 48): • Introduction of fishery closure from 1 Oct-30 Nov (revoking previous prohibition on taking TRL using hookah between 1 Oct-30 Nov). Exemption from closure but bag limits apply - 3 without a boat, 3 with 1 person in a boat, 6 with more than 1 person in a boat

Time period	Topic/Keywords	Description
		• Introduction of prohibition on taking or carrying of TRL while using, or in the possession of, hookah gear between 1 Oct-31 Jan • All other requirements remained unchanged - method restrictions, minimum size limits
2002	Legislation, TSRA, PZJA	*Torres Strait Fisheries Act 1984* is amended to make the Torres Strait Regional Authority Chairperson a member of the Protected Zone Joint Authority
Nov-2002	Latent effort, fishery participation	A 30% reduction in the number of tenders attached to each non-Traditional Inhabitant licence package was implemented, except where only 1 tender exists, in which case the tender will be entitled to continue working. This was done in order to reduce latent effort in the fishery and restrict expansion of effort by non-Traditional Inhabitant fishers. This arrangement was in place until 2011.
November 2002	Traditional Inhabitant access, Skehill report, management objectives	Skehill report – "A Fair Share of the Catch" – is delivered, evaluating Torres Strait fisheries and establishing an order of priority for their management. Recommends Traditional Inhabitants be given priority of access to the TRL Fishery.
Dec-2002	Regulations	Under FMN 62: • Introduction of prohibition of processing or carrying TRL meat removed from the shell on a boat. Exemption provided for traditional fishing.
Dec-2003	Latent effort	Cap on Traditional Inhabitant licences for boats greater than 6 m with a TRL Fishery endorsement – in place until 2006
2003	QLD East Coast Fishery	Size limit increased to 90mm carapace length and 115m tail length. Seasonal to be in place from 1 October to 31 January implemented.
Late 2003	Logbooks	Torres Strait Seafood Buyers and Processors Docket Book (TDB01) implemented – voluntary
Jun-2003	Logbooks	Under the *Torres Strait Fisheries Logbook Instrument No. 1*: • Tropical Rock Lobster Logbook TRL04 implemented – mandatory for all non-Traditional Inhabitant operators
Jan-2005	Management arrangements	Moon-tide hookah closures (a periodic closure on the use of hookah gear three days either side of the full or new moon each month during between Februrary and September) introduced – first implemented in 2005 as a way to reduce fishing effort to levels recorded in 2002. In 2013 the closures were removed following a buy-out

Time period	Topic/Keywords	Description
		of non-Traditional Inhabitant licences however were reintroduced in 2014 following agreement from both the sectors, and continue to date
Jul-2005	Management plan	PZJA agreed to create a plan of management to implement a quota management system in the fishery.
July 2005	Allocation	PZJA agrees to transition to initial 50:50 sectoral split in the fishery, brought about by government funded buyout, with a later goal of a 70:30 split between Traditional Inhabitants and non-Traditional Inhabitants, funded by an "open market and self-funded tender process".
2006	TAC	Notional total allowable catches implemented (notional as allocation had not yet been undertaken nor a management plan developed)
Mar-2006	Regulations	Under FMN 73 (replaced FMN 58, 62): • Introduction of fishery closure from 1-30 Nov (revoking previous fishery closure from 1 Oct-30 Nov). Exemption from closure for traditional fishing only but bag limits apply - 3 without a boat, 3 with 1 person in a boat, 6 with more than 1 person in a boat • Introduction of prohibition on carriage of diving equipment between 1900-0600 AEST. Exemption can be sought, but all diving equipment (face mask and fins) in possession of that person, or on board the boat, is stowed and secured during the prohibited hours. ES states that this was implemented in response to concerns that night diving may occur in the Fishery • All other requirements remained unchanged - method restrictions, prohibition of processing or carrying TRL meat, minimum size limits, hookah gear restrictions
April 2006	IAAP, allocation	PZJA agrees to create an Independent Allocation Advisory Panel (IAAP) to advise on the appropriate basis for the allocation of fishing concessions in the non-Traditional Inhabitant sector.
Sep-2006	Regulations	Under FMN 80 (replaced FMN 73): • Correction made to error in FMN 73 regarding the fishery closure, reinstated to 1 Oct-30 Nov. Exemption from closure for traditional fishing only but bag limits apply - 3 without a boat, 3 with 1 person in a boat, 6 with more than 1 person in a boat • All other requirements remained unchanged - method restrictions, prohibition of processing or carrying TRL meat, minimum size limits, hookah gear restrictions, prohibition on carriage of diving equipment between 1900-0600 AEST
Jun-2007	IAAP, allocation	PZJA agrees to final Independent Allocation Advisory Panel (IAAP) report and a sectoral catch share ratio of 35:65 between the Traditional Inhabitant and non-Traditional Inhabitant sectors as detailed in the 'Report to

Time period	Topic/Keywords	Description
		stakeholders on the data used to establish the historical catch ratios of the Community and non-community sectors'
Apr-2008	Buyback, structural adjustment	Australian Government buy-back of non-Traditional Inhabitant licences. 13 primary licences and 29 associated tenders removed from the TRL Fishery. Based on the provisional allocations associated with the 'bought-out' licences the sectoral catch share between the Traditional Inhabitant and non-Traditional Inhabitant sectors changed to 53.5:46.5.
2008	Conversion factor	TRL tail to whole weight conversion ratio (2.677) implemented
2009	Harvest strategy	Interim Harvest Strategy implemented for the TRL Fishery in response to the planned transition to a quota management system, laying out the biological objectives for the fishery and how this could be achieved.
Mar-2010	Environment	Torres Strait coral bleaching event
Aug-2011	Regulations	Under FMI 9 (replaced FMN 80): • Application of arrangements extended to PNG Treaty endorsed operators • All other requirements remained unchanged – method restrictions, prohibition of processing or carrying TRL meat, minimum size limits, hookah gear restrictions, prohibition on carriage of diving equipment between 1900-0600 AEST, fishery closure. FMI 9 was intended to amend an administrative oversight that had excluded cross-endorsed fishers from the provisions of FMN 80.
Apr-2012	Buyback, structural adjustment	Based on a further buy-out of one licence (1 primary and 1 tender) the sectoral catch share between the Traditional Inhabitant and non-Traditional Inhabitant sectors changed to 56.2:43.8
7-Aug-2013	Native title, sea claim	The High Court hands down decision regarding Torres Strait Sea Claim Part A. The decision overturned the Full Federal Court decision from March 2012 and found that the native title rights in the sea claim area include the right to take fish for commercial or trading purposes. This was found to be a non-exclusive right, and native title holders are still required to hold the appropriate licences and abide by the relevant laws and regulations.
2014	Fishery participation, Traditional Inhabitant access, 100% ownership	The Protected Zone Joint Authority acknowledges and supports the aspiration of Torres Strait Communities to own 100% of access to commercial Fisheries in the Australian area of the Torres Strait Protected Zone

Time period	Topic/Keywords	Description
May-2014	Native title	Malu Lamar (Torres Strait Islander) Corporation is appointed as the Registered Native Title Body Corporate for the Sea Claim Area Part A.
Mar-2016	Environment	Torres Strait coral bleaching and sea cage mortality event
Oct-2016 to Oct-2017	Buyback, structural adjustment	Based on a further buy-out of three licences (3 primaries and 7 tenders) the sectoral catch share between the Traditional Inhabitant and non-Traditional Inhabitant sectors changed to 66.17:33.83
Jul-2017	Vessel monitoring	Vessel monitoring system (VMS) implemented – mandatory for primary boat and/or operating with a Carrier Boat License (Class A, B, or C). Vessels operating for freight shipping are exempt from installing VMS. Exemptions may also be provided for carrier vessels that are six meters or less in length.
Dec-2017	Logbooks	Torres Strait Fisheries Catch Disposal Record (TDB02) implemented – mandatory for all Torres Strait licence holders
10-Apr-2018	Management arrangements	Following a low Recommended Biological Catch, additional moon-tide hookah closures introduced covering all new and full moon periods for the remainder of the 2017-18 fishing season, in order to slow down fishing effort and provide the TIB sector with the longest possible fishing season, avoiding an early closure of the fishery.
27-Apr-2018	Management arrangements, hookah	Prohibition on the carriage and use of hookah gear for the remainder of the 2017-18 fishing season.
29-Jun-2018	Management arrangements, hookah	Federal Court of Australia order to revoke prohibition on the carriage and use of hookah gear – reverted to additional moon-tide hookah closures.
20-Jul-2018	Regulations	Under the TRL Management Instrument 2018 (replaced FMI 9): • Traditional fishing bag limits removed. Noted that PZJA does not have jurisdiction in relation to traditional fishing conducted by Traditional Inhabitants • Introduction of capacity to close the TRL Fishery early to commercial fishing, when the total allowable catch is reached • Introduction of capacity to prohibit the use of hookah gear (i.e. moon-tide hookah closures) during the hookah season (1 Feb-30 Sep)

Time period	Topic/Keywords	Description
		• All other requirements remained unchanged – method restrictions, prohibition of processing or carrying TRL meat, minimum size limits, hookah gear restrictions, prohibition on carriage of diving equipment between 1900-0600 AEST, fishery closure
31-Jul-2018	Management arrangements	TRL Fishery closed for the remainder of the 2017-18 fishing season due to total allowable catch being reached.
1-Dec-2018	Management plan	*Torres Strait Fisheries (Quotas for Tropical Rock Lobster (Kaiar)) Management Plan 2018* commenced
1-Dec-2018	Regulations	Under the TRL Management Instrument 2018 (amendment to Jul-2018 Instrument): • Ability to close the TRL Fishery early to commercial fishing revoked • Implementation of a split of the total allowable catch for the TRL Fishery between the Traditional Inhabitant (66.17% of the total allowable catch) and non-Traditional Inhabitant sectors – applied from 1 Dec 2017-30 Sep 2018 only • Introduction of capacity to close of the TRL Fishery to the Traditional Inhabitant sector once their part of the total allowable catch is reached – applied from 1 Dec 2017-30 Sep 2018 only • Provide for individual transferrable quota arrangements to be established for the non-Traditional Inhabitant sector via licence conditions – applied from 1 Dec 2017-30 Sep 2018 only • Provide for the operation of the proposed Management Plan should the quota allocation process be finalised before the start of the 2019-20 fishing season • All other requirements remained unchanged – method restrictions, prohibition of processing or carrying TRL meat, minimum size limits, hookah gear restrictions, prohibition on carriage of diving equipment between 1900-0600 AEST, fishery closure, moon-tide hookah closures
16-Sep-2019	Management plan, allocation	Quota units allocated under the Management Plan: • 662,016 quota units to the Torres Strait Regional Authority (TSRA) comprising: 562,000 to hold for the benefit of the traditional inhabitant sector; and 100,016 for the TVH licences it holds • 337,981 quota units to the remaining TVH principal licence holders
19-Nov-2019	Harvest strategy	PZJA adopts final Harvest Strategy for the TRL Fishery
1-Dec-2019	Management plan, management arrangements	TRL Fishery commences operation under a quota management system as per the Management Plan

Time period	Topic/Keywords	Description
Early 2020	Markets, price, export	• Live export market into China closed temporarily prior to 2020 Chinese New Year. • Prices in the fishery were down significantly, similar to lowest prices on record in 2002-03. • TVH boats in Torres Strait and QLD East Coast were forced to stop fishing. • Whole frozen product only purchased at reject prices. • COVID-19 impacts affect flights and freight routes from Australia to Asian markets
~ October 2020	Markets, export, Cadmium	China began to increase inspection levels and testing of cadmium in Australian live lobster at the point of entry in major Chinese ports, causing considerable delays while inspection and testing was being undertaken. This resulted in high mortality rates of lobster product (not Torres Strait product).
November 2020	Markets, export	China formally notified the DAWE of two instances of non-compliance of lobster shipments with detections of cadmium above the maximum levels set by the Chinese Government.
November 2020	Management Plan, allocation	The PZJA (meeting 36) agreed to amend the TRL Management Plan to provide the PZJA with additional time in which to commence a review of the allocation of quota units to the Traditional Inhabitant sector, to within 4 years of the Plan commencement.
December 2020	Markets, export	China banned the import of Australian lobster product
December 2020	Wildlife Trade Operation	On 4 December 2020 the TRL Fishery was re-accredited as an approved Wildlife Trade Operation (WTO) under the *Environment Protection and Biodiversity Conservation Act 1999*.
December 2023	Wildlife Trade Operation, LENS	In October 2023 the TRL Fishery was re-assessed under the *Environment Protection and Biodiversity Conservation Act 1999* and added to the List of Exempt Native Specimens (LENS). Coming into force on 4 December 2023, this allows extended export approval though to 4 December 2033.

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Thursday Island	MEETING 35 12-13 December 2023
PRELIMINARIES Out-of-session correspondence	Agenda Item 1.5 For NOTING

RECOMMENDATIONS

1. That the RAG **NOTE** the correspondence sent out-of-session since TRLRAG33 meeting held on 13-14 December 2022.

BACKGROUND

2. The following correspondence was circulated out-of-session since the TRLRAG 33 on 13-14 December. Out-of-session correspondence was not covered at TRLRAG34 (6 July 2023) due to time constraints in a virtual format. Copies of this correspondence can be requested at any time from the TRLRAG Executive Officer.

Date	Item
25 January 2023	AFMA circulated the draft meeting record from TRLRAG 33 for member comment.
22 February 2023	Following closure of the member comment period, AFMA circulated a final clean version of the TRLRAG 33 meeting record. The meeting record was also posted on the PZJA website.
26 May 2023	AFMA invited members to comment on the Commonwealth Ecological Risk Management policy and guidelines
27 June 2023	AFMA forwarded an invitation from the Department of Climate Change, Energy, the Environment and Water (DCEEW) to comment on the TRL WTO application.
7 July 2023	AFMA provided follow up information as per action items identified at TRLRAG on 6 July. These included: - Year on year catch data graphs - Supply chain paper - Sea surface temperature maps
20 July 2023	AFMA circulated the updated 5-year TRL research plan for 2024/25 – 2029/30, as discussed at TRLRAG 33 (on 6 July 2023).
5 September 2023	For information – AFMA circulated information to members on an upcoming marine heat wave, including briefing details from the Bureau of Meteorology.
7 September 2023	The TRLRAG EO forwarded a message on behalf of the TSSAC EO, inviting members to share the Torres Strait call for research proposals with interested researchers.

18 September 2023	AFMA circulated the draft meeting record from TRLRAG 34 for member comment.
3 October 20203	Following closure of the member comment period, AFMA circulated a final clean version of the TRLRAG 34 meeting record. The meeting record was also posted on the PZJA website.
13 October 2023	For information – AFMA circulated a community notice flyer from CSIRO regarding the annual kaiar survey.
23 October 2023	For information – AFMA informed the RAG of the success of the TLR/Kaiar fishery in achieving extended export approval (as assessed by DCEEW) for a period of 10 years.
31 October 2023	AFMA circulated a draft agenda for TRLRAG 35 for member comment and input.
28 November 2023	AFMA circulated a second version of the draft TRLRAG 35 agenda, which included additional agenda items at members requests.
30 November 2023	For information – AFMA circulated an update on briefings available on the upcoming marine heatwave.

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Thursday Island	MEETING 35 12-13 December 2023
UPDATES FROM MEMBERS Industry & Scientific members	Agenda Item 2.1 For NOTING

RECOMMENDATIONS

1. That the RAG **NOTE** updates provided by industry and scientific members.

BACKGROUND

2. Verbal reports are sought from industry and scientific members under this item, with particular emphasis on market and export impacts to the previous fishing season and the start of the 2023-24 season.
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 the TRL Fishery. This includes within adjacent jurisdictions. This ensures that where relevant, the RAG is able to have regard for these strategic issues and trends.
4. RAG members are asked to provide any updates on trends and opportunities in markets, processing and value adding. Industry is asked to contribute advice on economic and market trends where possible. Scientific members are asked to contribute advice on any broader strategic research projects or issues that may be of interest to the Torres Strait in future.
5. At the last meeting of the RAG (TRLRAG 34), the RAG noted updates provided by industry members and observers regarding the performance of the TRL Fishery during the 2022-23 season, in particular that:
    a) Operating costs, in particular fuel, continue to be high while market prices remain low. This is reducing economic profitability in the fishery and driving lower fishing effort. High fuel prices also restricted fishers' ability to access fishing grounds.
    b) freight and transport logistics continue to be a challenge for the fishery.
    c) There appeared to be fewer numbers of small lobsters in June/July than would normally be expected. Members reported the number of kaiar was average at best.
    d) New and increasing sand incursions had also been observed. Scientific members noted that increased sand incursions were seen the last time we entered an El Nino phase.
6. General updates are sough from scientific members, with further detail on specific projects and areas of research to follow under Agenda Items 3-7 inclusive.

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Thursday Island	MEETING 35 12-13 December 2023
UPDATES FROM MEMBERS Government agencies	Agenda Item 2.2 For NOTING

RECOMMENDATIONS

1. That the RAG:
    a. **NOTE** the written update provided by the Australian Fisheries Management Authority (AFMA) below;
    b. **NOTE** a verbal update to be provided by Queensland Department of Agriculture and Fisheries (QDAF); and
    c. **NOTE** a verbal update to be provided by the Torres Strait Regional Authority (TSRA).

KEY ISSUES

Australian Fisheries Management Authority

Wildlife Trade Operation (WTO) re-accreditation and addition to the List of Exempt Native Specimens (LENS) 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 TRL Fishery was first accredited as an approved Wildlife Trade Operation (WTO) in November 2004 for a period of three years and was subsequently reassessed and re-approved in 2007, 2011, 2014, 2017 and 2020.
4. The fishery was assessed this year, and added to the List of Exempt Native Specimens (LENS) by the Delegate for the Minister of the Environment and water, for a period of 10 years (until 4 December 2033), 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 TRL Fishery is provided as **Attachment 2.2a**.
5. This decision reflects the fishery's strong management framework, well managed target stocks, its limited impact on bycatch and protected species, and its low impact on the broader marine ecosystem, and recognises the TRLRAG and Working Group have put into the management of the fishery.

ABARES fishery status report

6. 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 stock and the economic status of fisheries managed, or jointly managed by the Australian Government (Commonwealth fisheries).

7. The latest ABARES Fishery Status Report 2023 (covering the performance of fisheries in 2022) have now been released. The reports assess all key commercial species from Commonwealth managed fisheries and examines the broader impact of fisheries on the environment, including on non-target species.
8. In summary, the TRL Fishery has been assessed for the 2022 period as outlined below.
9. ABARES fishery status reports can be accessed on the ABARES website at:

https://www.agriculture.gov.au/abares/research-topics/fisheries/fishery-status

Table 16.1 Status of the Torres Strait Tropical Rock Lobster Fishery

Biological status					
	2021		2022		
Stock	Fishing mortality	Biomass	Fishing mortality	Biomass	Comments
Tropical rock lobster (*Panulirus ornatus*)					Fishing mortality is less than the recommended biological catch. Spawning stock biomass is above the target reference point.
Economic status					
Economic status of the fishery is uncertain. Real GVP declined over the period 2011–12 to 2021–22, with the decline driven by lower catch volumes. Although rock lobster prices increased in the early part of this period, supporting GVP, prices declined sharply after the onset of the COVID-19 pandemic in early 2020, before stabilising at these lower levels. GVP increased in 2021–22 as a result of slightly higher catch volumes.					

Notes: **GVP** Gross value of production.

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

Management arrangements for the 2023-24 fishing season

10. A letter was sent to all Torres Strait Tropical Rock Lobster Fishery (TRL Fishery) licence holders on 21 November 2023 (**Attachment 2.3b**). The letter detailed key management arrangements that will apply for the 2023-24 fishing season, including moontide hookah closures and the start of season 200 tonne TAC.
11. Enclosed to the letter was a copy of the new Tropical Rock Lobster Fishery Management Arrangements Booklet 2023-24 which was also made publicly available on the PZJA website.

Australian Government
Department of Climate Change, Energy, the Environment and Water

Mr Wez Norris
Chief Executive Officer
Australian Fisheries Management Authority
Box 7051 Canberra BC
Canberra ACT 2610

Dear Mr Norris

I am writing to you as Delegate of the Minister for the Environment and Water in relation to the wildlife trade assessment of the Commonwealth Torres Strait Tropical Rock Lobster Fishery (the fishery) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In June 2022, the Australian Fisheries Management Authority (AFMA) applied to have the fishery assessed and approved under the Part 13 (protected species) and Part 13A (export) provisions of the EPBC Act.

The application has now been assessed and I have agreed to add the fishery to the List of Exempt Native Specimens (LENS) for a period of 10 years (until 4 December 2033). This decision reflects the fishery's strong management framework, well managed target stocks, its limited impact on bycatch and protected species, and its low impact on the broader marine ecosystem. All of which makes the fishery eligible for a longer-term export approval.

The LENS listing is contingent on several conditions being met by AFMA throughout the listing period. These will require AFMA to inform the department of any intended changes to relevant fisheries legislation and/or management arrangements, and the provision of regular annual reports to the department (**Attachment A**).

I have also accredited the fishery's management regime under Part 13 of the EPBC Act. Although given the fishery's limited interactions with protected species and ecological communities, I have chosen to not place any conditions on the Part 13 instrument.

I look forward to receiving the regular annual reports for this fishery in the future.

Yours sincerely

Belinda Jago
Branch Head
Ocean and Wildlife Branch
Delegate of the Minister for the Environment and Water
19 October 2023

Attachment A

Conditions placed on the List of Exempt Native Specimens (LENS) instrument for the Commonwealth Torres Strait Tropical Rock Lobster Fishery – December 2023

Condition 1:

The specimen, or the fish or invertebrate from which it is derived, was taken lawfully.

Condition 2:

The Australian Fisheries Management Authority must inform the Department of Climate Change, Energy, the Environment and Water of any intended changes to fisheries legislation that may affect the legislative instruments relevant to this approval.

Condition 3:

The Australian Fisheries Management Authority must inform the Department of Climate Change, Energy, the Environment and Water of any intended material changes to the Commonwealth Torres Strait Tropical Rock Lobster Fishery management arrangements that may affect this approval.

Condition 4:

The Australian Fisheries Management Authority must provide the Department of Climate Change, Energy, the Environment and Water with an annual report by June each year detailing any changes in the fishery.

Condition 5:

The specimens are included in the list until 4 December 2033.

Australian Government
Australian Fisheries Management Authority

15 November 2023

Dear Torres Strait Tropical Rock Lobster Fishery licence holder

Management Arrangements for the 2023-24 Fishing Season

The 2023-24 fishing season for the Torres Strait Tropical Rock Lobster Fishery (TRL Fishery) will commence on 1 December 2023. This letter details some key management arrangements that will apply this season.

Total Allowable Catch

On 10 November 2023, Senator the Hon. Murray Watt, Commonwealth Minister for Agriculture, Fisheries and Forestry determined a total allowable catch (TAC) of 200,000 kilograms of tropical rock lobster (TRL) in the Australian waters of the TRL Fishery for the 2023-24 fishing season to apply for the fishing season commencing on 1 December 2023. It is expected that the TAC will be increased once the outcomes of the scientific assessment processes and the catch sharing arrangements under the Torres Strait Treaty between Australia and Papua New Guinea (PNG) have been considered. Any increase in the TAC is expected to be determined by the end of February 2024.

Under this TAC, the value of each quota unit and available catch for each TRL Fishery sector is outlined in the table below. All weights are provided in unprocessed weight in kilograms.

<table>
<tr><th>TRL Fishery Sector</th><th>TAC (kilograms)</th><th>Number of quota units</th><th>Value of each quota unit (kilograms)</th><th>Available catch per sector (kilograms)</th></tr>
<tr><td>Traditional Inhabitant Boat (TIB) licence holders</td><td rowspan="2">200,000</td><td>662,016*</td><td rowspan="2">0.200000</td><td>132,403.597</td></tr>
<tr><td>Transferrable Vessel Holder (TVH) licence holders</td><td>337,981</td><td>67,596.403</td></tr>
</table>

* Held by the Torres Strait Regional Authority (TSRA)

A further explanation of how TACs are determined for the TRL Fishery, how catch is shared between Australia and PNG, and how each sector's catches will be managed for the 2023-24 fishing season, is provided in the enclosed TRL Management Arrangements Booklet 2023-24 (**Enclosure A**).

Papua New Guinea Cross Endorsement Applications

The Papua New Guinea Fisheries Minister has written to the Minister Watt applying for cross endorsement licenses under the Torres Strait Treaty for PNG vessels to fish in Australian waters. AFMA is processing those applications, including through Native Title notification.

Canberra
PO Box 7051
Canberra ACT 2610
P 02 6225 5555
F 02 6225 5500

Darwin
PO Box 131
Darwin NT 0801
P 08 8943 0333
F 08 8942 2897

Thursday Island
PO Box 376
Thursday Island QLD 4875
P 07 4069 1990
F 07 4069 1277

Lakes Entrance
PO Box 408
Lakes Entrance VIC 3909
P:0447 019 916

Moontide Hookah Closures

For the purpose of subsection 13(2) of the *Torres Strait Fisheries (Tropical Rock Lobster) Management Instrument 2018*, I provide notice that the use, possession or control, on a boat, of hookah gear to take, process or carry TRL will not be permitted during the 2023-24 fishing season during the moontide hookah closure periods shown in the calendar provided in **Enclosure B** to this letter. The first scheduled moontide hookah closure period starts on 7 February 2024.

These moontide hookah closures are in addition to the hookah closure period from 1 December and 31 January each fishing season. Free-diving, lamp fishing and traditional fishing are permitted during all hookah closure periods.

Should you have any questions concerning the matters covered in this letter, please contact the AFMA Thursday Island office on 07 4069 1990 or FisheriesTI@afma.gov.au. If you would also like to receive future management updates by email or SMS please contact the AFMA Thursday Island office to update your contact details.

Yours sincerely

Wez Norris
Chief Executive Officer

Enclosures

A TRL Fishery Management Arrangements Booklet 2023-24

B TRL Fishery moontide hookah closure calendar for the 2023-24 fishing season

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Thursday Island	MEETING 33 13-14 December 2022
UPDATES FROM MEMBERS PNG National Fisheries Authority	Agenda Item 2.3 For NOTING

RECOMMENDATIONS

1. That the RAG:
    a) **NOTE** the verbal update to be provided by the PNG National Fisheries Authority (NFA); and
    b) **NOTE** the preliminary outcomes of the 2023 Torres Strait Treaty Bilateral Fisheries Committee Meeting held on 25 July 2023 in Loloata Island, Papua New Guinea, relevant to the TRL Fishery; and
    c) **NOTE** that AFMA have received formal applications from NFA for cross endorsement licenses for two vessels.

KEY ISSUES

2. AFMA has a standing invite for officials from the PNG National Fisheries Authority (NFA) to attend all PZJA advisory committee meetings. If in attendance, NFA officials will provide an update on the PNG TRL fishery at the meeting.
3. On 4 October 2023 AFMA received a formal request for cross endorsement for two Papua New Guinean licensed vessels to fish in the Australian waters of the Protected Zone. AFMA and NFA have been in correspondence to progress these applications.

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, which includes tropical rock lobster.

Torres Strait Treaty Fisheries Committee Bilateral Meeting 2022

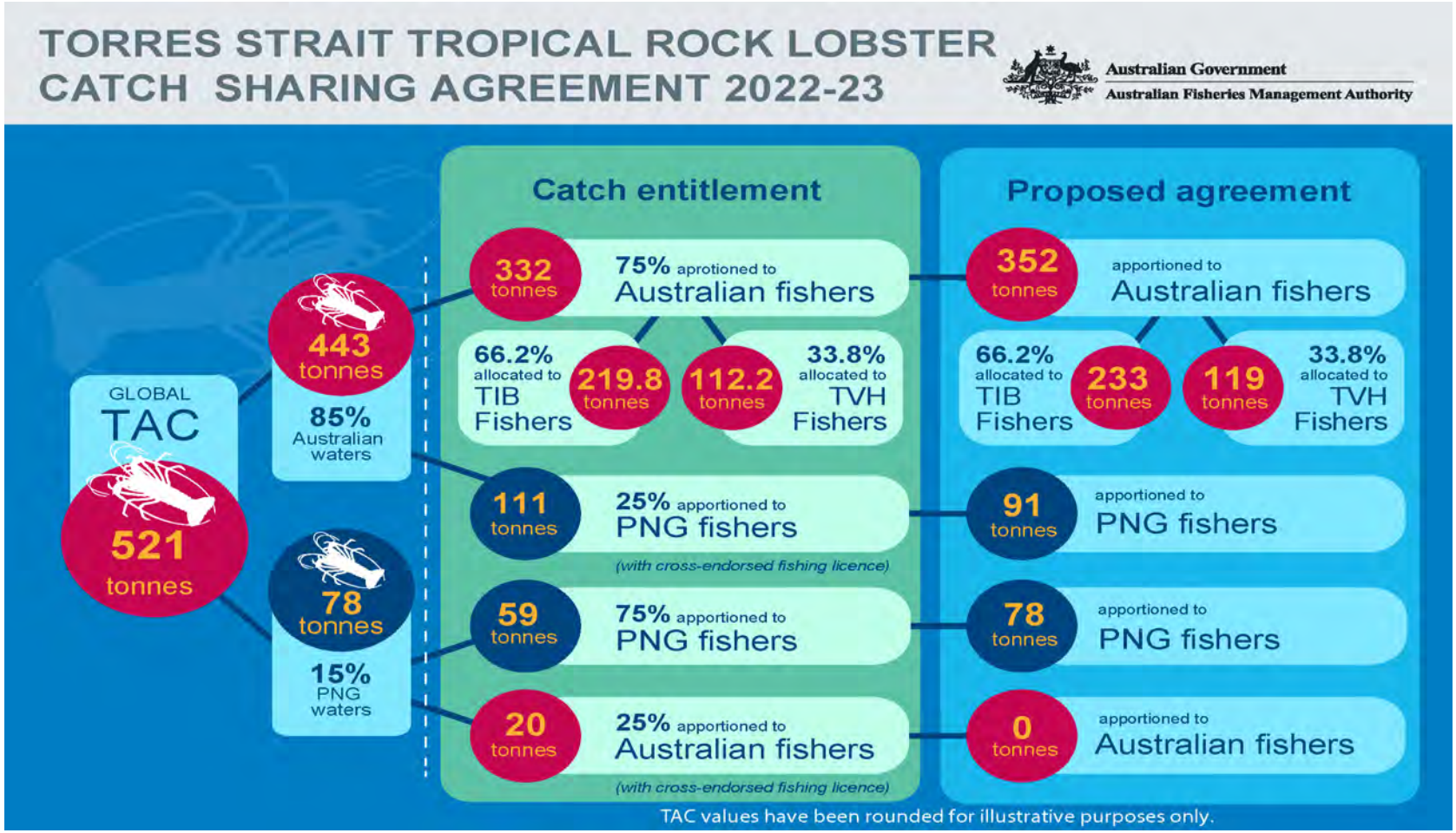
7. In July 2023 Australia and Papua New Guinea officials met face to face in Loloata Island, Papua New Guinea for a series of Torres Strait Treaty Bilateral meetings including the Fisheries Bilateral Meeting (FBM) between AFMA and PNG NFA on 25 July.
   The meeting led to the Joint Advisory Council (JAC) meeting which took place on 28 July 2023.
8. Of particular importance to the TRL Fishery, the FBM noted:
   a) That AFMA and PNG met virtually on 7 February 2023 to discuss catch sharing arrangements for the 2022-23 season and agreed to arrangements resulting in:
      i. 352 tonnes apportioned to Australian fishers in Australian waters
      ii. 91 tonnes apportioned to PNG fishers in Australian waters, and
      iii. 78 tonnes apportioned to PNG fishers in PNG waters.

   Further detail is available in **Attachment 2.3a**

   b) That consistent with previous years, and in accordance with the TRL Harvest Strategy and *Torres Strait Fisheries (Quotas for Tropical Rock Lobster (Kaiar)) Management Plan 2018* (the TRL Management Plan), AFMA intends to apply the same process for finalising the global TAC for the TSPZ TRL Fishery and negotiating catch sharing arrangements between AFMA and NFA as previous years. Both parties agreed to this approach.
   c) That the Guidelines *for authorising cross-endorsement in areas of Australian jurisdiction in areas of the Torres Strait Protected Zone* have been finalised.
9. AFMA and PNG NFA agreed that continuing collaboration to ensure that all available catch and effort data is provided to support effective application of the eHCR and stock assessment processes in the TAC setting processes.

Cross Endorsement Applications for the 2023-24 TRL season

10. 4 October 2023 AFMA received a request for cross endorsement for two Papua New Guinean licensed vessels to fish in the Australian waters of the Protected Zone, which included formal correspondence and details of the applicants.
11. Two primary vessels, each with seven tender vessels, are seeking cross endorsement licences. Both belong to Aquila Enterprise, a Daru based company owned by a treaty inhabitant from the village of Parama.
12. AFMA and NFA have been in correspondence to progress these applications, with the intention of allowing the two vessels to participate in the fishery in early 2023.
13. As the grant of a licence under legislation this act requires a native title notification process under section 24HS of the Native Title Act. This was sent to relevant bodies and individuals on 20 November 2023 and will remain open for comment until 8 January 2024.
14. Information was also provided to all TRL license holders in a letter on Management Arrangements for the 2023-24 season, sent on 21 November 2023.



i. As per Article 22(1), the global TAC of 521 tonnes was to be apportioned within each jurisdiction equal to 85 per cent (442.85 tonnes) in Australian waters and 15 per cent in PNG waters (78.15 tonnes);
ii. In line with the apportionment of catch in each Party's waters under Article 23 of the Treaty (being 75%:25% to the home Party), Australian boats can take in Australian waters, part of the cross-endorsement catch entitlement ordinarily available to PNG boats in Australian waters, equivalent to Australia's cross-endorsement catch entitlement in PNG waters (equal to 19.538 tonnes);
iii. The remaining part of PNG's cross-endorsement catch entitlement (91.175 tonnes) would remain available for PNG boats to take in Australian waters under cross-endorsement arrangements; and
iv. AFMA would not seek access to Australia's cross-endorsement catch entitlement in PNG waters and this could instead be taken by PNG boats in PNG waters, bringing the total catch apportionment for PNG boats in PNG waters up to 78.15 tonnes.

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Thursday Island	MEETING 35 12-13 December 2023
UPDATES FROM MEMBERS Native Title Update	Agenda Item 2.4 For NOTING

RECOMMENDATIONS

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

BACKGROUND

2. AFMA has a standing invite for a representative from Malu Lamar to attend all PZJA advisory committee meetings.
3. 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*.
4. Traditional Owners and Native Title representative bodies have an important role in managing Torres Strait fisheries. It is important therefore that the RAG keep informed on any relevant Native Title issues arising.

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Thursday Island	MEETING 35 12-13 December 2023
CLIMATE AND ECOSYSTEM UPDATE	Agenda Item 3 For DISCUSSION

RECOMMENDATIONS

1. That the RAG:
   a) **RECALL** the draft ecosystem status report from the last meeting; and
   b) **DISCUSS** this year's climate and ecosystem status update (**Attachment 3a**).

2. That the RAG **NOTE** observations from industry members on environmental conditions, (including differences to expected conditions).

KEY ISSUES

3. At its meeting on 19 July 2023, the Protected Zone Joint Authority (PZJA) agreed that a standing agenda item "Climate and ecosystem update" be introduced to all RAG and Working Group agendas where total allowable catch (TAC) and/or effort limits are to be considered. This is in line with discussions during TRLRAG33 in December 2022, where the RAG agreed that consideration of climate change was a priority for the TRL fishery.
4. The PZJA also directed PZJA agencies, RAGs and Working Groups to further develop mechanisms to collate and incorporate Traditional Ecological Knowledge into fisheries monitoring and assessment.
5. CSIRO have prepared a Climate and Ecosystem Status Report for the TRL Fishery for 2023. As in 2022, the status report has a section specifically for fisher observations, to capture industry, community, and on water knowledge of what is happening in the region.
6. TIB industry members, where culturally appropriate, are also invited to share their observations on if and how current environmental conditions differ from what might be expected using Traditional Ecological Knowledge.

BACKGROUND

Climate and Ecosystem Status Report for the Torres Strait Kaiar – TRL Fishery for 2023

7. The RAG first formally discussed climate change at its 33rd meeting on 13-14 December 2023 (although changing environmental conditions with respect to research priorities have been discussed since TRLRAG29 in October 2020). At this meeting, the RAG agreed that consideration of climate change was a priority for the TRL fishery and the Torres Strait region.

8. To inform management decision-making processes, including advisory body discussions, annual Climate and Ecosystem Status reports are being developed for key Commonwealth fisheries. These reports are intended to provide a short, accessible update on key indicators of climatic or ecosystem status and trends relevant to the fishery, utilising readily available information.

9. Noting the considerable interest in climate impacts on the Torres Strait tropical rock lobster fishery, the TRL fishery was identified as an early priority for development of a Climate and Ecosystem Status Report. As such, TRLRAG33 had the opportunity to view, discuss, and provide comment on a draft Climate and Ecosystem Status Report for the Torres Strait Kaiar – Tropical Rock Lobster Fishery for 2022.

10. The RAG is now invited to note, discuss, and provide input to the Climate and Ecosystem Status Report for the Torres Strait Kaiar – Tropical Rock Lobster Fishery 2023. The status report provides an insight into recent trends in the Torres Strait, including valuable knowledge on changes being seen by fishers.

Coming Martine Heatwave

11. The Bureau of Meteorology are forecasting marine heatwave conditions in the coming months. At this stage, it appears the most severe impacts in the Torres Strait will likely be from January through to March.

12. Sea surface temperatures are expected to be up to 0.8°C warmer than normal for this time of year. Maps of the sea surface temperature anomalies are available at **Attachment 3b**. this information is included in the Climate and Ecosystem Status Report for 2023.

13. The Bureau of Meteorology and CSIRO have been providing regular briefings on the upcoming conditions, held on:

    a) 24 June;
    b) 25 August; and
    c) 8 December.

14. In an effort to provide industry with as much information in advance to help with preparation where possible AFMA on behalf of the PZJA, provided information on the briefings, conditions, and available resources (see **Attachment 3c**). This information was circulated to the RAG on 5 September and an update provided on 30 November (see Agenda Item 1.5).

Building climate change information into fisheries management processes in other fisheries

15. In other Commonwealth managed fisheries (fisheries managed elsewhere in Australia by AFMA), a program of work is being undertaken to ensure that climate impacts are more strategically incorporated into the management of these fisheries to ensure that AFMA continues to meet legislative objectives relating to ecological sustainability. This work is a follow up action from the *Adaption of Commonwealth fisheries management framework to climate change project (FRDC project 2016-059)* (the climate adaptation project) that looked at the readiness of Commonwealth fisheries management arrangements to the potential impacts of climate change and provided a range of resources to assist with adaptation.

16. As a foundational element of the Climate Adaptation Program, the AFMA Commission endorsed a suite of actions to build explicit and structured consideration of climate change impacts into decision-making processes. These actions include adding a standing agenda item on climate change to advisory body meetings and preparing Climate and Ecosystem Status reports for key fisheries. Recognising the priority that the Torres Strait community places upon management of climate change impacts and the vulnerability of Torres Strait fisheries to climate change, AFMA is rolling out similar for Torres Strait fisheries through the PZJA's advisory committees.

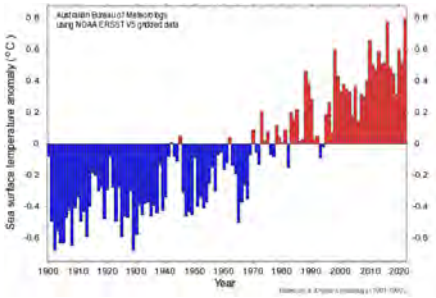
Climate & Ecosystem Status Report

Torres Strait Kaiar - Tropical Rock Lobster Fishery

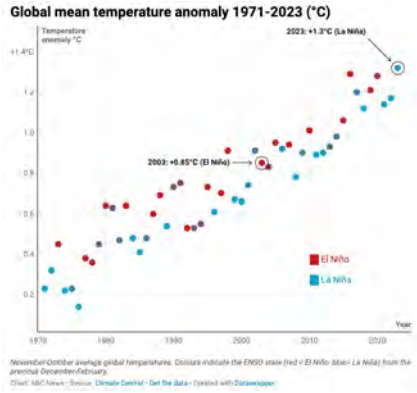
November 2023

Historical Period

Climate Drivers



Australian waters have warmed significantly over time (link)[1]. The last decade has been ~0.5°C warmer than the 1960-1990 average.

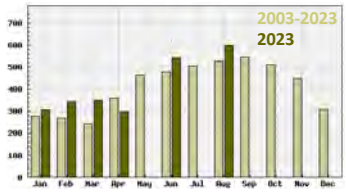


ENSO dynamics interact with long-term warming.

E.g. Hot, dry conditions during El Niño are exacerbated. La Niña events bring cooler conditions to Australia, but recent La Niña's have been warmer than historical El Niño's.

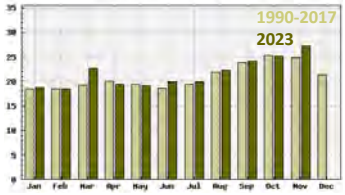
Regional Dynamics[1]: Horn Island (link)

Mean daily wind run (km)



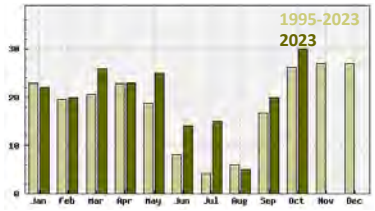
Wind run (mean speed over 24hrs) in 2023 has been higher than average.

Mean daily solar exposure (MJ/m²)



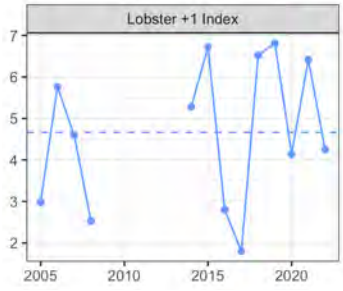
Solar exposure (low cloud cover) was above average in Mar & Nov '23. El Niño brings low cloud cover & warms surface waters.

Number of days air temp. >30°C

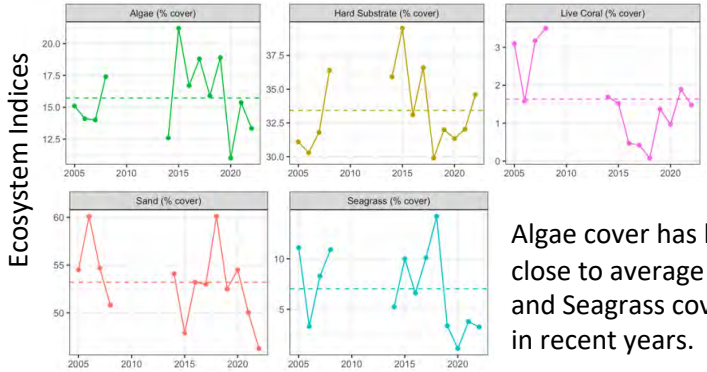


2023 has been hotter than average, especially during June and July.

Ecosystem Trends



Lobster+1 index in 2022 was close to the long-term average.



Live coral and hard substrate cover has been increasing since 2018.

Algae cover has been below or close to average since 2020. Sand and Seagrass cover has been low in recent years.

Observations

To be sourced at RAG

- *Reports of sand incursion covering up seagrass*
- *Reports of winds being different*

Sources: BOM[1] CSIRO[2] IMOS[3] Wolanksi et al., 2017[4]

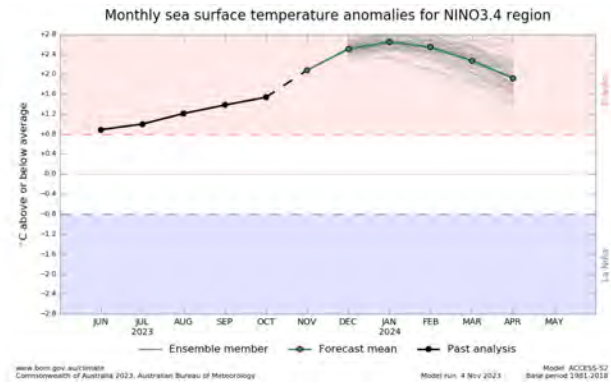
Climate & Ecosystem Status Report

Torres Strait Kaiar - Tropical Rock Lobster Fishery

November 2023

Future Outlook for 2023-2024

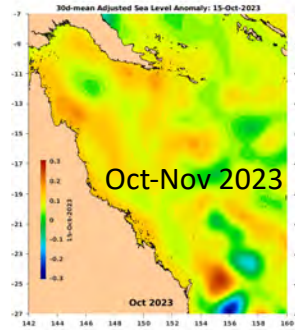
Climate Drivers



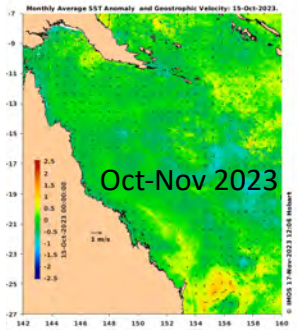
El Niño is forecast through April (link)[1]. These conditions:

- Weaken/reverse easterly trade winds.
- Decreases gradient of sea surface height between TS and GoC, which can reduce water movement/flushing.
- Delay monsoon season 2-6 weeks.
- Delay the onset of cyclone season & reduces the number of cyclones & lows.
- Result in low cloud cover and increased solar radiation, which can warm surface waters.
- Can have higher sand incursion in Torres Strait.

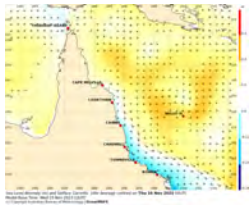
Regional Dynamics



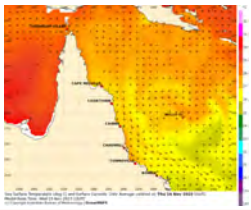
Sea Level Anomaly for the past 30 days (link) [3].



Sea Surface Temperature anomalies show normal conditions for the past 30days (link) [3].



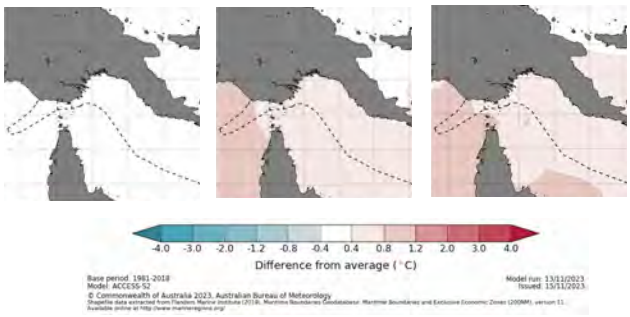
14-Nov-2023



10-day forecasts of sea surface temperature, sea level anomaly, and currents around Australia (link)[1] may be useful for fishing operations.

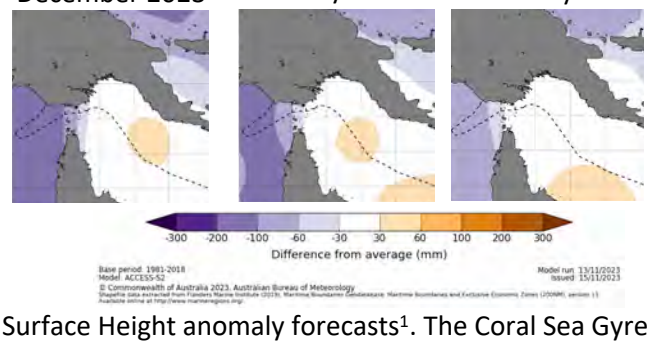
Ocean Forecasts

December 2023 January 2024 February 2024



Forecasts of SST anomalies[1]. SST is forecast to be typical for 2023, but warming by up to 0.8°C is forecast for summer 2024 (link).[1]

December 2023 January 2024 February 2024

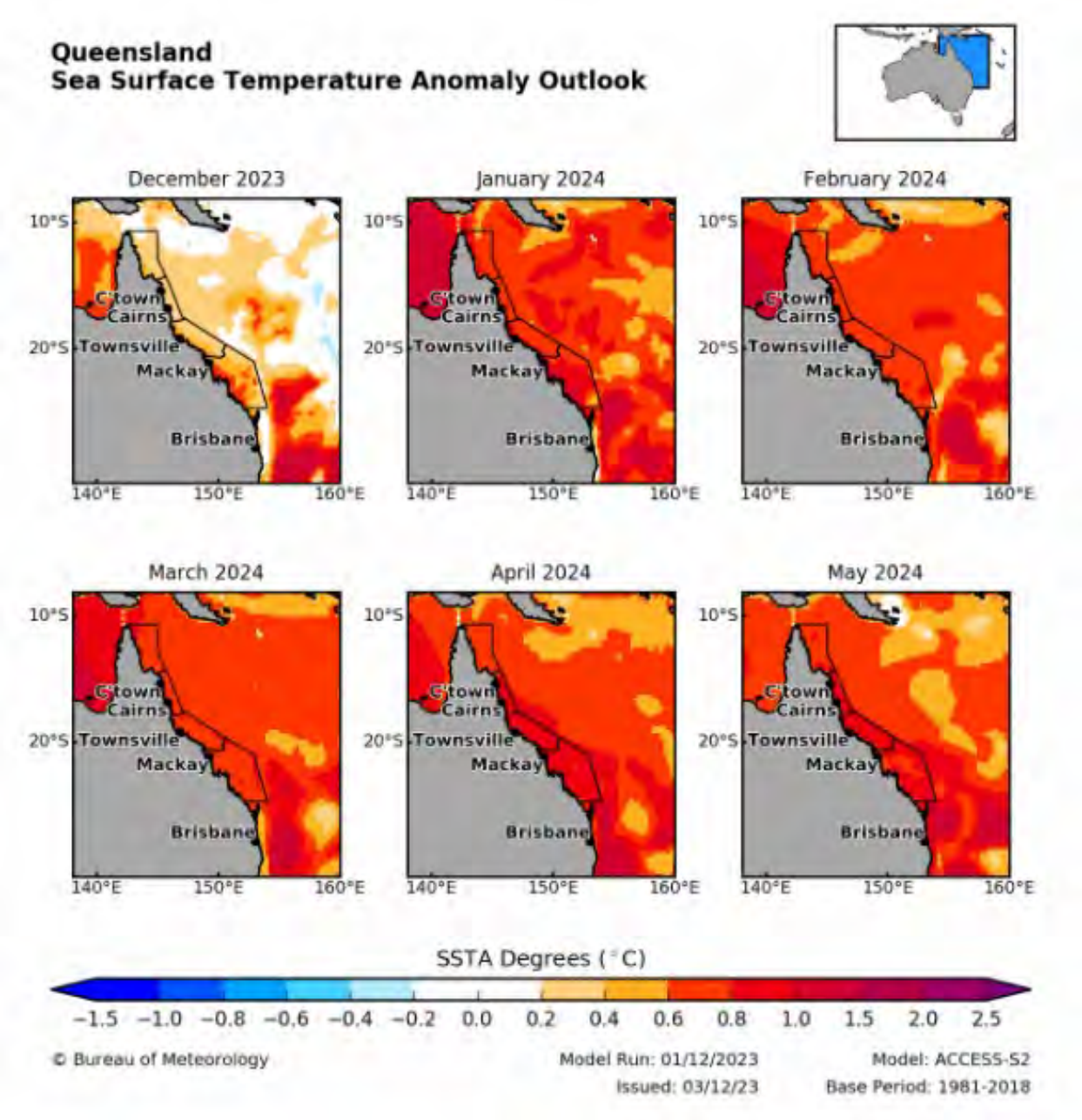


Sea Surface Height anomaly forecasts[1]. The Coral Sea Gyre and SSH gradient at Torres Strait weakens throughout summer, driven by monsoonal westerlies. Eastward flowing water from GoC can warm the TS[4] (link).

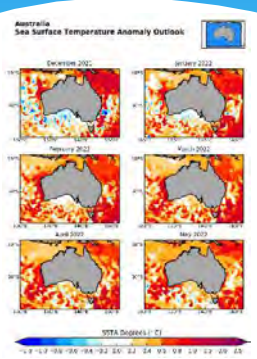
Sources: BOM[1] CSIRO[2] IMOS[3] Wolanski et al., 2017[4]

contact details:
steph.brodie@csiro.au

Sea Surface Temperature Anomaly Outlook Maps



Seafood Sector: Ocean Services & Information



Ocean Temperature Outlooks

Realtime sea surface temperature forecasts for Australian waters up to 6 months ahead (25km resolution)

- SST, SST anomalies, accumulated thermal stress
- Forecast accuracy

www.bom.gov.au/oceanography/oceantemp/sst-outlook-map.shtml

Climate Driver Outlook

Current conditions and climate outlook:

- ENSO (La Niña/El Niño)
- Indian Ocean Dipole
- Southern Annular Model (SAM)
- Cloudiness & trade winds

www.bom.gov.au/climate/enso/

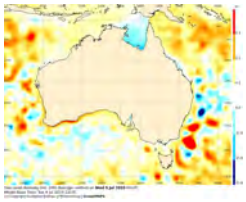
Rainfall & Air Temp Outlooks

Seasonal outlooks for up to 3 months ahead

www.bom.gov.au/climate/outlooks/

OceanMaps

Daily ocean forecasts out to 7 days for Australia



- SST & salinity
- Sealevel, currents

www.bom.gov.au/oceanography/forecasts/

Wind & Wave Forecasts

For the Australian coast

www.bom.gov.au/australia/meteye

Tide Predictions

Australia, South Pacific and Antarctica

www.bom.gov.au/australia/tides/

Tropical Cyclone Outlooks

Outlook for Australia for Nov-April

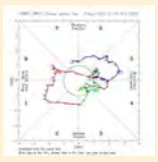
www.bom.gov.au/climate/cyclones/Australia/

Tropical Climate Update

Past fortnight over northern Australia

www.bom.gov.au/climate/tropical-note/

Madden-Julian Oscillation (MJO)



- Current phase
- Observed cloudiness
- Outgoing longwave radiation

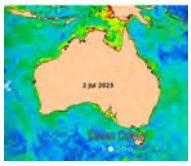
www.bom.gov.au/climate/mjo/

Sea Temperature Analysis

Latest global daily satellite SST

www.bom.gov.au/marine/sst.shtml

IMOS Ocean Current



Observed SST, ocean colour, waves, sealevel for Australia

https://oceancurrent.aodn.org.au/

Realtime Marine Heatwave Tracker

www.marineheatwaves.org/tracker.html

Historical SST & Trends

www.bom.gov.au/climate/change/index.shtml#tabs=Tracker&tracker=timeseries

Marine Heatwave Research: https://research.csiro.au/cor/research-domains/climate-impacts-adaptation/marine-heatwaves/dynamical-forecasting-of-marine-heatwaves/

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Thursday Island	MEETING 35 12-13 December 2023
CATCH AND EFFORT ANALYSES FOR THE 2022-23 FISHING SEASON	Agenda Item 4 For discussion and advice

RECOMMENDATIONS

1. That the RAG:
    a. **NOTE** the reported landed catch for the Australian Torres Strait Tropical Rock Lobster Fishery (TRL Fishery) (**Attachment 4a**).
    b. **NOTE** the reported landed catch for the PNG TRL Fishery as reported by the PNG National Fisheries Authority (NFA) (**Attachment 4b**).
    c. **DISCUSS** and **PROVIDE ADVICE** on the catch, effort and catch per unit effort (CPUE) data analyses for the Australian TRL Fishery for the 2022-23 fishing season undertaken and presented by CSIRO (**Attachment 4c**).

KEY ISSUES

Australian TRL Fishery catch

2. The Australian TRL Fishery fishing season runs from 1 December through to 30 September the following year. There is a prohibition on the use of hookah gear from 1 December through to 31 January the following year and periodically each month throughout the remainder of the season.
3. The reported landed catch for the Australian TRL Fishery for the 2022-23 fishing season is 243.3 tonnes. All reported catches are from inside the Torres Strait Protected Zone (TSPZ) and Australia's declared outside but near area combined.
4. This equates to about 69% per cent of Australia's 351,675.0 kilogram (351.675 tonnes) total allowable catch (TAC) for the 2022-23 fishing season. This catch data is sourced from Torres Strait Fisheries Catch Disposal Record (TDB02) and electronic Catch Disposal Records (e-CDRs) and covers the Traditional Inhabitant Boat (TIB) and Transferable Vessel Holder (TVH) sectors.
5. The TIB sector caught 125.1 tonnes of TRL which equates to 53.7 per cent of the TIB TAC and the TVH sector caught 118.1 tonnes of TRL which equates to 100% per cent of the TVH TAC.
6. A summary of the reported landed catch for the Australian TRL Fishery is provided at **Attachment 4a.**

PNG TRL Fishery catch

7. The PNG TRL Fishery fishing season runs from 1 January through to 31 December each year. There is a prohibition on the use of hookah gear in the waters of Western Province and Torres Strait from 1 December through to 31 March the following year.

8. The total reported catch of the PNG TRL Fishery for 2023 (January – October 2023, as at 7 December 2023) is 30,005.82 kgs. This is reported as 20,638.70 kg caught within the Torres Strait Protected Zone (TSPZ) and 6,376.65 kg outside the TSPZ. (**Attachment 4b**).

9. The TAC for the PNG TRL Fishery in 2023, in PNG waters was 91,175 kilograms, however AFMA did not receive formal applications from NFA for PNG fishers to fish their allocation in Australian waters this season.

10. An infographic showing the final catch sharing agreement between Australia and PNG is shown at **Attachment 2.4a**.

Total reported commercial catch for the TRL stock

11. The total reported commercial catch for the TRL stock is:

Area	Total (kg)	TAC (kg)
Australian TRL Fishery (1 Dec 2021 – 30 Sept 2022)	243,431.05	**351,675.00**
PNG TRL Fishery* (January – October 2022)	30,005.82	**78,150.00**
catches inside the TSPZ	20,638.70	
catches outside the TSPZ	6,376.65	
PNG catch allocation within Australian waters	0	**91,175.00**
Total	**273,436.87**	**521,000.00**

* Reported as at 7 December 2023

Catch and catch per unit effort (CPUE) data analyses

12. The annual data summary to be presented by CSIRO under this agenda item reviews the nominal and standardised catch per unit effort (CPUE) from the TIB and TVH sectors, as well as total catch from all sectors, the size-frequency information provided from a sub-sample of commercially caught TRL and the fishery-independent survey indices of 0+ and 1+ age lobsters. The data summary is used as an indicator to identify if catches correspond to the RBC, and to monitor CPUE (section 2.9 of the TRL Harvest Strategy).

13. The RAG is asked to consider the following catch and CPUE analyses CSIRO has prepared for the 2021-22 fishing season and provide advice as appropriate (*TS TRL Data and CPUE summary paper* (**Attachment 4c**).

14. These analyses will be presented by CSIRO at the meeting. The total catch data and standardised CPUE indices for the TVH and TIB sectors are key inputs to the empirical harvest control rule (eHCR) and integrated stock assessment.

15. Further analyses of the November 2022 pre-season survey data will be presented under **Agenda Item 6**.

Table 1. Reported landed catch (kilograms whole weight) of Tropical Rock Lobster (TRL) for the Australian Torres Strait TRL Fishery by month and sector for the 2021-22 fishing season.
Source: Torres Strait Fisheries Catch Disposal Records (TDB02) and electronic Catch Disposal Records as at 3 November 2023.

Month	Traditional Inhabitant Boat (TIB) sector	Transferable Vessel Holder (TVH) sector	Total (kg)
Dec-22	852.16139	7371.82[#]	11380.23
Jan-23	3156.25072		
Feb-23	18486.37659	14712.7	33199.07659
Mar-23	12468.40035	19256.502	31724.90235
Apr-23	11045.46277	4655.1515	15700.61427
May-23	16816.66614	22574.41638	39391.08252
Jun-23	14597.13267	14087.354	28684.48667
Jul-23	12339.85802	18495.73	30835.58802
Aug-23	19812.4717	13831.48557	33643.95727
Sep-23	15344.18989	3526.925	18871.11489
Total reported catch (kg)	**124918.9702**	**118512.0845**	**243431.0547**
TAC (kg)	**232,815.00**	**118,860.00**	**351,675.00**
Reported catch as a per cent of the TAC*	**53.65 %**	**99.570 %**	**69.22 %**

[#] In accordance with AFMA's Information Disclosure policy (*Fisheries Management Paper 12*), catches by month have been aggregated for December 2022 through to January 2023, as less than 5 boats operated in the Transferable Vessel Holder (TVH) sector. This data is sourced from raw Catch Disposal Records (TDB02) and electronic Catch Disposal Records, and may not account for data cleaning undertaken by CSIRO during CPUE analysis.

Table 2. Reported landed catch (kilograms) of TRL for the PNG Torres Strait TRL Fishery by month and processed weight for the Jan – Oct 2023.
Source: PNG National Fisheries Authority reported as at 7 December 2023.

PNG Jurisdiction of the TSPZ: Jan - Oct 2023				
Month (2023)	**Tail weight (kg)**	**Tail wt converted to whole wt (C. factor 2.677)**	**Whole weight (kg)**	**Total Catch (kg)**
JANUARY	372.50	997.18	2,108.41	3,105.59
FEBRUARY	152.10	407.17	3,031.90	3,439.07
MARCH	34.80	93.16	1,554.10	1,647.26
APRIL	159.40	426.71	6,565.50	6,992.21
MAY	21.10	56.48	2,367.00	2,423.48
JUNE	18.40	49.26	2,412.00	2,461.26
JULY	1.00	2.68		2.68
SEPTEMBER	7.30	19.54		19.54
OCTOBER			547.6	547.60
TOTAL	**766.60**	**2,052.19**	**18,586.51**	**20,638.70**

PNG Waters outside but near TSPZ: Jan - Oct 2023				
Month (2023)	**Tail weight (kg)**	**Tail wt converted to whole wt (C. factor 2.677)**	**Whole weight (kg)**	**Total Catch (kg)**
JANUARY	114.80	307.32	1,548.26	1,855.58
FEBRUARY	113.70	304.37	1,433.70	1,738.07
MARCH	70.30	188.19	499.40	687.59
APRIL	15.20	40.69	809.30	849.99
MAY	8.50	22.75	264.50	287.25
JUNE	6.60	17.67	426.10	443.77
JULY	11.20	29.98	-	29.98
SEPTEMBER	10.20	27.31	-	27.31
OCTOBER	-	-	457.10	457.10
TOTAL	**350.50**	**938.29**	**5,438.36**	**6,376.65**

PNG Catch Total: Jan - Oct 2023				
Month (2020)	**Tail weight (kg)**	**Tail wt converted to whole wt (C. factor 2.677)**	**Whole weight (kg)**	**Total Catch (kg)**
JANUARY	487.30	1,304.50	3,656.67	4,961.17
FEBRUARY	265.80	711.55	4,465.60	5,177.15
MARCH	105.10	281.35	2,053.50	2,334.85
APRIL	174.60	467.40	7,374.80	7,842.20
MAY	29.60	79.24	2,631.50	2,710.74
JUNE	25.00	66.93	2,838.10	2,905.03
JULY	12.20	32.66		32.66
SEPTEMBER	17.50	46.85		46.85
OCTOBER		2990.4767	1004.7	3995.1767
	1,117.10	**5,980.95**	**24,024.87**	**30,005.82**

Torres Strait Tropical Rock Lobster Fishery – Summary of Catch and Effort Data pertaining to the 2023 Fishing Season (Dec-2022 to Sep-2023)

Roy Deng, Denham Parker, Steven Edgar, Éva Plagányi, Laura Blamey, Nicole Murphy, Leo Dutra and Kinam Salee

CSIRO Environment

December 2023

1. Introduction

This paper provides a summary of the catch and effort data pertaining to the Torres Strait Tropical Rock Lobster (TSTRL) fishery during the 2023 fishing season. (Note, a fishing season begins on 1st December each year and extends through to 30th September the following year).

2. Catch summary

The catch summary in Table 1 is updated with 2023 season data for TSTRL. The TIB sector data are mainly updated from TDB02 - the Torres Strait Catch Disposal Record (CDR) and TVH data are updated mainly from TRL04 - the Torres Strait Tropical Rock Lobster Fishery Daily Fishing Log. PNG data is by PNG NFA data via AFMA;

The 2023 fishing season combined catch recorded by the TIB and TVH sectors was 241.2 tonnes (rounded) which represents a 17.4% decrease from last season and equates to about 71% of the quota for that year. TIB and TVH caught 125.1 and 116.1 tonnes respectively, representing a 16.7% and 18.1% decrease from the previous season. The Australian sector catches represent 59.3% and 100% of the allocations for the TIB and TVH sectors respectively.

Please refer to the following figures and tables for summaries of catch:

- Table 1 for the annual catch for TSTRL shown by fishing season (Dec-Sept for each year)
- Figure 1. TIB and TVH annual effort trajectories

3. Effort summary

The effort summary in Table 2 is updated from the same data sources as catch records, except that they exclude the additional late records as referred to above. The effort unit for TVH is tender-shot day and TIB is crew day, adjusted from the original data source.

The 2023 TVH sector fishing effort was 1,156 tender-days and TIB sector was 2,329 days fished which equates to a 14.5% and 29.3% decrease, respectively, relative to the previous season. The nominal catch rates for TIB sector decreased but increased slightly for the TVH sector during the 2023 season (see TVH_CPUE and TIB_CPUE updates).

Summaries of the effort data are provided in the following figures and tables:

- Table 2 for the annual effort for TVH and TIB sector

- Figure 1 for TIB and TVH annual effort trajectories.

Table 1. Total annual catch (in tonnes) for each of the sectors as indicated

SEASON	TIB	TVH	PNG DIVERS	PNG TRAWL	TS TOTAL	TAC (t)
2001	52.0	79.9	173.0	5.4	310.3	
2002	68.0	147.2	327.0	42.8	585.0	
2003	123.0	358.8	211.0	5.4	698.2	
2004	210.4	481.0	182.0	0.0	873.4	
2005	367.6	549.0	228.0	0.0	1144.6	
2006	140.5	135.4	142.0	0.0	417.9	
2007	268.7	268.6	228.0	0.0	765.3	
2008	185.7	100.4	221.0	0.0	507.1	
2009	147.8	91.1	161.4	0.0	400.3	
2010	140.0	282.6	292.8	0.0	715.4	
2011	199.1	503.5	165.0	0.0	867.6	
2012	142.4	387.3	173.7	0.0	703.4	
2013	142.5	361.7	108.3	0.0	612.5	871
2014	198.8	273.2	151.4	109.8	733.2	616
2015	202.6	152.7	235.7	0.0	591.0	769
2016	267.1	243.0	248.0	0.0	758.1	796
2017	111.6	166.3	113.0	0.0	390.9	495
2018	127.4	128.3	156.4	0.0	412.1	320
2019	260.6	155.9	167.0	0.0	583.5	641
2020	216.2	145.1	126.4	0.0	487.7	582
2021	126.8	117.1	97.0	0.0	340.9	623.5
2022	150.1	141.8	88.8	0.0	380.7	615
2023	125.1	116.1	*36.0**	0.0	277.2	521
Last 5 year mean	167.7	134.1	111.9	0.0	413.7	

*Note: PNG 2023 catch data provided for Jan to October 2023 totals 30t. The PRELIMINARY total of 36t shown for use in analyses is an extrapolated value based on the same method as used previously – catch data provided to end of October hence December 2022 and November 2023 assumed to both be equivalent to the average catch over the period January to October 2023.

Table 2. Effort for TVH (tender-shot days) and TIB (days fished)

Season	TVH	TIB
2004	5217	4830
2005	4389	8613
2006	2427	4795
2007	2861	7099
2008	1211	5788
2009	1293	4859
2010	2366	3717
2011	2667	3460
2012	2380	2330
2013	3008	288
2014	2910	2930
2015	2682	3228
2016	2654	2932
2017	2515	3100
2018	1506	3537
2019	1910	4530
2020	1267	2742
2021	1621	2962
2022	1352	3296
2023	1156	2329

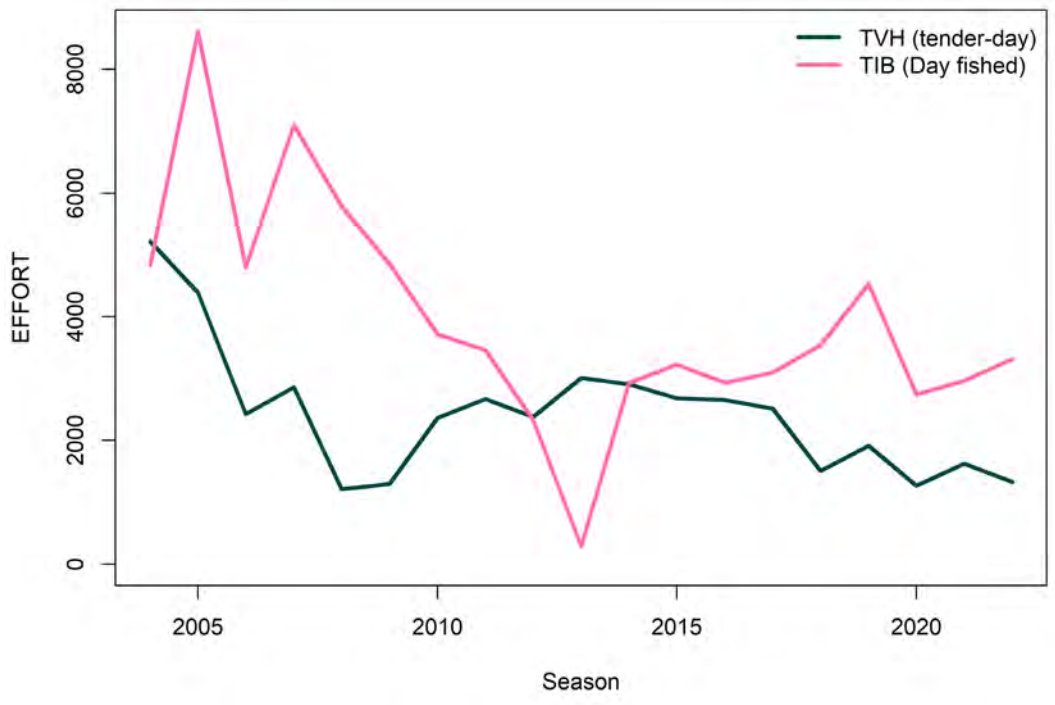


Figure 1. TIB and TVH annual effort trajectories.

Use of TIB Logbook Data to construct an Annual Abundance Index for the Torres Strait Rock Lobster fishery– 2023 Update

Roy Deng, Denham Parker, Steven Edgar, Eva Plaganyi, Laura Crous, Nicole Murphy, Leo Dutra and Kinam Salee

CSIRO Environment

December 2023

1. Selection of TIB Data for CPUE analysis

Considerable effort has gone into understanding the nature of both the TDB01, TDB02 Docket-Book and TRL04 Logbook data so as to identify the catch records that should be assigned to the TIB sector of the fishery. A full description of the approach and data-rules used to identify and remove these duplicate records from the Docket-Book data is described in Campbell and Pease (2017) and Campbell et al. (2021). Each catch record in the TIB data is associated with a Record-No, and the structure of the Docket-Book would seem to indicate that there should be a unique Record-No for each vessel, date and seller-name. However, investigation of the data indicates that there are often multiple Record-Nos associated for a given vessel, date and seller-name. The reason for these multiple records remains unknown but may be due to incorrect recording of dates, etc.

In order to identify an appropriate data structure for analysis, we used the same procedure as previously to filter the data:

1. The TIB data was aggregated over vessel-symbol, date and seller-name. Where the vessel-symbol or seller-name was null these fields were set to 'Unknown'. Data was limited to the seasons 2004 to 2023 resulting in a total of 64,948 aggregate Vessel-Day-Seller records (hence-forth known as VDS records);
2. Only those VDS records having a unique Record-No were selected for analysis – accounting for 62,340 (96.0%) of the VDS records identified in the previous step. It was assumed that where the vessel or seller were unknown, that selection of only those GLM records having a unique Record-No limited the GLM records chosen to those associated with a single vessel and a single seller;
3. VDS records were also deleted where any of the number of fishers, the number of days fished, the number of methods, the area fished, and the Seller-Home were not unique or remained unknown (i.e. not recorded). Records associated with the TRL04 logbook or where the catch was zero were also deleted. This resulted in 51,595 VDS-records being retained.
4. Finally, VDS records were only retained where they satisfied the following criteria:
    a. the month was not October or November,
    b. the fishing method listed in Table 2 was either 'Hookah diving', 'Free diving', 'Lamp fishing' or some combination of these three methods (denoted 'Mixed'),
    c. the number of fishers was between 1 and 3,

d. the number of days fished was between 1 and 9,
e. the recorded catch weight was between 1kg and 500kg, Note, the distribution of catches is over-dispersed, with 0.54% of records having a catch greater than 500kg and 0.17% of records having a catch greater than 1000kg.

The records for a few large vessels which were considered non-representative of the TIB fishing sector were also removed.

5. Finally, the records for the 2013 season were also deleted due to the small number of records for this season (72) compared to all other seasons (between 1,018 and 5,459). The small number for 2013 was because many of the fields on the TDB-01 Docket-Book that season were left blank.
6. This procedure resulted in 48,671VDS records being selected for analysis.

2. Method

As in previous years, several different General Linear Models (GLMs) were adopted for analysing the data in order to obtain a standardised relative index of stock abundance in each year. Rob Campbell originally implemented the GLM methods to apply to TIB CPUE standardisation, and the full technical details are provided in Campbell et al. (2019), Plagányi et al. (2022) and Campbell et al. (2021).

General Linear Models (GLM) were fitted to the selected TIB data in order to standardise the CPUE to account for changes in the distribution of records across several main effects (e.g. Season, Month, Area and Fishing-Method). The measure of effort for the TIB data was taken to be days-fished. The catch rate associated with each GLM record was then defined to be the mean weight of lobsters caught per day-fished, i.e.

$$CPUE = \frac{Whole\ \ Weight\ of\ landed\ lobsters}{Number\ of\ days\ fished}$$

In order to investigate the influence of the various effects on the catch rate associated with each GLM data record, and to help account for the possible misreporting of the Area fished on Docket-Book records (as noted by TSRL-RAG23 in May 2018), the following two models were fitted to the data records as described above. All GLMs were weighted as described in Campbell (2019) and Campbell et al. (2021).

Model-1: Main Effects Model

To explore the impact of each main effect included in the GLM, the first set of analyses was based on the following model where no interactions between main effects were included:

CPUE = Intercept + Season + Month + Area-Fished + Fishing-Method
+ Proportion-landed as Tails
+ Southern Oscillation Index + Moon-Phase
/ distribution = gamma, link = log

= I + S + M + SI + + F + P + SOI + Moon / dist= gamma, link=log

where:

a) *Season* has 18 levels: 2004-2012, 2014-2023.
b) *Month* has 10 levels: December–to-September.
c) *Area-Fished* corresponds to the *Seller-Home* and has 13 levels.
d) *Fishing-Method* has 4 levels: (1) Hookah, (2) Free Diving, (3) Lamp Fishing, and (4) Mixed methods.
e) *Proportion*-Tails has 5 levels: (1) <20%, (2) 20-40%, (3) 40-60%, (4) 60-80%, and (5) ≥80%.
f) *SOI* is the monthly value of the Southern Oscillation Index.
g) *Moon-Phase* has 30 levels: the number of days after the last full moon.

Interactions Models

A second set of analyses was undertaken to explore whether the inclusion of interactions between the main spatial-temporal effects improved the model fit to the data. Specifically, the following three models were examined:

Model-2: Int-1:

*CPUE = Intercept + Season +Month + Month*Area*
+Fishing-Method + Proportion-Tails + SOI + Moon
/ distribution = gamma, link = log

Model-3: Int-2:

*CPUE = Intercept + Season *Month +Season*Area + Month*Area*
+Fishing-Method + Proportion-Tails + SOI + Moon
/ distribution = gamma, link = log

Model-4: Int-3:

*CPUE = Intercept + Season *Month*Area*
+Fishing-Method + Proportion-Tails + SOI + Moon
/ distribution = gamma, link = log

where * indicates an interaction between the related effects. The inclusion in these interactions allows for the relative distribution of the resource between the different areas and months to be different between seasons.

A further set of models were run to include the "Seller" effect, this model has previously been adopted by the TRLRAG as the default for input to the eHCR. All effects were fitted as categorical effects except for SOI which was fitted as a continuous cubic function.

Using results from each GLM, an annual abundance index was constructed. As the standardised-CPUE is taken as an index of the density of fish within each stratum, an index of the abundance of lobsters across the fishery for each season can be obtained by taking the average across the *Month* indices in each season. Finally, a relative annual

abundance index, B_s, was calculated such that the mean index over all seasons equals 1.

3. Results of Standardisation of Annual Abundance Indices

The seasonal abundance indices based on each of the four GLM models listed in the previous section are listed in Table 1 and Figure 1 respectively. Relative to the nominal index, each of the standardised indices displays substantive shifts, generally being lower than the nominal index over the first half of the time-series and higher than the nominal index during the second half (i.e. since 2012 to 2023). The nominal and standardised TIB CPUE suggest an increasing trend in lobster density since the 2015 season and all relative index values have been >1 since 2019 (Figure 2).

As outlined in Campbell et al (2019, 2021), the reasons for these changes can be investigated using the seasonal influence of each factor for the Main and Seller models. The parameter with the most substantive influence on the annual index is the *Seller* (Table 2), and while displaying a variable influence over time, the influence of this effect has increased in recent seasons resulting in an increase in catch rates. This indicates that there has been an increase in the relative fishing efficiency of *Sellers* in recent seasons, which when accounted for in the standardisation model leads to a decrease in the standardised CPUE. The influence of the *Seller* effect in recent seasons therefore explains the divergence seen between the standardised indices based on the Main and Seller models during this period. *Area* is the second most influential parameter, followed by *Season*, suggesting that the model is able to reasonably account for variation in CPUE observations across space and time (Table 2). While Moon-phase explains a significant proportion of the variability in the CPUE data, the annual influence of Moon-phase across the entire period is seen to be negligible, because the proportion of fishing during each level of Moon-phase is likely to have remained unchanged over time (likely being relatively equal each season).

Based on discussions over the past few years, Model “Seller” is considered the preferred model.

Table 1. Relative abundance indices based on standardised CPUE data for the TIB fishery. Note, each index is scaled so that the mean of the index over all years is equal to 1. The model "Seller" has previously been adopted by the TRLRAG as the default for input to the eHCR.

Models	Main	ln(CPUE) = Season + Month + Method + Percent_Tails + SOI + Moon
	Int - M*A	ln(CPUE) = Season+ Month + Month*Area + Area + Method + Percent_Tails + SOI + Moon
	Seller	ln(CPUE) = Season + Month + Method + Percent_Tails + Seller + SOI + Moon
	Seller -Int M*A	ln(CPUE) = Season + Month +Month*Area + Area + Method + Percent_Tails + Seller + SOI + Moon
	Index scales so mean over all years = 1	

Season	Nominal	Main	Int - M*A			Seller	Seller Int-M*A		
04	0.97	0.80	0.80			0.84	0.84		
05	1.16	0.94	0.94			1.01	1.01		
06	0.77	0.69	0.69			0.73	0.73		
07	0.93	0.79	0.80			0.82	0.83		
08	0.90	0.76	0.75			0.79	0.78		
09	0.82	0.82	0.83			0.85	0.85		
10	0.93	0.89	0.90			0.93	0.94		
11	1.44	1.27	1.25			1.24	1.22		
12	1.17	1.07	1.08			1.11	1.12		
13									
14	0.90	0.93	0.94			0.96	0.96		
15	0.68	0.77	0.78			0.82	0.82		
16	0.93	1.12	1.11			1.11	1.11		
17	0.79	0.88	0.87			0.85	0.85		
18	0.83	0.93	0.93			0.88	0.88		
19	1.15	1.25	1.24			1.17	1.17		
20	1.39	1.46	1.49			1.36	1.38		
21	1.01	1.20	1.20			1.16	1.15		
22	1.01	1.10	1.10			1.08	1.08		
23	1.19	1.33	1.31			1.29	1.26		
Mean	1.00	1.00	1.00			1.00	1.00		

Table 2. Model statistics for the main effects of the Seller Model applied to TIB data.

Main Effects	Log-Likelihood	DF	Chi-Squared	Pr > ChiSq
Intercept	-376406	-	-	-
Season	-374125	18	2281	<0.0001
Month	-373109	9	1016	<0.0001
Area	-370361	12	2748	<0.0001
Method	-369223	3	1138	<0.0001
Tails	-368182	4	1041	<0.0001
Moon-phase	-367868	29	314	<0.0001
Seller	-359537	303	8331	<0.0001
SOI	-359531	1	6	0.0109
SOI2	-359490	1	40	<0.0001
SOI3	-359490	1	0	0.5835

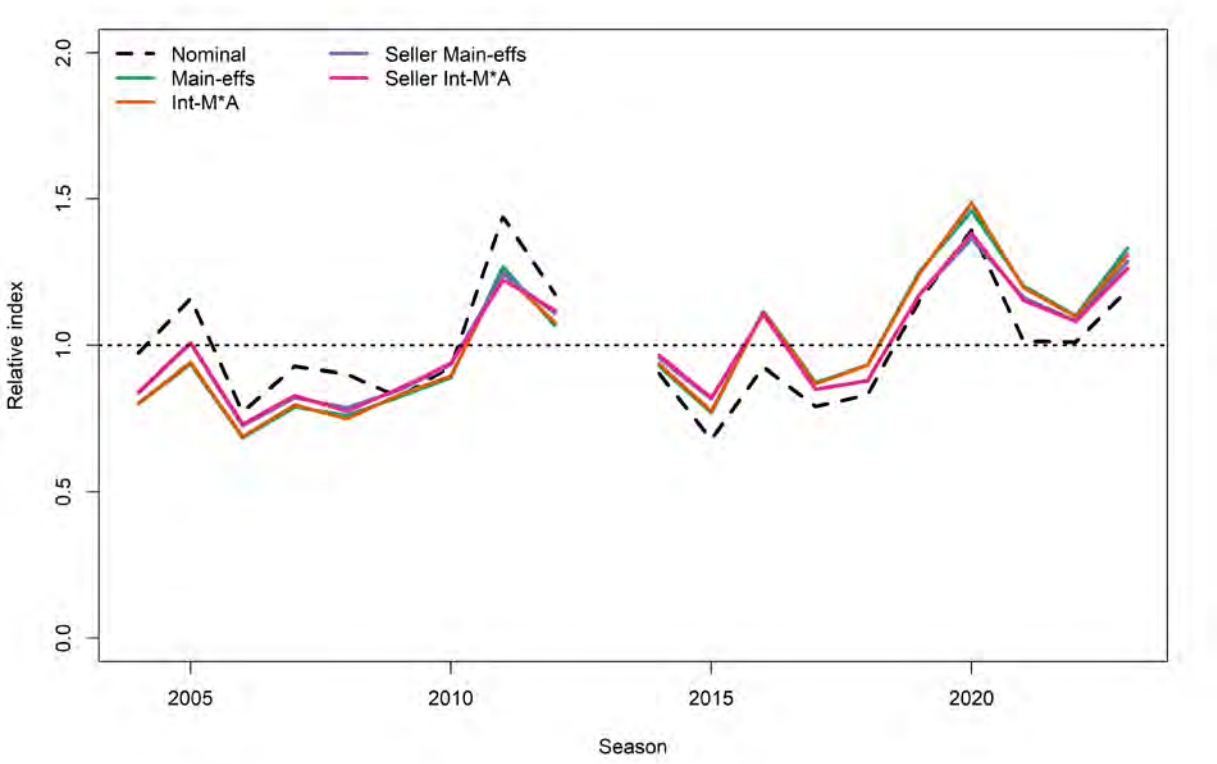


Figure 1. Relative indices of resource abundance based on each of the models fitted to the catch and effort data for the TIB fishery. The nominal CPUE is also shown for comparison. The model “Seller” is the default series used for the eHCR.

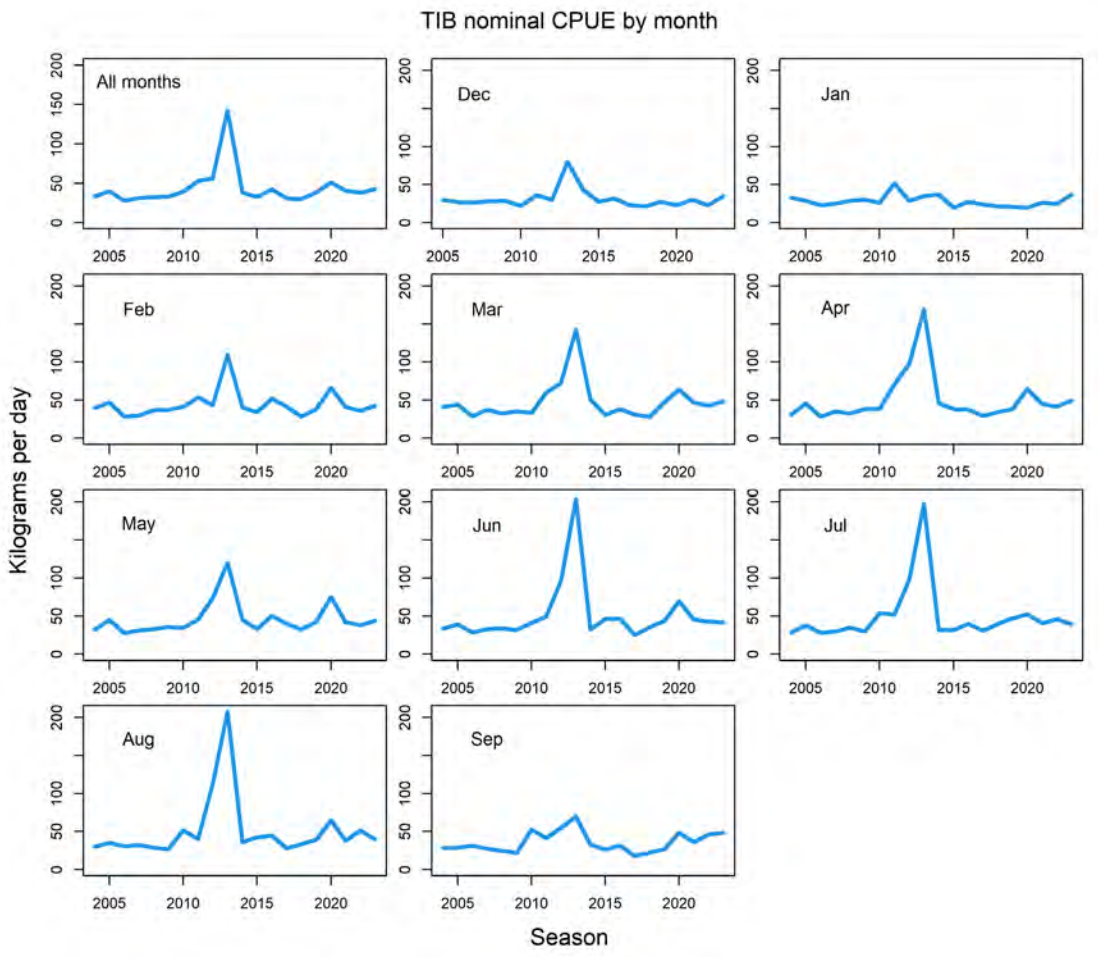


Figure 2. The TIB CPUE nominal time series shown per month.

Acknowledgement

Thanks to AFMA and fishery participants for providing the fishery data for the analysis. Funding for this research is provided by AFMA and CSIRO.

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Robert Campbell, Steven Edgar, Eva Plaganyi, Laura Crous, Nicole Murphy, Leo Dutra. 2021. Use of TIB Logbook Data to construct an Annual Abundance Index for Torres Strait Rock Lobster – 2021 Update.

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Plagányi, É.E., Dutra, L., Murphy, N., Edgar, S., Campbell, R., Deng, R., Upston, J., Salee, K., Blamey, L. 2022. Torres Strait Tropical Rock Lobster 'kaiar' (TRL) Fishery: surveys, CPUE, stock assessment and harvest strategy - 2022 Final Report. AFMA Project No. 2019/0825. 209 pages

Use of TVH Logbook Data to construct an Annual Abundance Index for Torres Strait Rock Lobster – 2023 Update

Roy Deng, Denham Parker, Steven Edgar, Eva Plaganyi, Laura Crous, Nicole Murphy, Leo Dutra and Kinam Salee

CSIRO Environment

December 2023

1. TVH Data

The Torres Strait Tropical Rock Lobster Fishery Daily Fishing Log (TRL04) was used to record the catches taken in the TVH sector of the Torres Strait Tropical Rock Lobster fishery. Logbook data obtained from AFMA consists of over 100,000 individual catch records for the TVH rock-lobster fishery for the 28 years from 1994 to 2023. For each vessel-day there can be multiple shots (up to 4) with each shot consisting of up to 8 tenders. Each tender has a catch recorded by diving method (hookah, free or unknown) and the catch is recorded by processed form (whole, tailed or unknown). The data were aggregated so that each record refers to the rock-lobster catch for a unique vessel-day, shot, tender and diving method. This gave 77,781 records.

The distribution of these 77,781 catch records was analysed by season and month, diving method, processed state of catch and area. The analysis was limited to the 8 months between February and September, the other months had minimal effort recorded and were omitted (see Campbell et al., 2019 and 2021 for details). Similarly, the analysis was also limited to those records with a known MSE-area (i.e. areas designated A0 and A99 were excluded). MSE-areas 201 and 202 were combined and designated as area 101 (to provide a better data coverage), and area 401 (GBR) was also excluded.

2. Method

As in previous years, several different General Linear Models (GLMs) were used for analysing the data in order to obtain a standardised index of stock abundance in each year. The GLM methods applied were the same as those previously applied (see full technical details provided in Campbell et al. 2019 and 2021, Plagányi et al. 2020).

The GLM models include:

<u>Model-1: Main Effects Model</u>

To explore the impact of each main effect included in the GLM, the first set of analyses was based on the following model where no interactions between main effects were included:

CPUE = Intercept + Season + Month +Area + Vessel +Fishing-Method
+ Proportion of Catch Landed as Tails
+ Southern Oscillation Index (SOI) + Moon-Phase
/ distribution = gamma, link = log

where:

a) *Season* has 29 levels: 1994-2023 (see below)
b) *Month* has 8 levels: February–to-September.
c) *Area* has 10 levels (Campbell, et al 2021, Table 3)
d) *Vessel* has 51 levels (Campbell, et al 2021, Figure 9)
e) *Fishing-Method* has 3 levels: (1) Hookah, (2) Free Diving, (3) Unknown
f) *Proportion*-Tails has 5 levels: (1) <20%, (2) 20-40%, (3) 40-60%, (4) 60-80%, (5) ≥80%
g) *SOI* is the monthly value of the Southern Oscillation Index
h) *Moon-Phase* has 30 levels: the number of days after the last full moon.

The SAS GENMOD procedure was used to fit the model. All effects were fitted as categorical effects except for SOI which was fitted as a continuous cubic function. A log-gamma distribution was assumed for the distribution of CPUE values. The annual index of abundance was determined using the method described in the next section.

The simple structure of this Main Effects model is based on some simplified assumptions. For example, it assumes that the influence of each level of a given main effect is the same across all other combinations of the other main effects. For example, the relative influence of each *Month* is assumed to be the same across all *Seasons* and *Areas*, and similarly the relative influence of each *Area* is the same across all combinations of *Month* and *Season*. Whilst these assumptions may to some extent approximate reality, there may be instances where some assumptions are not fulfilled. For example, there appears to be a degree of inter-annual variation in the relative level of catch rates in different areas across different seasons. Such variation can be accounted for in the "Interaction models" described below.

As shown in Campbell (2004) a bias in the annual abundance index can result when there is an unequal number of observations within each spatial-temporal stratum used for calculating the abundance index. To overcome this problem a weighting of the observations needs to be incorporated when fitting the data to the GLM. Each observation was therefore weighted such that the sum of the weights for all observations in each of the *Season-Month-Area* strata was the same for all strata. Furthermore, in order to account for the weighting given each observation in determination of the annual influence of each main effect, the sum of the weights for all observations within a given level was used instead of just the number of observations.

Interactions Models

A second set of analyses was undertaken to explore whether the inclusion of interactions between the main spatial-temporal effects improved the model fit to the data. Specifically, the following three models were examined:

Model-2: Int-1:

*CPUE = Intercept + Season +Month + Month*Area*
+ Vessel +Fishing-Method + Proportion-Tails + SOI + Moon
/ distribution = gamma, link = log

Model-3: Int-2:

*CPUE = Intercept + Season *Month +Season*Area + Month*Area*
+ Vessel +Fishing-Method + Proportion-Tails + SOI + Moon
/ distribution = gamma, link = log

Model-4: Int-3:

$$CPUE = Intercept + Season * Month * Area + Vessel + Fishing\text{-}Method + Proportion\text{-}Tails + SOI + Moon$$
/ distribution = gamma, link = log

where * indicates an interaction between the related effects. The inclusion in these interactions allows for the relative distribution of the resource between the different areas and months to be different between seasons.

Using results from each GLM an annual abundance index was constructed based on the standardised CPUE with the major effects from the *Season*, *Month* and *Area* factors to derive the annual index. In total there are 2,320 (29 seasons x 8 months x 10 areas) *Season-Month-Area* strata. The standardised CPUE was taken as an index of the density of fish within each stratum, which is then integrated across the month and area strata to provide an overall index of the abundance of lobsters across the fishery in each season. Finally, a relative annual abundance index, B_y, was calculated such that the mean standardised index over all seasons equals 1.

3. Results of Annual Abundance Indices

The relative abundance indices based on each of the four GLM models are listed and displayed in Table 1 and Figure 1 respectively. Relative to the nominal index (see Fig. 1), each of the standardised indices is similar but is higher at the start of the time-series (particularly prior to 1999) and lower from 2012-2019. The 2023 standardised CPUE values for all models are higher than the nominal index (Table 1). Overall, the annual relative CPUE index fluctuates about the mean of 1 and there is no clear trend throughout the time series.

After the annual effect (e.g., *Season*), *Vessel* is the second most influential variable in the main effects standardisation model (Table 2). The influence of *Vessel* is likely twofold; (1) variation in fishing efficiency between vessels operating within the same season and (2) the (expected) increase in the relative fishing power of vessels over time. The relative influence of the *Vessel* effect is seen to be greatest towards the start and end of the time- series and explains the divergence seen between the nominal and standardised indices at these times. *Area* also explains a substantial proportion of variation in the CPUE observations, indicating spatial variability in lobster densities (Table 2). While Moon-phase explains a significant proportion of the variability in the CPUE data, the annual influence of Moon-phase across the entire period is seen to be negligible, because the proportion of fishing during each level of Moon-phase is likely to have remained unchanged over time (likely being relatively equal each season).

Figure 2 demonstrates the seasonal variation in the nominal CPUE. The figure shows no obvious difference of nominal CPUE when using tender-set as effort from the record of all tenders and set fishing 0.5-12 hours. The CPUE in kilograms per fished hour also track the same trends as the former type CPUE.

Figure 3 shows the equivalent CPUE to those of Figure 2 in monthly variation, and with a focus on Season 2023. It indicates that in Jan, CPUE peaks, then flattens during the winter (a minor increase in April) and increases at the end of the season.

Figure 4 shows the seasonal CPUE from all tender records for each of the months.

Figure 5 shows the seasonal CPUE from all tender records for each of the Areas.

Table 1. Annual relative abundance indices for the TVH sector of the Torres Strait rock lobster fishery based on the standardised CPUE from the weighted GLM models. The index based on nominal CPUE is also shown for comparison. The model "Int-1" has been adopted by the TRLRAG as the default index for use as an input to the eHCR.

Models	Main Effs	cpue = season month area method tails vessel soi				
	Int-1 (Int-M*A)	cpue = season month*area method tails vessel soi				
	Int-2 (S*M+S*A+M*A)	cpue = season*month season*area month*area method tails vessel soi				
	Int-3 (S*M*A)	cpue = season*month*area method tails vessel soi				
Season	Nominal	Main-Effs	Int-1	Int-2	Int-3	Mid-year Survey
94	0.89	1.44	1.43	1.37	1.32	1.03
95	0.96	1.40	1.38	1.34	1.30	1.76
96	0.93	1.03	1.03	1.04	1.00	0.91
97	1.03	1.18	1.17	1.10	1.10	0.79
98	0.98	1.12	1.11	1.09	1.07	1.05
99	0.76	0.67	0.67	0.67	0.67	0.35
00	0.62	0.70	0.70	0.74	0.72	0.47
01	0.44	0.44	0.44	0.47	0.46	0.18
02	0.77	0.69	0.68	0.62	0.63	0.64
03	1.03	1.05	1.04	0.99	1.00	1.71
04	1.09	1.15	1.15	1.12	1.13	1.24
05	1.48	1.46	1.47	1.38	1.38	1.60
06	0.68	0.69	0.69	0.64	0.65	0.59
07	1.08	0.98	0.98	0.97	0.99	1.20
08	0.87	0.86	0.87	0.91	0.95	0.71
09	0.62	0.65	0.66	0.70	0.74	0.90
10	1.24	1.13	1.15	1.26	1.27	1.01
11	2.11	1.75	1.75	2.02	2.02	1.71
12	1.68	1.39	1.40	1.25	1.28	1.11
13	1.27	1.23	1.23	1.34	1.34	1.04
14	1.04	0.93	0.94	0.93	0.95	1.01
15	0.63	0.63	0.63	0.55	0.55	
16	1.21	1.10	1.11	1.13	1.13	
17	0.76	0.73	0.74	0.66	0.65	
18	0.90	0.70	0.71	0.72	0.71	0.58
19	1.01	0.93	0.94	0.87	0.87	
20	1.19	1.24	1.24	1.31	1.30	
21	0.73	0.69	0.69	0.70	0.70	
22	1.01	0.96	0.96	1.01	1.02	
23	1.00	1.07	1.07	1.09	1.10	
Mean	1.00	1.00	1.00	1.00	1.00	0.98

Table 2. Model statistics for the main effects of the GLM applied to TVH data.

Fixed Effect	Log-Likelihood	DF	Chi - Squared	Pr > ChiSq
Intercept	-428571	-	-	-
Season	-415751	29	12819.7	<0.0001
Month	-415399	7	352.77	<0.0001
Area	-414228	9	1170.75	<0.0001
Method	-414118	2	109.85	<0.0001
Tails	-413668	4	449.9	<0.0001
Moon-Phase	-412942	29	726.09	<0.0001
Vessel	-405720	50	7221.89	<0.0001
SOI	-405578	1	141.92	<0.0001
SOI2	-405578	1	0.01	0.9176
SOI3	-405547	1	30.76	<0.0001

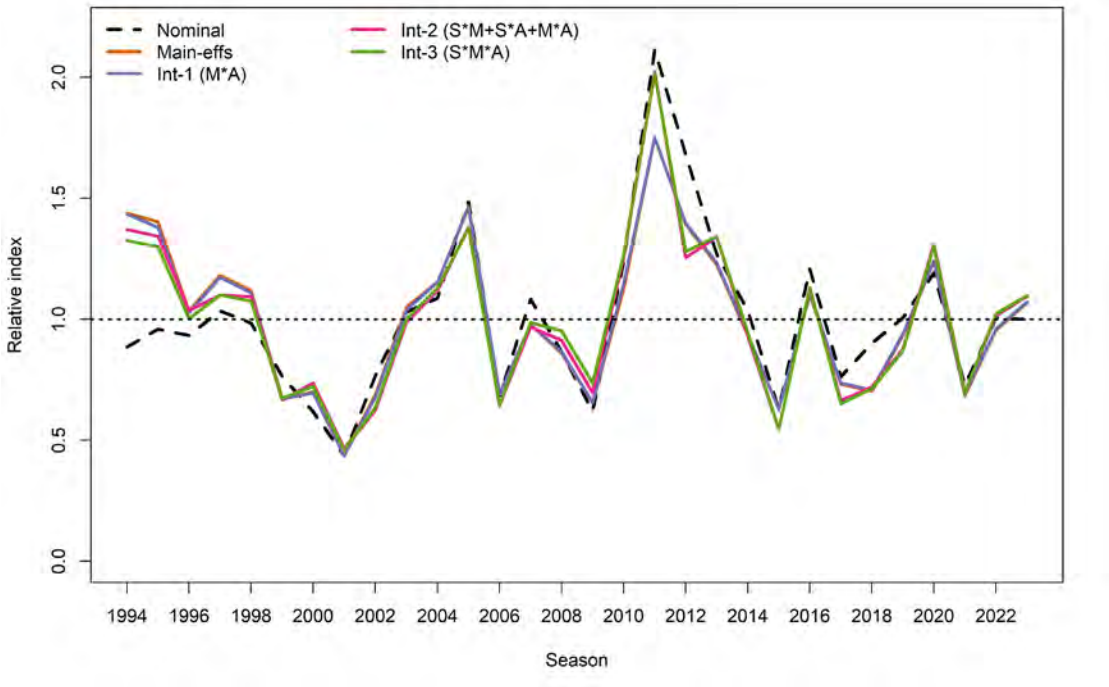


Figure 1. The seasonal abundance indices for the TVH sector of the Torres Strait rock lobster fishery based on the standardised CPUE from the Main-Effects and several interaction models.

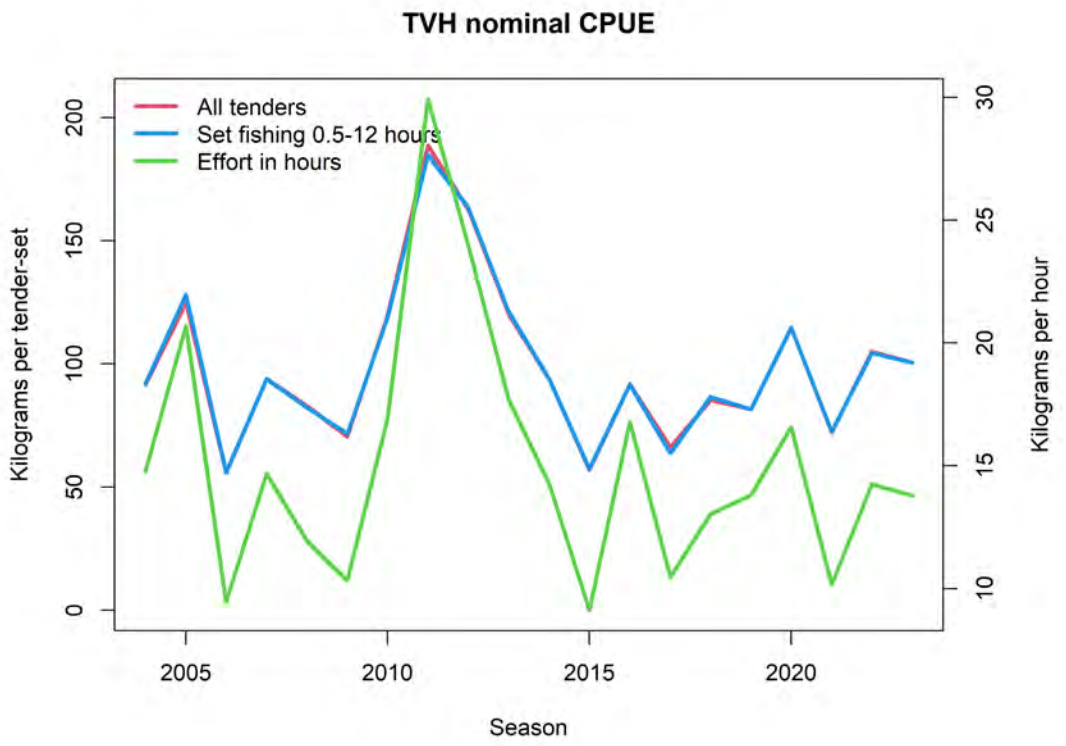


Figure 2. The alternative nominal TVH CPUE series (from 2004).

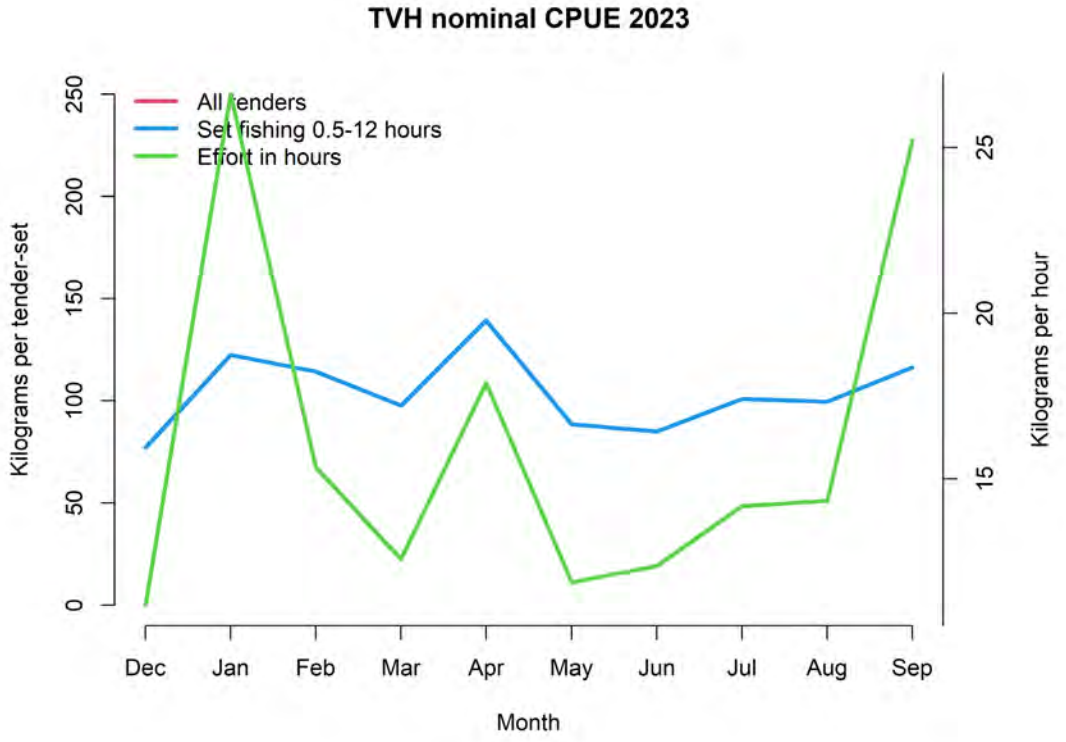


Figure 3. Season 2023 nominal TVH CPUE per month.

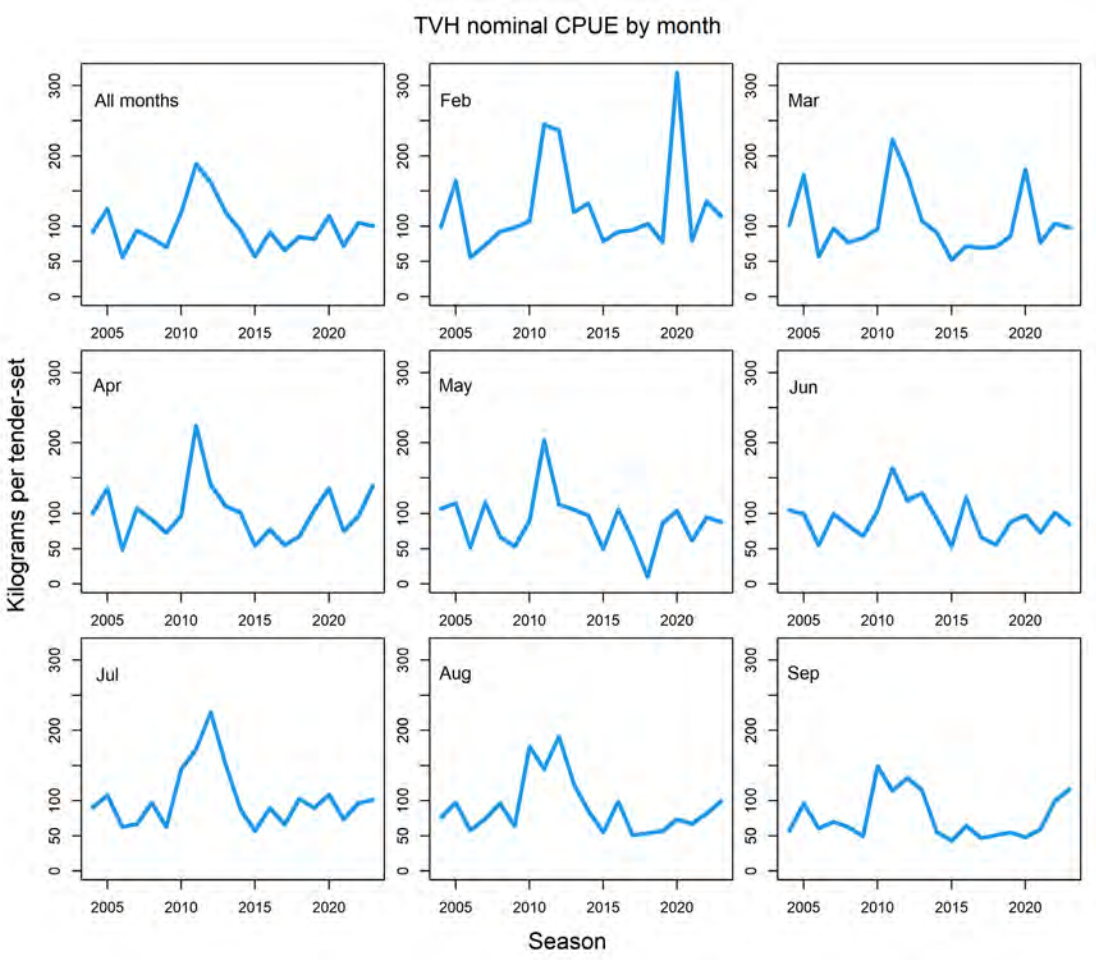


Figure 4. Monthly CPUE time series from nominal CPUE per month. No plots for Dec and Jan due to the hookah gear closure period.

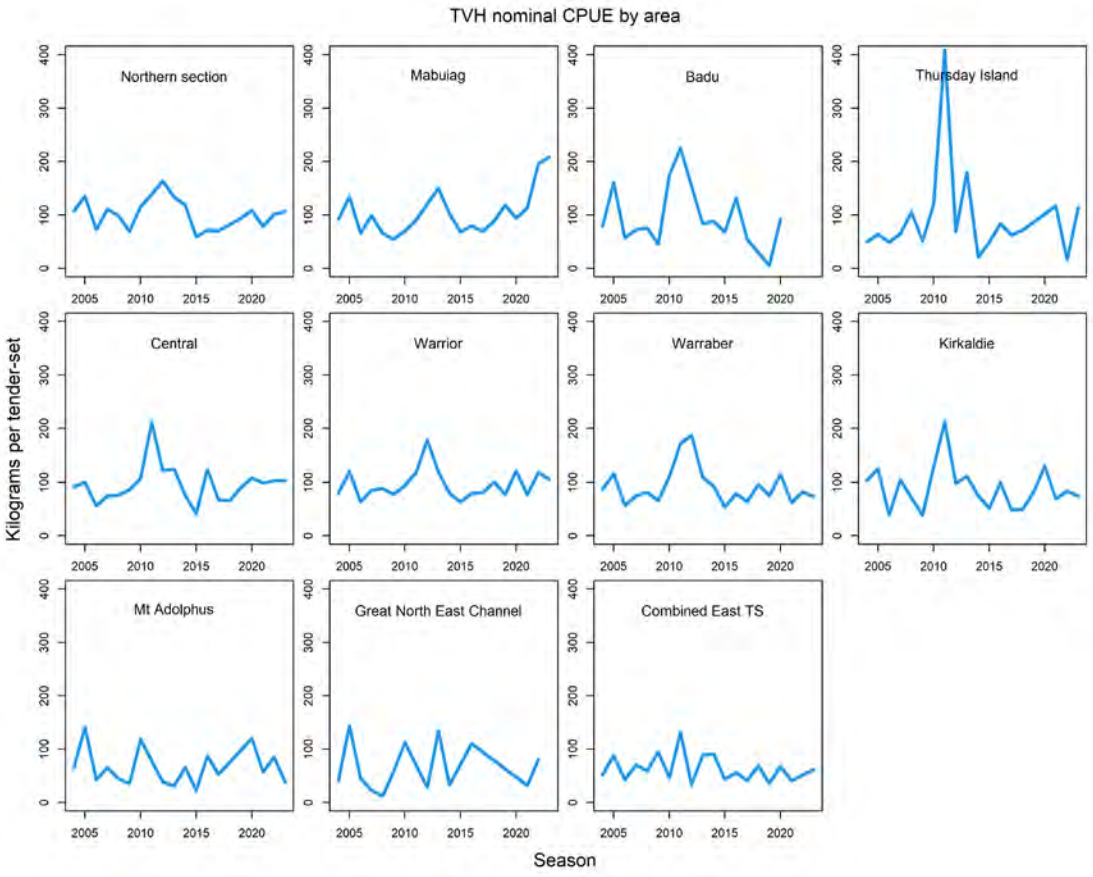


Figure 5. TVH CPUE time series from nominal CPUE per area.

Acknowledgements

Thanks to AFMA and fishery participants for providing the fishery data for the analysis. Funding for this research is provided by AFMA and CSIRO.

References

1. Campbell, R.A., Edgar, S, Plaganyi, E, Crous, L., Murphy, M, Dutra, L. 2021, Use of TVH Logbook Data to construct an Annual Abundance Index for Torres Strait Rock Lobster – 2021 Update: Report to AFMA – TSRL RAG , December 2021.
2. Campbell, R.A., Plaganyi, E, Deng, R., Upston, J. 2019. Use of TVH Logbook Data to construct an Annual Abundance Index for Torres Strait Rock Lobster – 2019 Update: Report to AFMA – TSRL TAG 27, December 2019.
3. Plagányi, É.E., Dutra, L., Murphy, N., Edgar, S., Campbell, R., Deng, R., Upston, J., Salee, K., Blamey, L. 2022. Torres Strait Tropical Rock Lobster 'kaiar' (TRL) Fishery: surveys, CPUE, stock assessment and harvest strategy - 2022 Final Report. AFMA Project No. 2019/0825. 209 pages.

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Thursday Island	MEETING 35 12-13 December 2023
RESULTS OF THE NOVEMBER 2023 PRE-SEASON SURVEY	Agenda Item 5 For DISCUSSION and ADVICE

RECOMMENDATIONS

1. That the RAG **NOTE** the presentation from the CSIRO on testing and analysis done to ensure the robustness of the pre-season survey.

KEY ISSUES

2. The pre-season survey is a key input into the empirical harvest control rule (eHCR) and the TRL Harvest Strategy. It gives an estimate of the relative abundance and size of lobster in the Torres Strait, as well as valuable information on habitat and other environmental variables.
3. CSIRO aims to survey all sites selected for comparison to previous surveys, however weather and other circumstances sometimes mean surveys are conducted as partial surveys or some sites are not surveyed.
4. CSIRO have conducted some analysis to test the impact of partial surveys, along with other variables, to ensure the robustness of the pre-season survey.

BACKGROUND

5. Each year in November, the CSIRO undertake an independent scientific pre-season survey to determine the relative abundance and size of lobsters in the Torres Strait, together with an assessment of the habitat. Benchmark fishery-independent surveys (1989 and 2002) identified regions of lobster habitat within the TRL Fishery area. This allowed scientists to design ongoing annual population surveys using a few randomly selected sites, with the number of sites commensurate with the subregion area and lobster abundance.
6. Fishery-independent surveys have been conducted in the Fishery since 1989. Historically (1989-2014 and 2018), mid-season (July) surveys focused on providing an index of abundance of the spawning (age 2+) and juvenile (age 1+) lobsters. Mid-season surveys have been replaced with pre-season (November) surveys (2005-2008; 2014 to current) which focus on providing an index of recruiting (age 1+) lobsters as close as possible to the start of the fishing season to support the change to a quota management system and setting of a TAC. Pre-season surveys also provide indices of recently-settled (age 0+) lobsters, which may become useful depending on how reliable they are, as they allow forecasting of stock one year in advance and are used in the eHCR.
7. The 2023 preseason survey is a key annual output as part of the three year AFMA/TSRA funded project "*Fishery independent surveys, stock assessment, Harvest Strategy and Recommended Biological Catch calculation for the Torres Strait Tropical Rock Lobster Fishery*" which was supported by the Torres Strait Scientific Advisory Committee (TSSAC) at their meeting on 6-7 April 2022, funded from 2022-23 through to 2024-25.

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Thursday Island	MEETING 35 12-13 December 2023
RESULTS OF THE NOVEMBER 2023 PRE-SEASON SURVEY	Agenda Item 6 For DISCUSSION and ADVICE

RECOMMENDATIONS

1. That the RAG:
    a) **DISCUSS** and **PROVIDE ADVICE** on the results of the November 2023 pre-season survey to be presented by CSIRO at the meeting and summarised in a report provided at **Attachment 5a**; and
    b) **NOTE** that in accordance with the TRL Harvest Strategy, under section 2.10 Decision Rules, if in any year the pre-season survey 1+ index is 1.25 or lower (average standardised number of 1+ age lobsters per survey transect) it triggers a stock assessment.

KEY ISSUES

2. CSIRO conducted the annual pre-season survey from 12-13 November 2023. A total of 77 sites were surveyed, selected to provide for comparison with previous surveys. The amount of seabed biota (plants and some selected animals) and also substrate type was also recorded at each survey site. Length frequency data was collected from captured TRL.
3. The pre-season survey data is a key data input (with a 70 per cent weighting) in the empirical harvest control rule (HCR), and the integrated stock assessment when it is run (every three years under the TRL Harvest Strategy).
4. The results of the November 2023 pre-season survey will be presented by CSIRO at the meeting. A summary report of the pre-season population survey is provided at **Attachment 5a**.
5. The RAG is being asked to review the analysis and where relevant provide advice on the findings and/or need for further analysis.
6. Of particular relevance, section 2.10 Decision Rules of the Harvest Strategy provides that:
    - **If in any year the pre-season survey 1+ index is 1.25 or lower (average standardised number of 1+ age lobsters per survey transect) it triggers a stock assessment.**

BACKGROUND

7. Each year in November, the CSIRO undertake an independent scientific pre-season survey to determine the relative abundance and size of lobsters in the Torres Strait, together with an assessment of the habitat. Benchmark fishery-independent surveys (1989 and 2002) identified regions of lobster habitat within the TRL Fishery area. This allowed scientists to

design ongoing annual population surveys using a few randomly selected sites, with the number of sites commensurate with the subregion area and lobster abundance.

8. Fishery-independent surveys have been conducted in the Fishery since 1989. Historically (1989-2014 and 2018), mid-season (July) surveys focused on providing an index of abundance of the spawning (age 2+) and juvenile (age 1+) lobsters. Mid-season surveys have been replaced with pre-season (November) surveys (2005-2008; 2014 to current) which focus on providing an index of recruiting (age 1+) lobsters as close as possible to the start of the fishing season to support the change to a quota management system and setting of a TAC. Pre-season surveys also provide indices of recently-settled (age 0+) lobsters, which may become useful depending on how reliable they are, as they allow forecasting of stock one year in advance and are used in the eHCR.
9. The 2023 preseason survey is a key annual output as part of the three year AFMA/TSRA funded project "*Fishery independent surveys, stock assessment, Harvest Strategy and Recommended Biological Catch calculation for the Torres Strait Tropical Rock Lobster Fishery*" which was supported by the Torres Strait Scientific Advisory Committee (TSSAC) at their meeting on 6-7 April 2022, funded from 2022-23 through to 2024-25.

1 Torres Strait Tropical Rock Lobster 2023 Pre-season Population Survey

Leo Dutra, Nicole Murphy, Steven Edgar, Kinam Salee, Roy Deng, Laura Blamey Denham Parker and Éva Plagányi

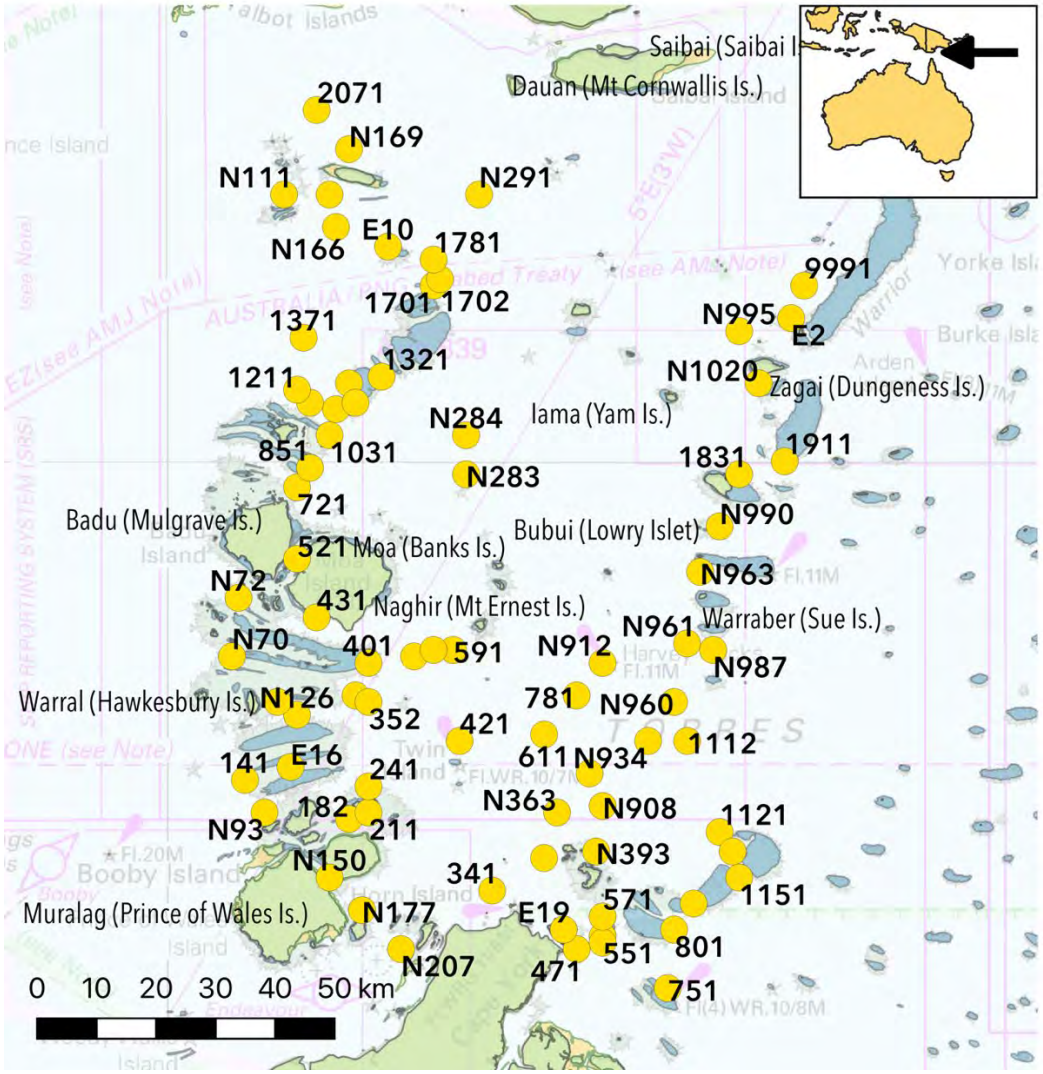
CSIRO Environment

Tropical Rock Lobster Pre-Season Survey Milestone Report – 01 December 2023

Milestone Progress Report – AFMA project no. 2021/0816

The 2023 Tropical Rock Lobster (TRL) Pre-season survey was conducted between the 2nd and the 14th of November 2023. Since 2021, the CSIRO team included a TIB fisher (Mr Tony Salam – skipper of the CSIRO NAIAD RIB and research assistant supporting tail width measurements of collected TRL), along with Leo Dutra, Nicole Murphy, Kinam Salee, and Steven Edgar). The 2023 CSIRO TRL dive team completed 77 survey sites (Figure 1) using the CSIRO NAIAD RIB to conduct the dives, supported by the mothership "Wild Blue" (Rob Benn Holdings) (Figure 2).

Figure 1. Map of western Torres Strait showing the sites surveyed during the 2023 TRL pre-season survey. The yellow dots and corresponding numbers are site identifiers for the survey.



Wind conditions during the 13-day survey varied, ranging between 10-20 knots. From days 1-5 of the survey, winds varied in intensity and were stronger (10-20 knots), dropping to 10-15 knots for days 6-10 and further dropping to 5-10 knots for the remainder of the survey (Figure 3). Underwater visibility averaged around 4m (range 1.5-10m) with neap tidal flows allowing for a good visual census and collection of TRL.

Figure 2. Boats used during the 2023 pre-season survey: Mothership "Wild Blue" (left) and CSIRO tender (Naiad RIB) (right) used to support dive operations.

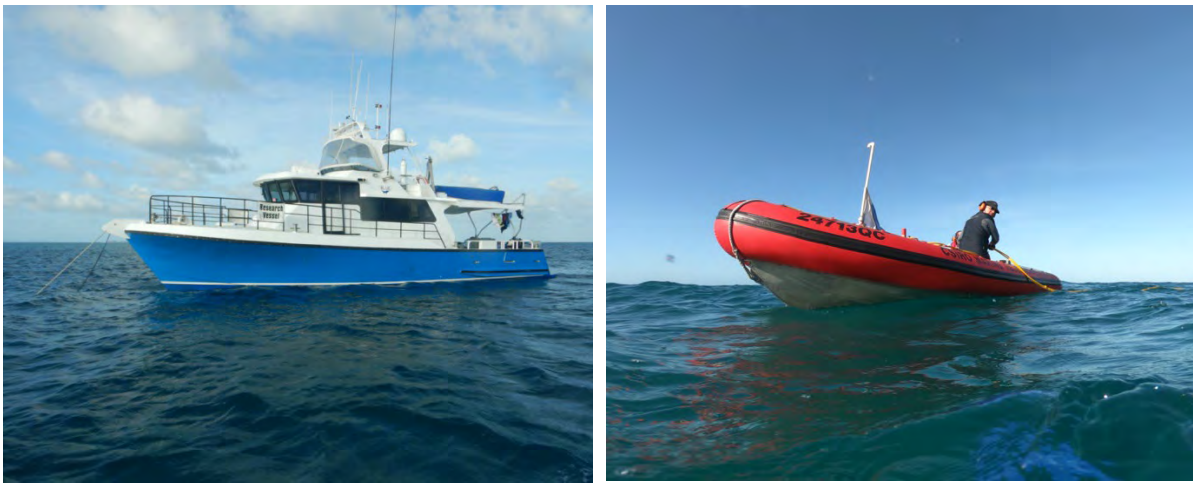


Figure 3. Weather and sea conditions during the 2023 TRL pre-season survey. Top: windy conditions prevailing for the initial 5 days of the survey. Bottom: good weather and calmer wind conditions for the remainder of the survey.

1.1 Survey permits

Three research permits are required and were obtained in 2023 to conduct research associated with TRL population surveys. These include:

- Protected Zone Joint Authority Permit

    - Collect no more than 430 lobster per survey within the area of Australian Jurisdiction in the Torres Strait Tropical Rock Lobster Fishery
- Queensland General Fisheries Permit
    - Collect no more than 430 lobster in tidal waters east of longitude 142˚ 31′ 49″ east and north of latitude 14˚ south
- Great Barrier Reef Marine Park Authority Permit
    - Collect no more than 35 juvenile lobster in total (≤90mm carapace length) per year from 7 sites from within the Great Barrier Reef Marine Park Zone (Figure 1; sites E19, 471, 541, 551, 571, 751, 801), and
    - Collect no more than 5 juvenile lobster per site per year from within the Great Barrier Reef Marine Park Zone

1.2 Site survey

The Dive Team used the standard 2000m^2 belt transect method (2 divers per site each scanning 2m by 500m; Figure 4) with transect distance measured using a Chainman® device. Divers follow the no decompression limits set by the Australian scientific diving code (AS2299.2). As a result, when time limits are reached before completion of the full 500m transects – often due to a lack of tidal current – observed lobster counts are standardised to an area of 2000m^2. At the completion of each transect divers recorded:

- The number of TRL caught per age-class;
- The number and age-class of those observed but not caught;
- Depth;
- Visibility;
- Current speed;
- Distance and direction swum from site co-ordinate;
- Habitat and substrate characteristics of the site.

In addition, species of interest (i.e. pearl oyster (*Pinctada maxima*), crown-of-thorns starfish (*Acanthaster planci*) and holothurian species e.g. *Stichopus herrmanni*) were counted and the habitat characterised using percent cover for the various substrate and biota types (sand, mud, hard substrate (consolidated rubble, limestone pavement, boulders), seagrass, algae, sponges, whips and live coral). The presence of bleached coral was also recorded, where applicable. These data are recorded onto data sheets.

Caught TRL (n=132) were measured (tail width, TW) to provide fishery-independent size-frequency data. Since 2019, temperature and depth profiles were measured at sites using a small Van Essen CTD Diver logger attached to a diver's harness. Since 2021, additional water column data (chlorophyll, depth, fluorescent dissolved organic matter, conductivity, dissolved oxygen, salinity, turbidity, total suspended solids, total dissolved solids, pH and temperature) were collected (up to 25m) using a hand-held sounder (Xylem - YSI EXO2 Multiparameter water quality sonde) deployed from the mothership 'Wild Blue' (Figure 5).

Figure 4. CSIRO Divers sampling a standard belt transect for the annual Torres Strait Tropical Rock Lobster surveys.

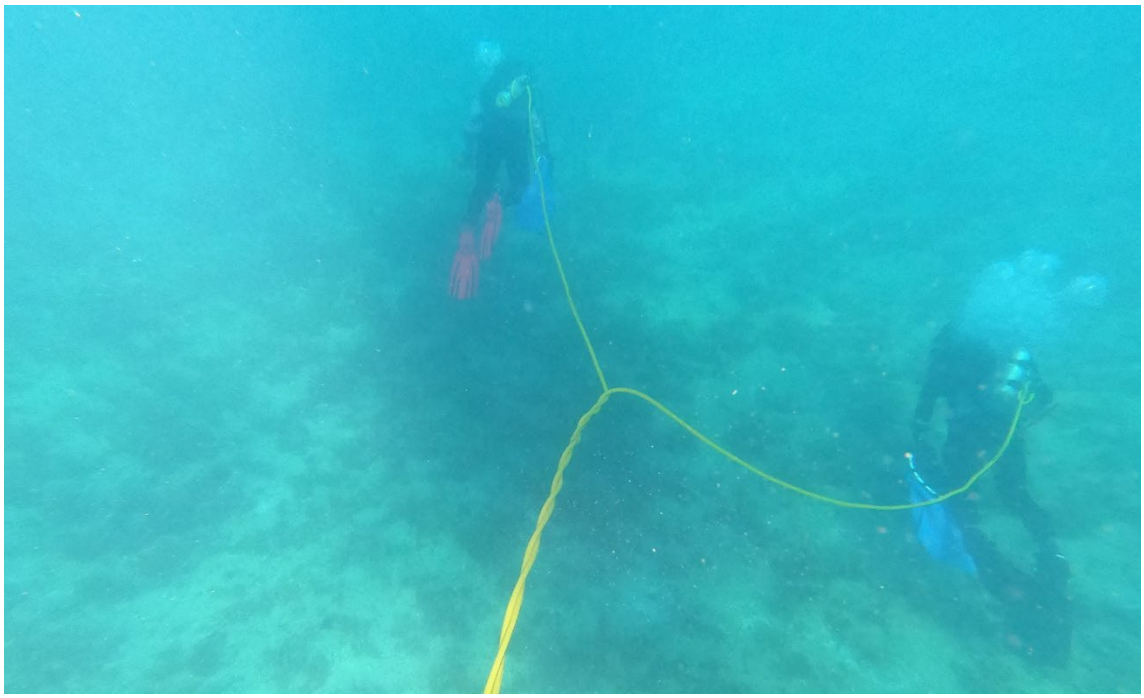


Figure 5. Additional water column data collected onboard the mothership using a hand-held sonde (Xylem - YSI EXO2 Multiparameter water quality sonde).

1.2.1 Survey data analysis

Upon completion of the transect dives, completed data sheets were entered into the project's relational database and verified for accuracy. Post survey data analyses will be presented at TRL RAG meeting on 12-13 December 2023. Some preliminary results are presented below.

1.3 Results

A total of 77 sites were surveyed. Divers aim to complete the full transect length at each site but occasionally transects were shorter than 500m due to bottom time limits of dive tables and weak currents. In 2023, extra safety measures were included in CSIRO dive policy, which further reduced divers' bottom time at deeper dives on the eastern side of the surveyed area. Additional survey pre-planning was done to minimise the number of partial transects. This resulted in only 10 partial transects out of the 77 sites (or 13% of total). This was less than the 20 transects that were previously identified to be potentially partial (i.e. with bottom time < 18 minutes). Out of the 10 partial transects, four were ≥ 400m.

In the 2023 survey a total of 309 TRL were observed and categorised into three age classes in the 2023 pre-season survey, compared to a total of 266 categorised in 2022, 356 in 2021 and 333 in 2020 (Table 1). Of these, 132 were measured (TW) and their sex determined. Males comprised 56% of the TRL measured (n=74) and females 44% (n=58) (Table 2). This is similar to the 2021 survey when 174 TRL were measured, of which 55% were males and 45% females.

As in previous surveys, most of the TRL observed in the 2023 survey (n=176) were from the Age 1+. Age 2+ TRL were rarely observed (n=7) as most have emigrated from Torres Strait during August/September to undertake the annual breeding migration. The number of Age 0+ lobster (n=126) observed during the 2023 survey were significantly higher compared to the previous four years (Table 1; section 1.3.2).

Table 1. Comparison of TRL numbers per age class observed from 2020 to 2023 pre-season surveys.

Age	2020	2021	2022	2023
0+	101	45	50	126
1+	225	307	205	176
2+	7	4	11	7
Total	333	356	266	309

Table 2. Comparison of sex ratios across surveys.

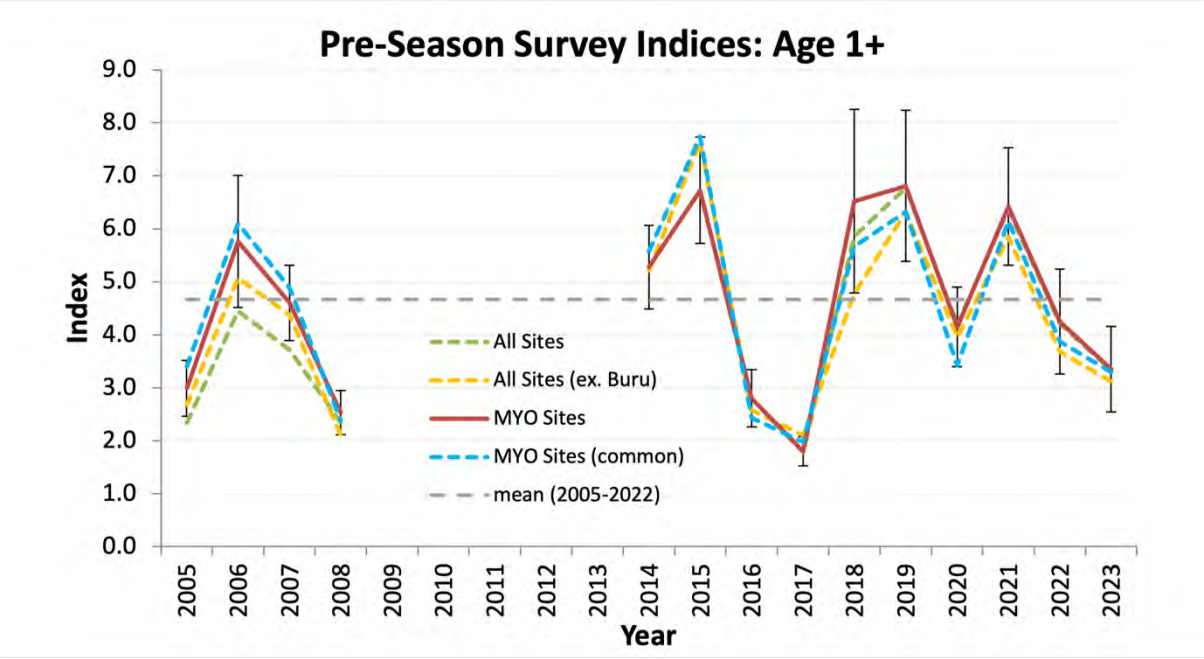
Sex	2020	2021	2022	2023
Female	99 (55%)	79 (45%)	63 (51%)	58 (44%)
Male	80 (45%)	95 (55%)	61 (49%)	74 (56%)
Total	179	174	124	132

1.3.1 Age 1+ TRL lobsters

In 2023, the Age 1+ abundance index for the mid-year only (MYO) sites (red line in Figure 6) was lower than 2022 and below the long-term average, i.e. below the long-term average for the pre-season surveys (2005-2022) shown by dashed grey line. The 2023 Age 1+ point estimate index was close to and slightly above 2005. It was also above point estimates for 2008, 2016 and significantly above the lowest point estimate calculated for 2017. The 2023

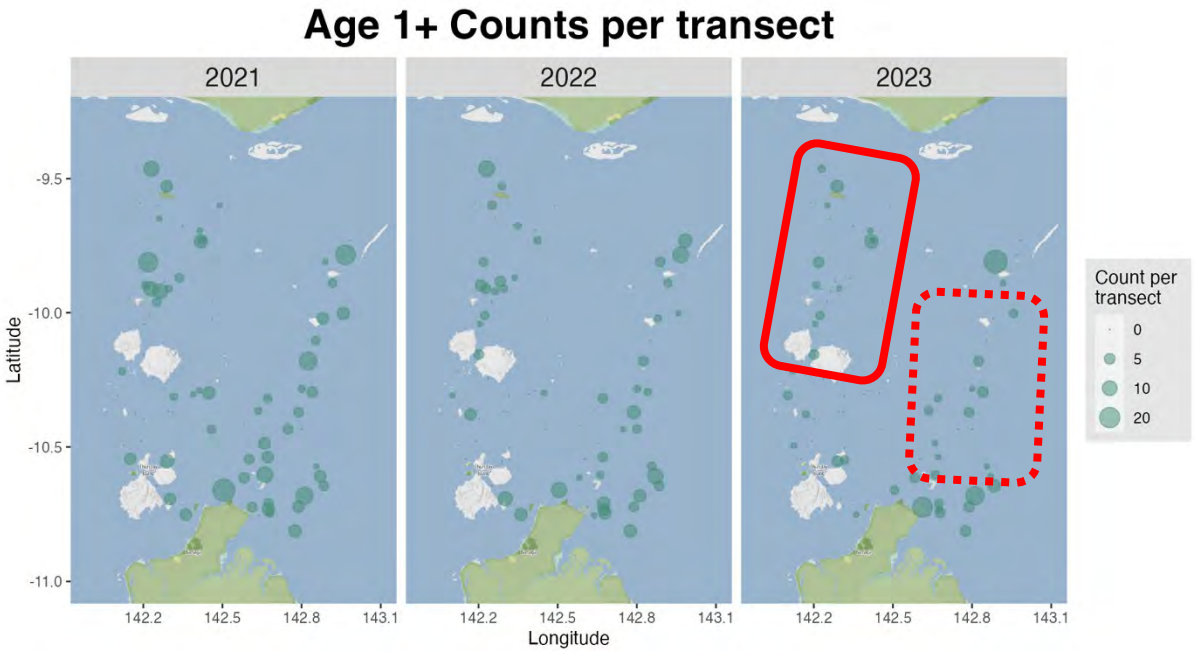
survey index variance was slightly smaller compared to those for 2021-22 surveys, and considerably smaller than the high variances observed in the 2018 and 2019 surveys.

Figure 6. Torres Strait TRL (*P. ornatus*) Age 1+ abundance index (2023) shown for a number of alternative scenarios as indicated. Standard errors for Mid-Year Only (MYO) sites are shown as vertical bars. The long-term average for the pre-season surveys (2005-2022) is indicated by the horizontal grey dashed line.



Although the counts of Age 1+ TRL in 2023 were lower, they had a similar spatial distribution compared to 2022. This is shown in Figure 7 using circles which appear around the same locations in 2022 and 2023, but with some exceptions. For example, in the southeast quadrant of the survey area, 2023 counts were less compared to 2022. Historically, the eastern side of the surveyed area shows higher counts of Age 1+ TRL (Figure 8). Exceptions are in 2016 and 2018, when Age 1+ TRL counts were higher on the western side. Age 1+ TRL counts on the western side were lower (i.e. smaller circles) compared to 2022 (red square in Figures 7 and 8). It is important to note that the changes in spatial distribution over time and space are natural occurrences and happen from time to time, as seen from 2020-2023 (Figures 7-10). Counts for Age 1+ TRL on the eastern central region of the surveyed area in 2023 were lower compared to 2021-22 (dashed square in Figure 7). Similar to the previous two years, counts of Age 1+ TRL on the southeast region remained high.

Figure 7. Torres Strait TRL (*P. ornatus*) Age 1+ counts per transect across all sites surveyed in 2023 (n=77). The red boxes show representative areas for the survey, where numbers were lower than observed during the 2021 and 2022 survey years (i.e. fewer or smaller circles).



The abundance index for Age 1+ TRL across the survey regions (strata) in 2023 (Figure 9) indicates that recruitment to the fishery is generally widespread across the different regions surveyed. The highest recruitment was recorded at the Warraber Bridge. Similar to 2021 and 2022, recruitment at TI_Bridge was the lowest (Figures 9-10). A large standard error for Warraber Bridge, Reef Edge and Buru reflects the high variability in counts between sites within these regions. The 2023 results for the Age 1+ (point estimate) abundance index was around or above average in Warraber Bridge, South-East, Reef Edge and Buru and below average at Mabuiag, Kirkaldie Rubble and TI Bridge. Historically the indices of TI Bridge and Mabuiag are generally below the historical average, but Age 1+ index for Kirkaldie Rubble is generally above average (Figure 10). Low indices observed at these regions are potentially due to habitat differences and possibly varying currents and settlement, the latter could possibly explain low counts in Kirkaldie Rubble in 2023. In 2023 counts for Age 1+ TRL were more variable within Warraber Bridge and Reef Edge regions compared to the previous 3 years (higher standard errors shown in Figure 9B). Different to 2021 and 2022, the counts in these regions in 2023 varied more, i.e. the sizes of the bubbles (Figure 7) varied more; meaning there were more sites with high counts (e.g. 20 lobsters) in 2023 compared to the previous 2 years, but also more sites with lower counts (Figures 7, 9 and 10)

Figure 8. Torres Strait TRL (*P. ornatus*) Age 1+ counts for 2023 across the western and eastern regions of the surveyed area.

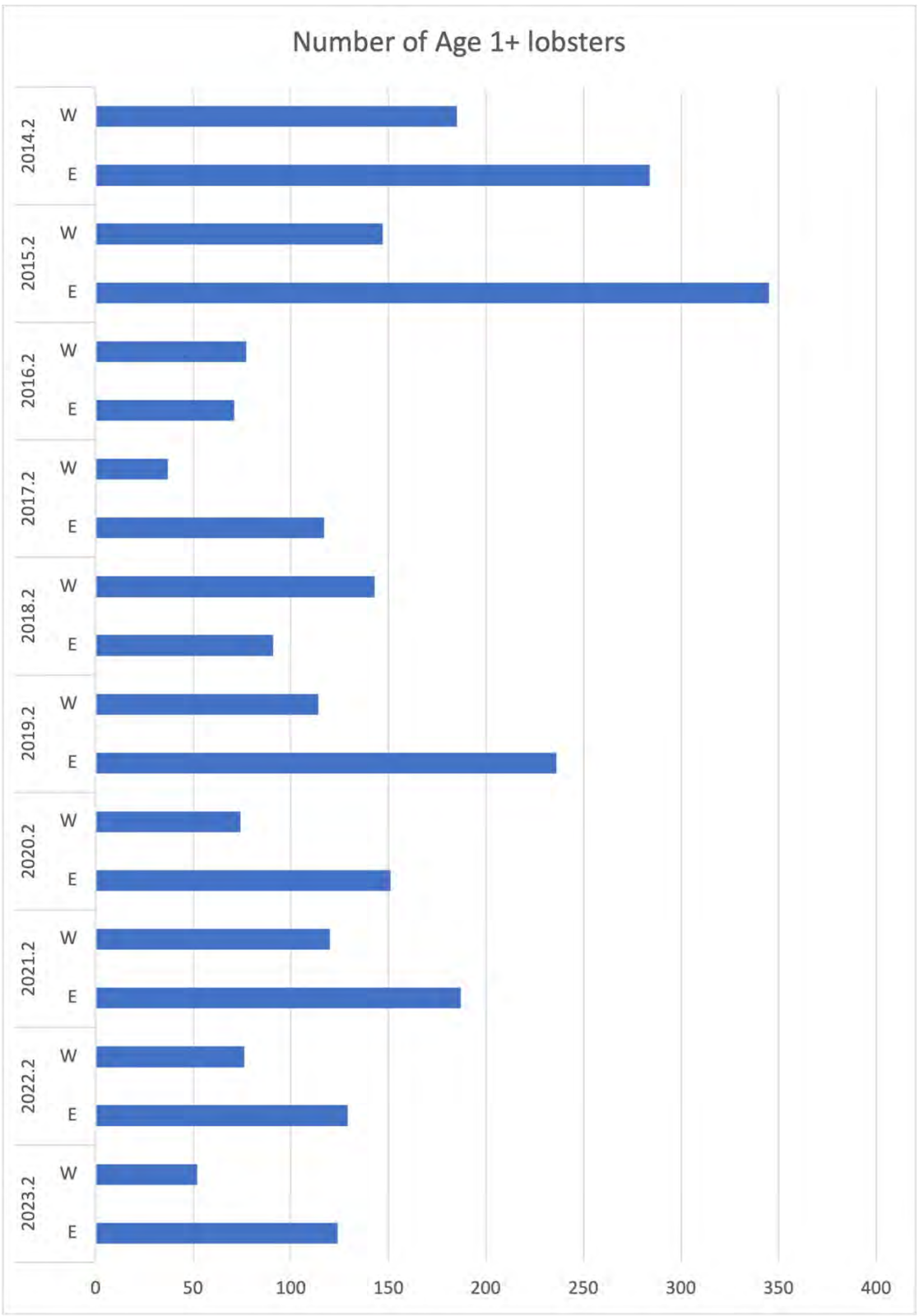


Figure 9. A) Strata (regions) sampled during the annual Torres Strait TRL (*P. ornatus*) surveys. B) Torres Strait TRL 2023 Age 1+ abundance index and standard errors by regions (stratum). The red dashed line indicates the mean abundance index for period between 2005 and 2022. Note that the 'Reef Edge' stratum is not shown on the map due to visualisation issues. The stratum consists of sites 1321, 9991, E10, E16, E19 and E2.

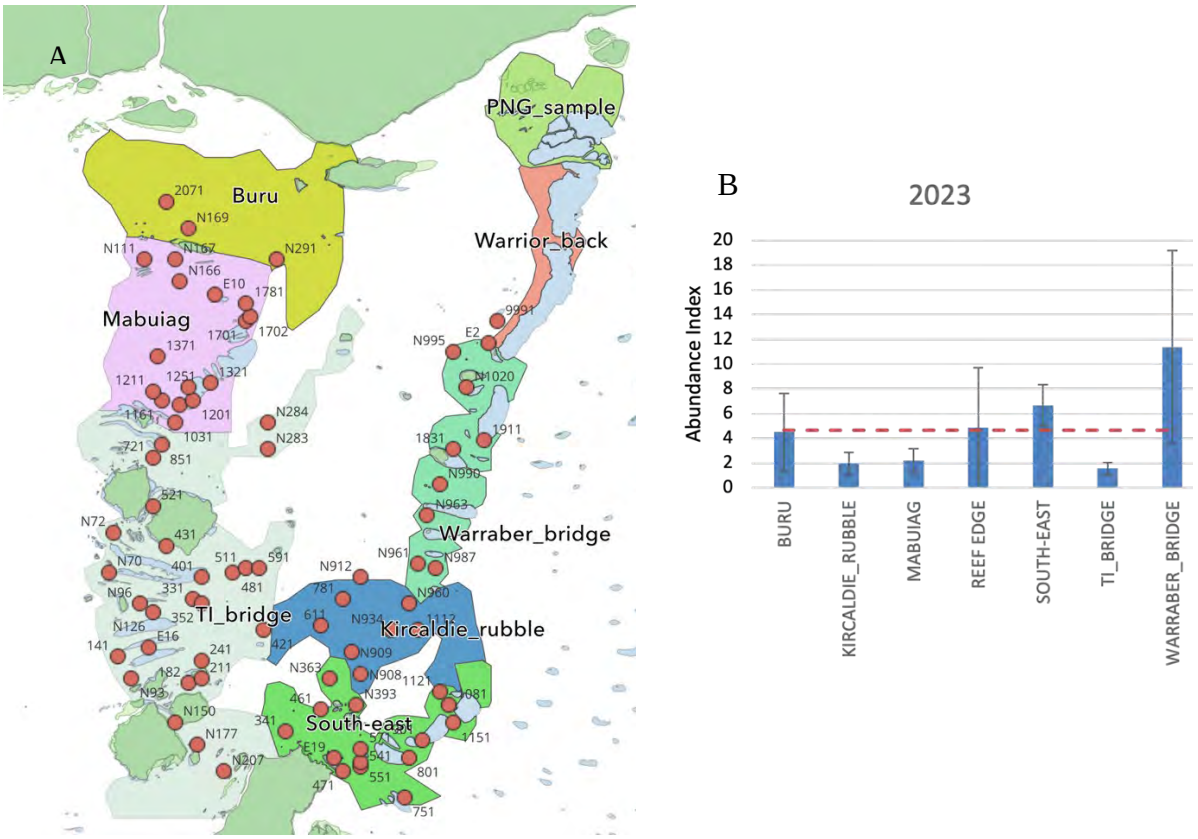
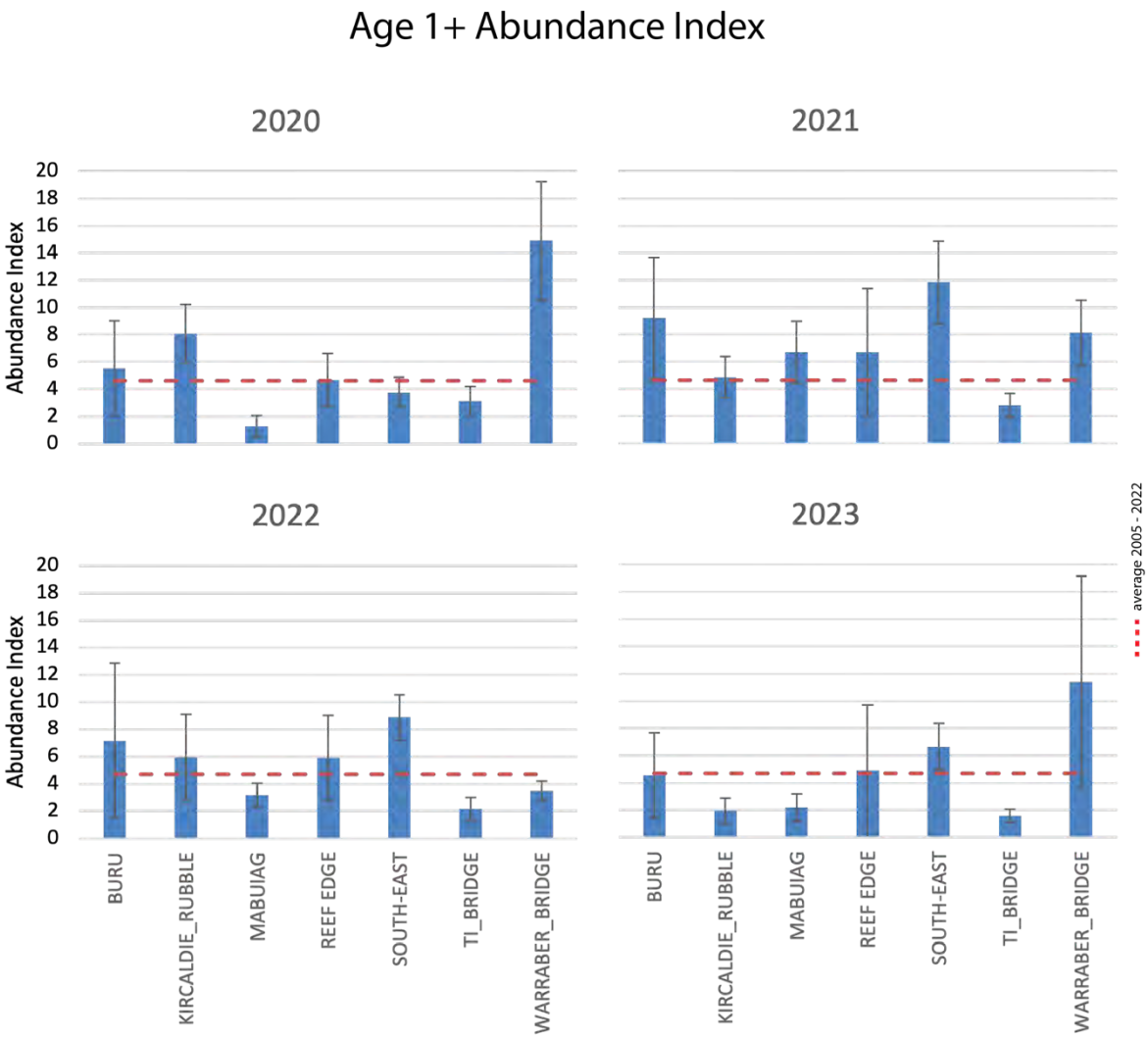


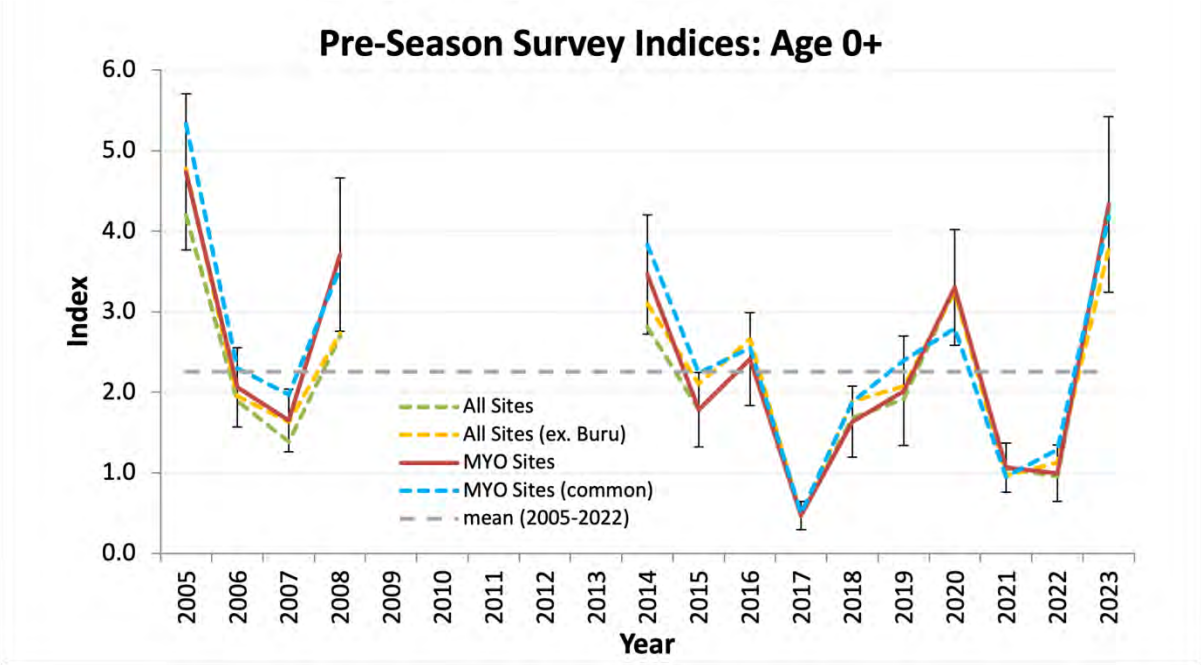
Figure 10. Torres Strait TRL (*P. ornatus*) Age 1+ abundance indices (and standard errors) across years and strata. The red dashed line represents the mean abundance index for the period between 2005-2022 for Mid-Year Only (MYO) sites.



1.3.2 Age 0+ TRL lobsters

In 2023 the Age 0+ abundance index point estimate showed a significant increase from the previous two years to levels that are the second highest after 2005 (Figures 11-14). Historically, survey data indicate that Age 0+ TRL typically settle on the western side of survey area (Figures 12-13). In 2023, Age 0+ TRL followed the historical trend, i.e. they were more commonly and disproportionally observed on the western side of the surveyed area after 2 years (2021-2022) of a more even distribution between eastern and western sides (Figure 12). In 2023 there were twenty times more Age 0+ TRL settling on the western side compared to the eastern side of the survey area (Figures 12 and 13).

Figure 11. Torres Strait TRL (*P. ornatus*) Age 0+ abundance indices (and standard errors) across years. The red dashed line represents the mean abundance index for the period between 2005-2022 for Mid-Year Only (MYO) sites.



The highest abundance of Age 0+ TRL were observed in Mabuiag, Buru and TI_Bridge, respectively, noting large variability especially in Buru (Figure 13). It is important to note that Buru and Mabuiag are regions where Age 0+ TRL counts are historically high (data not shown). The low counts of Age 0+ TRL in 2021 and 2022 were associated with no or little observations of recently settled TRL in Buru and Mabuiag. Overall (and similar to 2020), in 2023 abundance indices (point estimates) for recently settled TRL (Age 0+) were well above average for Buru and Mabuaig, contributing to a high overall index (Figures14-15). Age 0+ indices were zero or below average on Reef Edge, Southeast and Warraber Bridge. These regions have shown below average indices for the previous three surveys (Figures 14-15). Survey results show year to year variability in spatial distribution of where TRL settle, with an upward trend in 2023 from low counts in 2021 and 2022 (Figure 11).

Figure 12. Torres Strait TRL (*P. ornatus*) Age 0+ counts for the western and eastern regions of the surveyed area from 2014 to 2023.

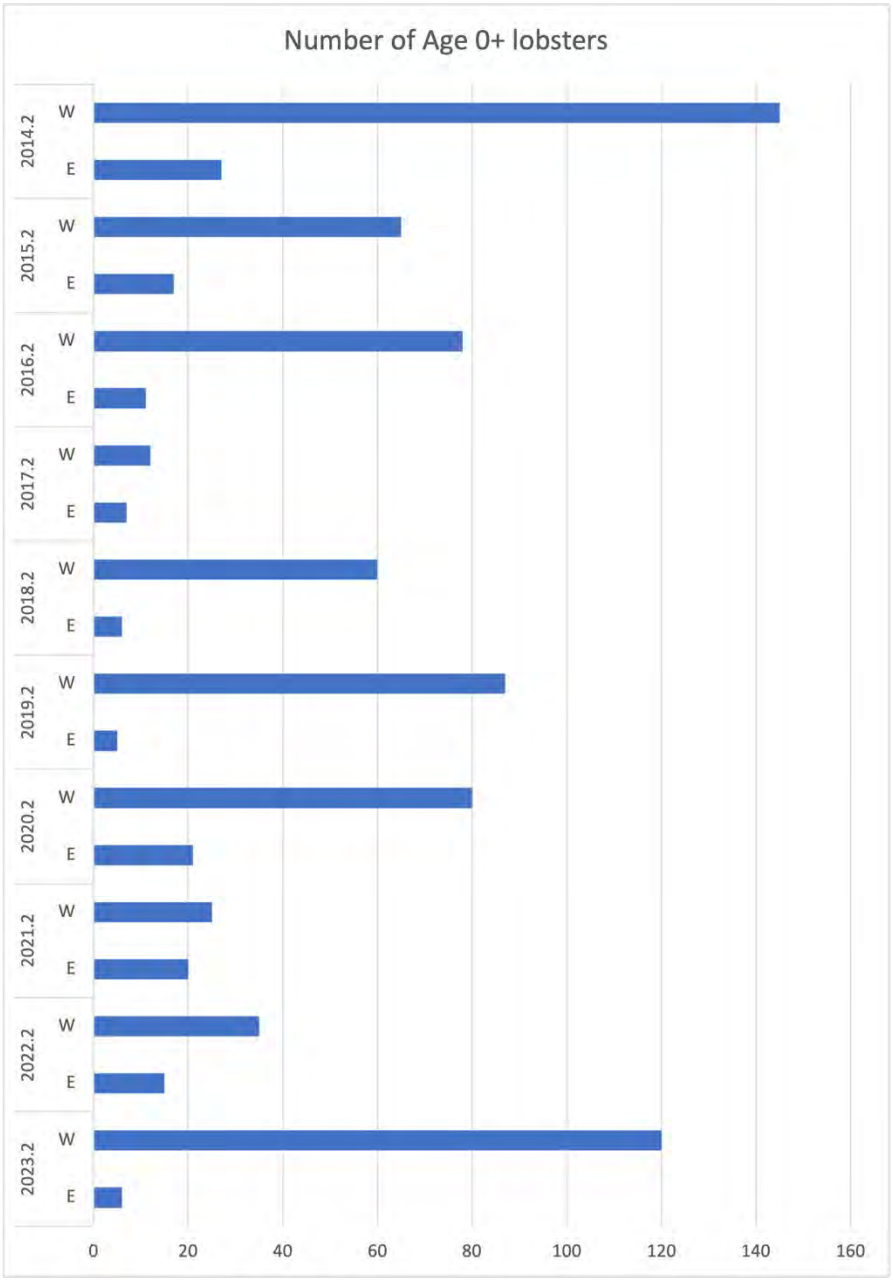


Figure 13. Torres Strait TRL (*P. ornatus*) Age 0+ counts per transect for all sites surveyed in 2023 (n=77). The red box shows a representative area for the survey, where numbers were significant higher compared to 2021 and 2022 survey years (i.e. more or larger circles).

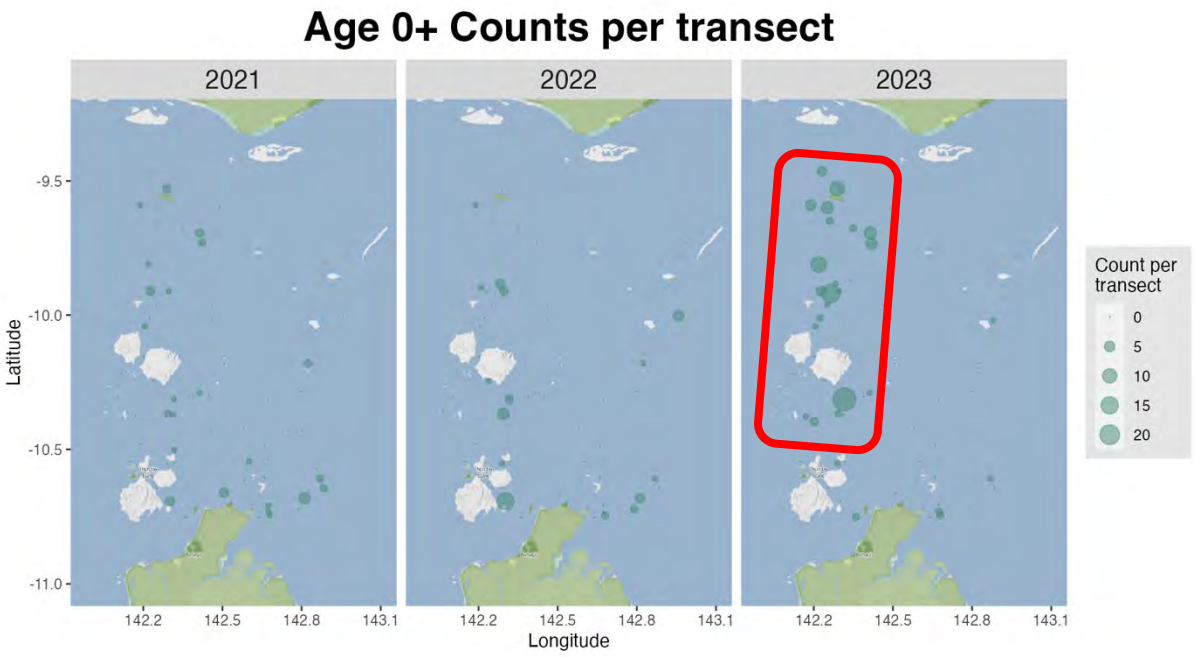
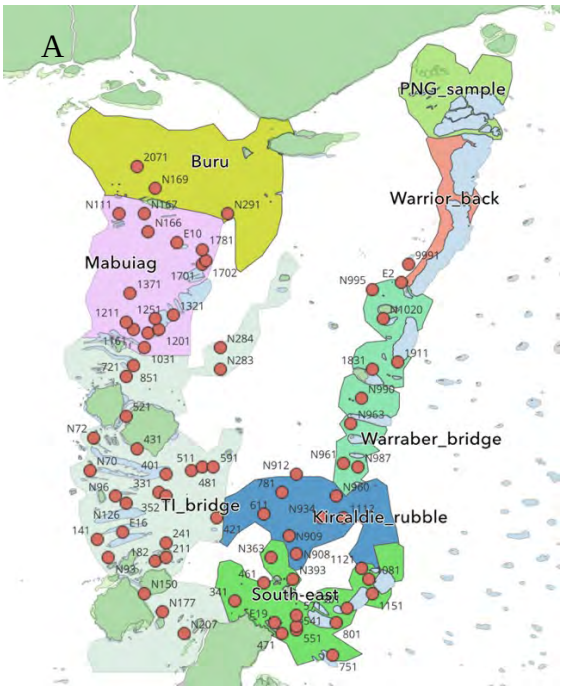


Figure 14. A) Regions (strata) sampled during the annual Torres Strait TRL (*P. ornatus*) surveys. B) Torres Strait TRL 2023 Age 0+ abundance index and standard errors) by stratum. The red dashed line indicates the mean abundance index for period between 2005 and 2022. Note that the 'Reef Edge' stratum is not shown on the map due visualisation issues. The stratum consists of sites 1321, 9991, E10, E16, E19 and E2.



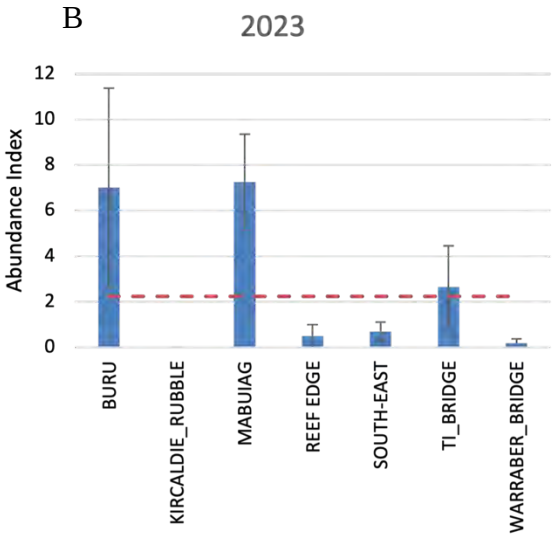
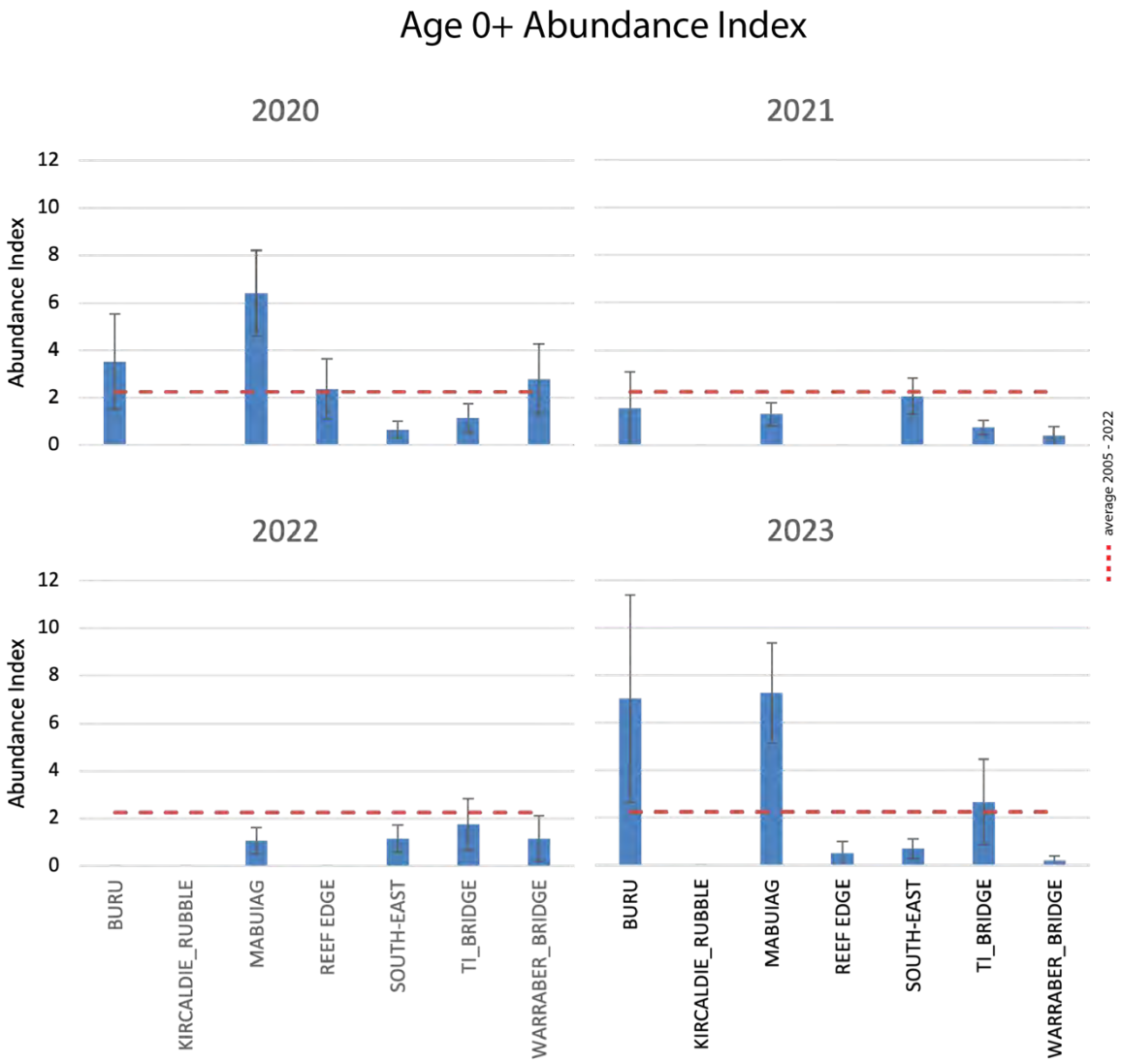


Figure 15. Torres Strait TRL (*P. ornatus*) Age 0+ abundance indices (and standard errors) across years and strata. The red dashed line represents the mean abundance index for the period between 2005-2022 for Mid-Year Only (MYO) sites.



1.4 Preliminary summary results

A total of 77 sites were surveyed in 2023. Good weather and sea conditions prevailed during the survey. Divers aim to complete the full transect length at each site but occasionally partial transects were completed due to bottom time limits of dive tables and weak currents. In 2023, there were 10 partial transects out of the 77 sites (or 13% of total) despite the survey team identifying potential for partial transect for 20 sites (i.e. with bottom time < 18 minutes).

In total, 309 TRL were observed and categorised into three age classes in the 2023 pre-season survey. Of these, 132 were measured (TW) and their sex determined. Males comprised 56% of the lobsters measured (n=74) and females 44% (n=58). As in previous surveys, Age 1+ TRL comprised the majority of TRL observed in 2023 (n=176). Age 2+ TRL were rarely observed (n=7) as most have emigrated from Torres Strait in August/September to undertake the annual breeding migration.

The Age 1+ abundance index for 2023 was lower than the 2022 index and the point estimates were below average for mid-year sites (MYO) and around or above average for Warraber Bridge, South-East, Reef Edge and Buru. There were lower counts of Age 1+ TRL in the northwestern and central east sections of the survey area compared to 2021 and 2022.

Age 0+ abundance index point estimate for 2023 showed a significant increase from the previous 2 years, to levels that are the second highest after 2005. In 2023, Age 0+ TRL were again more commonly and disproportionally observed on the western side of the surveyed area, after more even counts on west and east sides in 2021-2022. In 2023, twenty times more Age 0+ TRL were observed settling on the west, relative to the east side of the survey area.

These results further corroborate that there is year to year variability in spatial distribution where TRL settle in Torres Strait. Further detail on TRL spatial distribution as well as habitat monitoring results will be presented at the forthcoming TRLRAG meeting.

Acknowledgements

We wish to sincerely thank the master (Rob Benn) and crew (Anita Benn) of the Wild Blue and Mr Tony Salam for excellent assistance in all aspects of the pre-season dive survey in Torres Strait, and in logistic support. We gratefully acknowledge funding support for the survey from AFMA and CSIRO.

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) **Thursday Island**	**MEETING 35** **12-13 December 2023**
AMENDING THE EHCR FOR FUTURE SEASONS	**Agenda Item 7.1** **For DISCUSSION and ADVICE**

RECOMMENDATIONS

1. That the RAG:

    a. **NOTE** and **DISCUSS** the presentation from CSIRO on options for an amended empirical Harvest Control Rule (eHCR) to be applied in future seasons.

    b. **NOTE** the process for formally amending the Harvest Strategy to implement the agreed amendments to the eHCR will take time (see **Attachment 7.1a**), and that the RAG will have the opportunity to consider it further at an additional meeting in 2024 (to be discussed under **Agenda Item 12**).

    c. **AGREE** to and **RECOMMEND** a way forward in amending the eHCR, including any additional analyses, if necessary.

KEY ISSUES

2. Although designed to give industry confidence in decision making, harvest strategies are intended to undergo regular review and may require ongoing refinement. This is especially true in the rapidly changing conditions (economic and environmental) that we are likely to experience in the coming years.

3. When the Harvest Strategy, with the eHCR as a critical component, was implemented in 2019 the largescale disruptions to the TRL fishery and significant socioeconomic pressures as experienced in recent years were not accounted for.

4. TRLRAG 32 recommended that revision of the eHCR be investigated, and the CSIRO have prepared options to this effect. Recognising the impact of recent conditions on the fishery, and unanticipated effect of such conditions on the eHCR (and by extension the application of the TRL Harvest Strategy) the RAG is being asked to consider these options and agree on a way forward.

5. A revised eHCR will allow the RAG to continue to provide well informed and reliable advice, and provide confidence to the PZJA as the decision maker on the RBC. Any formal revision on the eHCR will have to go through a formal approval process, including through the PZJA, as detailed in **Attachment 7.1a**.

BACKGROUND

Harvest Strategy review

6. The Commonwealth Fisheries Harvest Strategy Policy and Guidelines, upon which the TRL Harvest Strategy (**Attachment 7.1b**) is based as best practice, specify that harvest strategies are to be reviewed every five years but may be reviewed earlier if necessary.

7. Section 2.13 of the TRL Harvest Strategy provides guidance on when a review may be required earlier than 5 years, including relating to changing external drivers.

8. As external drivers, ongoing market and economic pressures recently encountered in the fishery are beyond what was considered when the eHCR was developed, and warrant a revision of the eHCR. TRLRAG recommended this revision at their 32nd meeting in December 2021.

The empirical Harvest Control Rule (eHCR)

9. The eHCR is an integral component of the TRL Harvest Strategy (**Attachment 7.1b**) that is used to rapidly determine an RBC each fishing season.

10. The eHCR formula is the multiple of the average annual catch over the last five years (using available catch from TIB, TVH and PNG sectors), and a statistic which measures the relative performance of the fishery based on the following data inputs:

    a. the pre-season survey index of abundance of juvenile recruiting 1+ lobsters (70 per cent weighting);

    b. the pre-season survey index of abundance of newly recruited 0+ lobsters (10 per cent weighting);

    c. the standardised CPUE index from the TVH sector (10 per cent weighting)

    d. the standardised CPUE index from the TIB sector (10 per cent weighting).

11. CSIRO have developed an eHCR RBC calculator to assist stakeholders in understanding how the eHCR works (**available on request**). A non-technical summary explaining the design of the eHCR is also provided at **Attachment 7.1c**.

Lower than expected average catch multiplier

12. In recent seasons, the TRL Fishery has experienced a series of disruptions to both the export market and the fishing sector which has resulted in lower than expected, trends in total catch of TRL against the global TAC.

13. TRLRAG has previously discussed the implications of a lower-than-expected average catch multiplier on the eHCR, which in one season may not be as influential give the total catch is averaged over a five year period. However, in circumstances where the negative average total catch trend continued (i.e. since 2019-20), it can start to drive the RBC estimates down.

14. TRLRAG 32 (15 December 2021) and TRLRAG 33 (13-14 December 2022) implemented an ad-hoc method, whereby the actual catch value for anomalous seasons was substituted with the total fishery TAC, to account for these exceptional circumstances.

15. Although justifiable in anomalous exceptional circumstances where no biological risk to the stock was identified, implementing an ad-hoc approach is not suitable in an ongoing capacity.

16. The RAG is therefore being asked to consider options investigated by the CSIRO for formally amending the eHCR. The RAG should note that the process for formally amending the eHCR and the TRL Harvest Strategy (see **Attachment 7.1a**) requires several steps and will allow for the RAG and Working Group to provide further input in early 2024.

Process for formally amending the eHCR and TRL Harvest Strategy

STEP	TASK	TIMING (Indicative only, subject to capacity)
1	**CSIRO present potential options** Consider options for amending the eHCR ahead of TRLRAG35, and share with the group during the December meeting.	TRLRAG35 December 2023
2	**RAG discuss options and agree on a way forward** After CSIRO's presentation, the RAG can discuss and recommend an agreed way forward (which may require additional analyses).	TRLRAG35 December 2023
3	**RAG set 2023-24 season TAC** Acknowledging that formally amending the Harvest Strategy to implement the new agreed eHCR/method will take time, the RAG may use an ad-hoc approach (as in previous years) to set the 2023-24 TAC; Option 1 – use actual catch as the average catch multiplier If conditions are <u>not the same as the 2021-22 season</u>, or we have reason to be concerned about the biological status of the stock, then we should use catch in the eHCR as normal. Option 2 – use the TAC in place of actual catch (as in previous years). If conditions <u>are the same as the 2021-22</u> season (fuel prices high, lobster prices low and catch low) <u>AND</u> there is nothing to suggest increased biological concern about the status of the stock, then we should apply the same approach as last season and use the TAC in place of catch in the eHCR.	TRLRAG35 December 2023
4	**Update provided to the DCCEEW** AFMA to update the Department of Climate Change, Energy, the Environment and Water (DCCEEW), and feed any comments or questions back to the RAG.	Late December 2023
5	**RAG consider amendments to Harvest Strategy** Once changes to harvest strategy are drafted, the RAG will have a further opportunity to consider the amendments.	May/June 2024
6	**WG consider amendments to Harvest Strategy** Once changes to harvest strategy are drafted, the WG will have a further opportunity to consider the amendments.	May/June 2024
7	**Public/community consultation** Letter detailing the proposed change to be sent to all licences holders. There may also be the opportunity to provide an update during community visits if these occur.	Mid 2024
8	**PZJA approve amendments to Harvest Strategy**	Mid 2024 (very latest PZJA will have to approve before December 2024)
9	**Update provided to DCEEW** AFMA to provide a further update to DCEEW following PZJA approval and finalisation of the amendments to the harvest strategy.	Late 2024
10	**RAG apply new method to determine 2024-25 season TAC**	December 2024 RAG meeting

Australian Government

Australian Fisheries Management Authority

Torres Strait Tropical Rock Lobster Fishery Harvest Strategy

November 2019

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This harvest strategy is based on outcomes from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Oceans and Atmosphere Division project, *Torres Strait Tropical Rock Lobster (TRL) fishery surveys, stock assessment, harvest control rules and RBC*. The project was funded by the Australian Fisheries Management Authority (AFMA).

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CONTENTS

GLOSSARY

Types of reference points:

Reference Point	Description
Metarule	A rule that describes how the RBCs obtained from an assessment should be adjusted in calculating a recommended TAC
Target	The desired state of the stock or fishery (for example, MEY or B_{TARG})[1]
Limit	The level of an indicator (such as biomass or fishing mortality) beyond which the risk to the stock is regarded as unacceptably high[1]
MEY	The sustainable catch or effort level for a commercial fishery that allows net economic returns to be maximised. In this context, maximised equates to the largest positive difference between total revenue and total cost of fishing[1]
MSY	The maximum average annual catch that can be removed from a stock over an indefinite period under prevailing environmental conditions[1]

Notation:

Notation	Description
B	Spawning biomass - the total weight of all adult (reproductively mature) fish in a population[1]
B_0	The unfished spawning biomass (determined from an appropriate reference point)
F	Fishing mortality rate
B_{LIM}	Biomass limit reference point - the point beyond which the risk to the stock is regarded as unacceptably high[1]
B_{TARG}	Biomass target reference point - the desired biomass of the stock[1]

Other acronyms:

Acronym	Description
CPUE	Catch per unit effort
eHCR	Empirical Harvest Control Rule
HCR	Harvest Control Rule - pre-determined rules that control fishing activity according to the biological and economic conditions of the fishery (as defined by monitoring or assessment). Also called 'decision rules'. HCR are a key element of a harvest strategy[1]
HSP	*Commonwealth Fisheries Harvest Strategy Policy: Framework for applying an evidence-based approach to setting harvest levels in Commonwealth fisheries* (June 2018)
HS	Torres Strait Tropical Rock Lobster Fishery Harvest Strategy
PZJA	Protected Zone Joint Authority

[1] Definition sourced from the *Commonwealth Fisheries Harvest Strategy Policy: Framework for applying an evidence-based approach to setting harvest levels in Commonwealth fisheries* (June 2018)

MSE	Management Strategy Evaluation - a procedure whereby alternative management strategies are tested and compared using simulations of stock and fishery dynamics[1]
RBC	Recommended Biological Catch
TRLRAG	Protected Zone Joint Authority Tropical Rock Lobster Resource Assessment Group
TRLWG	Protected Zone Joint Authority Tropical Rock Lobster Working Group
TAC	Total Allowable Catch- the annual catch limit set for a stock, species or species group. Used to control fishing mortality within a fishery[1]
Tiered approach	A framework that uses different control rules to cater for different levels of uncertainty about a stock
TIB	Traditional inhabitant boat
TVH	Transferrable vessel holder
TRL	Tropical Rock Lobster
TSPZ	Torres Strait Protected Zone

OVERVIEW

The Torres Strait Tropical Rock Lobster Fishery (the Fishery) Harvest Strategy (HS) sets out the management actions needed to achieve the agreed Fishery objectives. The HS describes the performance indicators used for monitoring the condition of the stock, the fishery-independent survey and stock assessment procedures and the rules applied to determine the recommended biological catch (RBC) and the total allowable catch (TAC) each fishing season.

The HS uses a single tier approach with an empirical harvest control rule (eHCR) that is used to determine a RBC. The eHCR uses the pre-season survey index of abundance of juvenile (1+) and newly recruited (0+) Tropical Rock Lobster (TRL) and the catch per unit effort (CPUE) indices for the traditional inhabitant boat (TIB) and transferrable vessel holder (TVH) fishing sectors. The eHCR has been extensively tested using Management Strategy Evaluation (MSE) (Plagányi *et al.* 2018). The RBC is the best available scientific advice on what the total fishing mortality (landings from all sectors and discards) should be for the stock. The RBC is used to negotiate Australia-Papua New Guinea catch sharing and recommend TACs (an enforced limit on total catches).

The HS meets the requirements of the *Commonwealth Fisheries Harvest Strategy Policy: Framework for applying an evidence-based approach to setting harvest levels in Commonwealth fisheries* (June 2018) *(*HSP) by applying a precautionary approach to the reference points and measures to be implemented in accordance with the reference points. This is reflected in the use of proxy reference points that are more precautionary than those specified in the HSP. The eHCR is designed to decrease exploitation rate as the stock size decreases below the target reference point. The HS uses a biomass target reference point equal to recent levels (2005-2015) that take account of the fact that the resource is shared and important for the traditional way of life and livelihood of traditional inhabitants and is biologically and economically acceptable. The HS proxies are B_{LIM} is 32% of B_0, B_{TARG} is 65% of B_0.

Further work for the HS will include the development of a tiered approach. The tiered approach applies different types of control rules to cater for different amounts of data available and to account for changes to uncertainty on stock status. A tiered approach adopts increased levels of precaution that correspond to increasing levels of uncertainty about the stock status, in order to maintain the same level of risk across the different tiers.

The status of the stock and how it is tracking against the HS, is reported to the Tropical Rock Lobster Resource Assessment Group (RAG), Tropical Rock Lobster Working Group (TRLWG) and the Protected Zone Joint Authority (PZJA). The stock assessment is conducted periodically to evaluate stock status relative to reference levels and, in doing so, performance of the eHCR. The stock assessment includes considerations of the catch rates in current and previous fishing seasons, how the catches compare to the RBCs, stock status indicators in relation to the reference points and an RBC for the upcoming fishing season.

1 BACKGROUND

This Torres Strait Tropical Rock Lobster Fishery (the Fishery) Harvest Strategy (HS) has been developed in accordance with the *Commonwealth Fisheries Harvest Strategy Policy: Framework for applying an evidence-based approach to setting harvest levels in Commonwealth fisheries* (June 2018) (HSP) and consistent with objectives of the *Torres Strait Fisheries Act 1984* (the Act).

The Fishery HS takes into account key fishery specific attributes including:

a) there is potential for large, unpredictable inter-annual variations in availability and abundance of Tropical Rock Lobster (TRL);

b) TRL is a shared resource important for the traditional way of life and livelihood of traditional inhabitants, commercial and recreational sectors (Tropical Rock Lobster Resource Assessment Group (TRLRAG) 20, 4-5 April 2017); and

c) advice from the TRLRAG industry members to maintain stock abundance at recent levels (2005-2015) (TRLRAG 17, 31 March 2016).

1.1 COMMONWEALTH FISHERIES HARVEST STRATEGY POLICY

The objective of the HSP is the ecologically sustainable and profitable use of Australia's Commonwealth commercial fisheries resources (where ecological sustainability takes priority) - through implementation of harvest strategies.

To pursue this objective the Australian Government will implement harvest strategies that:

a) ensure exploitation of fisheries resources and related activities are conducted in a manner consistent with the principles of ecologically sustainable development, including the exercise of the precautionary principle

b) maximise net economic returns to the Australian community from management of Australian fisheries - always in the context of maintaining commercial fish stocks at sustainable levels

c) maintain key commercial fish stocks, on average, at the required target biomass to produce maximum economic yield from the fishery

d) maintain all commercial fish stocks, including byproduct, above a biomass limit where the risk to the stock is regarded as unacceptable (B_{LIM}), at least 90 per cent of the time

e) ensure fishing is conducted in a manner that does not lead to overfishing - where overfishing of a stock is identified, action will be taken immediately to cease overfishing

f) minimise discarding of commercial species as much as possible

g) are consistent with the *Environment Protection and Biodiversity Conservation Act 1999* and the *Guidelines for the Ecologically Sustainable Management of Fisheries*.

For fisheries that are managed jointly by an international organisation or arrangement, the HSP does not prescribe management arrangements. This includes management arrangements for commercial and traditional fishing in the Torres Strait Protected Zone (TSPZ), which are governed by provisions of the Torres Strait Treaty and the *Torres Strait Fisheries Act 1984*. However, it does articulate the government's preferred approach.

The HSP provides for the use of proxy settings for reference points to cater for different levels of information available and unique fishery circumstances. This balance between prescription and flexibility encourages the development of innovative and cost effective strategies to meet key policy objectives. Proxies, including those that exceed the minimum standards, must be demonstrated to be compliant with the HSP objective.

With a harvest strategy in place, fishery managers and stakeholders are able to operate with pre-defined rules, management decisions are more transparent, and there are likely fewer unanticipated outcomes necessitating hasty management responses. However, due to the inherently natural variability of TRL abundance there may be a need for significant changes in recommended catch on an annual basis.

1.2 DEVELOPMENT OF THE TRL HARVEST STRATEGY

The HS has been developed in consultation with the TRLRAG (meeting no. 17 on 31 March 2016; meeting no. 18 on 2-3 August 2016; meeting no. 19 on 13 December 2016; meeting no. 20 on 4-5 April 2017; meeting no. 22 on 27-28 March 2018; meeting no. 24 on 18-19 October 2018; and meeting no. 25 on 11-12 December 2018; out of session 16 September-9 October 2019) and TRLWG (meeting no. 6 on 25-26 July 2017; meeting no. 9 on 19-20 February 2019; out of session 16 September-9 October 2019). This HS replaces the interim HS developed for the Fishery in 2008.

2 TRL FISHERY HARVEST STRATEGY

2.1 SCOPE

This HS applies to the whole Fishery and it takes into account catch sharing arrangements between Australia and Papua New Guinea (PNG).

The HS outlines the control rules used to develop advice on the recommended biological catch (RBC) and to recommend total allowable catches (TACs) (an enforced limit on total catches). The HS sets the criteria that pre-agreed management decisions will be based on in order to achieve the HS objectives.

Over time the HS may be amended to use a tiered approach to cater for different amounts of data available and different types of assessments (for example mid-season surveys and annual assessments). Underpinning a tiered HS is increased levels of precaution with increasing levels of uncertainty about the stock status. Each tier has its own harvest control rule (HCR) and associated rules that are used to determine a RBC.

2.2 OBJECTIVES

The operational objectives of the HS are to:

a) Maintain the stock at (on average), or return to, a target biomass point B_{TARG} equal to recent levels (2005-2015) that take account of the fact that the resource is shared and important for the traditional way of life and livelihood of traditional inhabitants and is biologically and economically acceptable.

    - The agreed B_{TARG} is more precautionary than the default proxy B_{MEY} (biomass at maximum economic yield) level as outlined in the HSP.

b) Maintain the stock above the limit biomass level (B_{LIM}), or an appropriate proxy, at least 90 per cent of the time.

    - The agreed B_{LIM} is more precautionary than the default proxy HSP B_{LIM}.

c) Implement rebuilding strategies, if the spawning stock biomass is assessed to fall below B_{LIM} in two successive years.

2.3 RECOMMENDING TACs FROM RBCs

The RBC is the recommended total catch of TRL (both retained and discarded) that can be taken by all sectors within the TSPZ and waters declared as areas outside but near to the TSPZ, including Australian and PNG fishers. The HSP states that when setting the TAC for the next fishing season the HS should take into account all sources of fishing mortality.

The HS does not include catches taken by non-commercial fishing sectors, for example traditional, recreational or research catches. The TRLRAG recommended at meeting no. 18 on 2-3 August 2016 that non-commercial catches not be estimated in the stock assessment model or when setting the TAC at this time, noting the likely low level of overall catch and

the lack of accurate data. However, if unaccounted fishing mortality were to increase significantly this may impact on the performance of the stock assessment. The HS may be updated in the future to account for changing circumstances in the Fishery, the review provisions are described in **Section 2.13**.

2.4 MONITORING

Biological data for the Fishery are monitored by a range of methods listed below. Currently there is no ongoing monitoring strategy in place to collect economic information.

Fishery independent surveys

A key component of the monitoring program is the fishery-independent survey which provides a time-series of relative abundance indices for TRL. Fishery-independent surveys have been conducted in the Fishery since 1989. Historically (1989-2014 and 2018), mid-season (July) surveys focused on providing an index of abundance of the spawning (age 2+) and juvenile (age 1+) lobsters. Mid-season surveys have been replaced with pre-season (November) surveys (2005-2008; 2014 to current) which focus on providing an index of recruiting (age 1+) lobsters as close as possible to the start of the fishing season to support the transition to quota management and setting of a TAC. Pre-season surveys also provide indices of recently-settled (age 0+) lobsters, which may become useful under quota management as they allow forecasting of stock one year in advance and are used in the eHCR.

Catch and effort information

Fishers in the transferrable vessel holder (TVH) sector are required to record catch and effort information in the Torres Strait Tropical Rock Lobster Daily Fishing Log (TRL04). The following data are recorded for each TVH fishing operation: the port and date of departure and return, fishing area, fishing method, hours fished and the weight (whole or tails) of TRL retained. Fishers in both the TVH and traditional inhabitant boat (TIB) sectors are required to record catch information in the Torres Strait Fisheries Catch Disposal Record (TDB02). The provision of effort information under the TDB02 is voluntary. Some processors previously (2014-2016) reported aggregate TIB catch information directly to AFMA predominantly through the Torres Strait Seafood Buyers and Processors Docket Book (TDB01).

2.5 INTEGRATED STOCK ASSESSMENT MODEL

The stock assessment model (termed the 'Integrated Model') (Plagányi *et al.* 2009) was developed in 2009 and is an Age-Structured Production Model, or Statistical Catch-at-Age Analysis (SCAA) (e.g. Fournier and Archibald 1982). It is a widely used approach for providing RBC advice and the associated uncertainties.

The model integrates all available information into a single framework to assess resource status and provide a RBC. The model addresses all of the concerns highlighted in a review of the previous stock assessment approach (Bentley 2006, Ye *et al*. 2006, 2007). The model

is fitted to the mid-season and pre-season survey data and TIB and TVH catch per unit effort (CPUE) data. The growth relationships used in the model were revised from the previous stock assessment model (Ye *et al*. 2006) to ensure that the modelled individual mass at age more closely resembled field measurements. The model has been used as an Operating Model in a Management Strategy Evaluation (MSE) framework to support the management of the Fishery (Plagányi *et al.* 2012, 2013, 2018).

The stock assessment model is non-spatial and assumes (conservatively) that the Torres Strait Tropical Rock Lobster Fishery stock is independent of the Queensland East Coast Tropical Rock Lobster Fishery stock. A spatial version of the model has been developed as part of an earlier MSE project, and can be used to investigate plausible linkages between these stocks (Plagányi *et al*. 2012, 2013).

The model includes three age-classes only (0+, 1+ and 2+ age lobsters) as it is assumed that lobsters migrate out of the Torres Strait in October each year. Torres Strait TRL emigrate in spring (September-November) and breed during the subsequent summer (November-February) (MacFarlane and Moore 1986; Moore and Macfarlane 1984). A Beverton-Holt stock-recruitment relationship is used (Beverton and Holt 1957), allowing for annual fluctuation about the average value predicted by the recruitment curve. The model is fitted to the available abundance indices by maximising the likelihood function. Quasi-Newton minimisation is used to minimise the total negative log-likelihood function (using the package AD Model Builder™) (Fournier *et al*. 2012).

2.6 EMPIRICAL HARVEST CONTROL RULE

The empirical harvest control rule (eHCR) recommended by the TRLRAG uses the pre-season survey 1+ and 0+ indices, both standardised CPUE indices (TVH and TIB), applies the natural logarithms of the slopes of the five most recent years' data and the average catch over the past five years, with an upper catch limit of 1,000 t. The relative weightings of the eHCR indices are 70 per cent pre-season survey 1+ index, 10 per cent pre-season survey 0+ index, 10 per cent TIB sector standardised CPUE and 10 per cent TVH sector standardised CPUE.

The basic formula is:

$$RBC_{y+1} = wt\_s1 \cdot \left(1 + s_y^{presurv,1}\right) \cdot \bar{C}_{y-4,y} + wt\_s2 \cdot \left(1 + s_y^{presurv,0}\right) \cdot \bar{C}_{y-4,y}$$
$$+ wt\_c1 \cdot \left(1 + s_y^{CPUE,TVH}\right) \cdot \bar{C}_{y-4,y} + wt\_c2 \cdot \left(1 + s_y^{CPUE,TIB}\right) \cdot \bar{C}_{y-4,y}$$

Or if RBC_{y+1} > 1000t, TAC_{y+1} = 1000.

Where:

$\bar{C}_{y-4,y}$ is the average achieved catch during the past 5 years, including the current year i.e. from year *y*-4 to year *y*,

$s_y^{presurv,1}$ is the slope of the logarithms of the preseason survey 1+ abundance index, based on the 5 most recent values;

$s_y^{presurv,0}$ is the slope of the logarithms of the preseason survey 0+ abundance index, based on the 5 most recent values;

$s_y^{CPUE,TVH}, s_y^{CPUE,TIB}$ is the slope of the logarithms of the TVH and TIB CPUE abundance index, based on the 5 most recent values;

wt_s1, wt_s2, wt_c1, wt_c2 are tuning parameters that assign relative weight to the preseason 1+ (wt_s1) and 0+ (wt_s2) survey trends compared with the CPUE TVH (wt_c1) and TIB (wt_c2) trends.

2.7 REFERENCE POINTS

The HS reference points are:

a) The unfished biomass B_0 is the model-estimate of spawning stock biomass in 1973 (start of the Fishery). $B_0 = B_{1973}$.

b) The target biomass B_{TARG} is the spawning biomass level equal to recent levels (2005-2015) that take account of the fact that the resource is shared and important for the traditional way of life and livelihood of traditional inhabitants and is biologically and economically acceptable. B_{TARG} is the proxy for B_{MEY}, $B_{TARG} = 0.65\ B_0$.

   - The agreed B_{TARG} is more precautionary than the default proxy B_{MEY} (biomass at maximum economic yield) level as outlined in the HSP. The TRLRAG noted a B_{TARG} higher that the HSP default was considered important for the Fishery because: 1) the stock is a shared resource that is particularly important for traditional fishing; 2) the stock has high variability; and, 3) all industry members recommended the HS maintain the stock around the relatively high current levels (TRLRAG meeting no. 17, 31 March 2016 and meeting no. 18, 2-3 August 2016).

c) The limit biomass B_{LIM} is the spawning biomass level below which the risk to the stock is unacceptably high and the stock is defined as 'overfished'. B_{LIM} is agreed to be half of B_{TARG}, $B_{LIM} = 0.32\ B_0$.

   - The agreed B_{LIM} is more precautionary than the default proxy HSP B_{LIM}.

d) If the limit reference point (B_{LIM}) is triggered in two successive years then the Fishery is closed.

e) The target fishing mortality rate F_{TARG} is the estimated level of fishing mortality rate that maintains the spawning biomass around B_{TARG}. $F_{TARG} = 0.15$.

- F_{TARG} = 0.15 is the target fishing mortality rate that corresponds to an optimal level in terms of economic, biological and social considerations (TRLRAG meeting no. 18, 2-3 August 2016).

Rational for reference points

The HSP recognises that each stock/species/fishery will require an approach tailored to the fishery circumstances, including species characteristics. The HSP identifies that the selection of reference points within harvest strategies need to be realistic with respect to the scale or nature of the fishery and the resources available to manage it. Reference points should be set at levels appropriate to the biology of the species and the proper functioning of the broader marine ecosystem. Further, stocks that fall below B_{LIM} will be subject to the recovery measures stipulated in the HSP. A number of adaptive management approaches may be used to deal with this, such as pre-season surveys to provide estimates of abundance to which the eHCR is applied.

The Fishery is characterised by a highly variable stock where majority of the catch (since 2001 due to the introduction of a minimum size limit) is from a single cohort. The stock assessment model and MSE testing have identified the target biomass should be set between 65 and 80 per cent of the unfished biomass to account for the importance of the stock for the traditional way of life and livelihood of traditional inhabitants and to achieve biological and economic objectives. The HS's higher average target biomass level, compared to the default HSP target of 0.48 per cent of unfished biomass, reduces the risk of recruitment being compromised.

The unfished biomass (B_0) is calculated within the stock assessment model, the value of unfished biomass and target biomass have therefore varied over time in response to annual data updates and model parameter settings and estimates. Estimates of unfished biomass and target biomass are particularly sensitive to changes to parameter *h*, which determines the steepness of the stock-recruit relationship, and the input parameter that controls the level of stock-recruit variability.

Independent of variability to the unfished biomass value, the target fishing mortality rate F_{TARG} = 0.15 is applied to maintain the spawning biomass around the biomass target reference point (B_{TARG}), which is the average level over the past two decades. This is assumed to be a proxy for B_{MEY} because stakeholders agreed that this target level corresponded to an optimal level in terms of economic, biological and social considerations (TRLRAG meeting no. 18, 2-3 August 2016).

The biomass limit reference point (B_{LIM}) is 32 per cent of unfished biomass. The higher limit reference point, compared to the HSP proxy of 20 per cent of unfished biomass, is supported by recommendations of similar limit reference points for other highly variable species such as forage fish (Pikitch *et al.* 2012). Due to the changing values of unfished biomass and target biomass the value of the limit reference point, taken as half the target reference point, has previously varied between 32 and 40 per cent of unfished biomass.

Recent MSE testing identified that a limit reference point of 40 per cent unfished biomass is too conservative, it would result in the limit reference point being breached more frequently and add unnecessary precaution to the HS. The TRLRAG agreed to set the limit reference

point at 32 per cent of unfished biomass with the condition that if the stock falls below the limit reference point in two successive years it triggers a Fishery closure. The eHCR is more precautionary than the HSP criterion to 'maintain all commercial fish stocks, including byproduct, above a biomass limit where the risk to the stock is regarded as unacceptable (B_{LIM}), at least 90 per cent of the time'. The HSP provides for the designation of a limit reference point above the proxy (B_{20}) where this has been estimated or is deemed appropriate.

2.8 eHCR AND STOCK ASSESSMENT CYCLE

The eHCR and stock assessment cycle is as follows:

- The eHCR is run in November each year to provide a RBC by 1 December for the following fishing season.
- A stock assessment is run on a three year cycle by March, unless the stock assessment is triggered by a decision rule **(Section 2.10)**. The stock assessment determines the Fishery stock status and evaluates the performance of the eHCR and identifies if any revisions to the eHCR are required.
- If the eHCR needs to be revised, the stock assessment is conducted annually to estimate the RBC until the revised eHCR is agreed.

2.9 DATA SUMMARY

The annual data summary reviews the nominal and standardised CPUE from the TIB and TVH sectors, as well as total catch from all sectors, the size-frequency information provided from a sub-sample of commercially caught TRL and the fishery-independent survey indices of 0+ and 1+ age lobsters. The data summary is used as an indicator to identify if catches correspond to the RBC, and to monitor CPUE.

2.10 DECISION RULES

The decision rules for the HS are:

Maximum catch limit

- The eHCR includes a maximum catch limit of 1000 t. Once the HS is implemented the cap will be reviewed after three years using MSE testing with the updated stock assessment model.

Pre-season survey trigger

- If in any year the pre-season survey 1+ index is 1.25 or lower (average standardised number of 1+ age lobsters per survey transect) it triggers a stock assessment.

Biomass limit reference point triggered

- If the pre-season survey trigger is triggered in the first year, a stock assessment update must be conducted in March.
    - If after the first year the stock is assessed below the biomass limit reference point, it is optional to conduct a mid-season survey, the pre-season survey must continue annually.
- If the pre-season survey trigger is triggered two years in a row, a stock assessment must be conducted in December (of the second year).

Fishery closure rules

- If the stock assessment determines the stock to be below the biomass limit reference point in two successive years, the Fishery will be closed to commercial fishing.
    - MSE testing of the eHCR has shown that it is extremely unlikely (<1%) for the Fishery to be closed based on its current performance (Plagányi *et al.* 2018).

Re-opening the Fishery

- Following closure of the Fishery, fishery-independent mid-season and pre-season surveys are mandatory. The Fishery can only be re-opened when a stock assessment determines the Fishery to be above the biomass limit reference point **(Attachment A, Figure 5)**.

Based on the decision rules, there are four alternative possible scenarios **(Section 2.11)** that may occur under the application of the eHCR. Graphic representations of the four scenarios are provided in **Attachment A**.

2.11 DECISION RULE SCENARIOS

Scenario 1 – Pre-season survey trigger not triggered and the eHCR does not require revision

- The pre-season survey trigger is not triggered.
- The eHCR RBCs appear to remain within ranges tested by MSE.
- The updated stock assessment does not indicate any need for revision of the eHCR.
- Application of the eHCR continues unchanged.
- A graphic representation of Scenario 1 is provided in **Attachment A, Figure 1**.

Scenario 2 – Pre-season survey trigger not triggered, eHCR and stock assessment require revision

- The pre-season survey trigger is not triggered.

- The eHCR RBCs appear to remain within ranges tested by MSE.
- The updated stock assessment indicates the eHCR recommended RBCs are outside the revised ranges tested by MSE, indicating that the eHCR should be revised.
- Annual RBCs need to be set using annual stock assessments until a revised eHCR has been agreed, after which the revised eHCR is applied.

A graphic representation of Scenario 2 is provided in **Attachment A, Figure 2**.

Scenario 3– Pre-season survey trigger is triggered, eHCR is reviewed by stock assessment and the biomass limit reference point is not breached

- The pre-season survey trigger is triggered in one year.
- A stock assessment update (March) is required to confirm if the biomass limit reference point has been breached. This assessment update determines that the biomass limit reference point has not been breached.
- If the biomass limit reference point is breached once, discussions will be held on preventative measures to reduce the risk of closure.
- The eHCR RBC is applied and consideration is given to revising the eHCR to prevent future incorrect indications that the biomass limit reference point may have been breached.
- The stock assessment continues on a three year cycle, unless triggered to occur by a decision rule.
- A graphic representation of Scenario 3 is provided in **Attachment A, Figure 3**.

Scenario 4 – Pre-season survey trigger is triggered, stock assessment confirms the biomass limit reference point is breached

- The pre-season survey trigger is triggered in one year.
- A stock assessment update (March) is required to confirm if the biomass limit reference point has been breached. This assessment update determines that the biomass limit reference point has been breached.
- The pre-season survey trigger is triggered for a second successive year.
- A second stock assessment update (December) is required to confirm whether the biomass limit reference point has been breached a second time. This assessment update determines that the biomass limit reference point has been breached a second time.
- The commercial fishery is closed until an assessment update confirms that the stock has recovered to above the biomass limit reference point.
    - If the Fishery is closed to commercial fishing, discussions are held on future management arrangements.

- Fishery-independent mid-season and pre-season surveys are mandatory and conducted on an annual basis. The Fishery will only re-open when the Fishery is assessed to be above the biomass limit reference point by the stock assessment.
- The eHCR must be revised before being re-implemented to reduce the risk of the Fishery breaching the biomass limit reference point and for the eHCR to incorporate rebuilding requirements.

- A graphic representation of Scenario 4 is provided in **Attachment A, Figure 4**.

2.12 GOVERNANCE

The status of the Fishery and how it is tracking against the HS is reported to the TRLRAG, TRLWG and the PZJA as part of the yearly RBC and TAC setting process.

2.13 REVIEW

Harvest strategies are to be reviewed every five years. However, it may be necessary to amend harvest strategies earlier if:

- a marked change in stocks targeted occurs, leading to a change in which stocks are categorised as key commercial
- new information substantially changes understanding of the fishery, leading to revised estimates of indicators relative to reference points
- external drivers have unexpectedly increased the risk to a fishery and fish stocks, including environmental or climate drivers that have substantially altered the productivity characteristics (growth or recruitment) of the stock
- performance indicators show that harvest strategies are not working effectively, and that the intent of the HSP is not being met.

Early review may be triggered when either:

- harvest strategies are implemented without formal testing or evaluation using methods such as MSE
- MSE testing did not take adequate account of the changes in risk factors subsequently observed, or
- subsequent estimates of the performance indicators used in the HCR are biased or uncertain to the extent that application of the control rule using these indicators fails to appropriately adjust fishing pressure.

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Torres Strait Tropical Rock Lobster Fishery – alternative annual Harvest Control Rule application scenarios

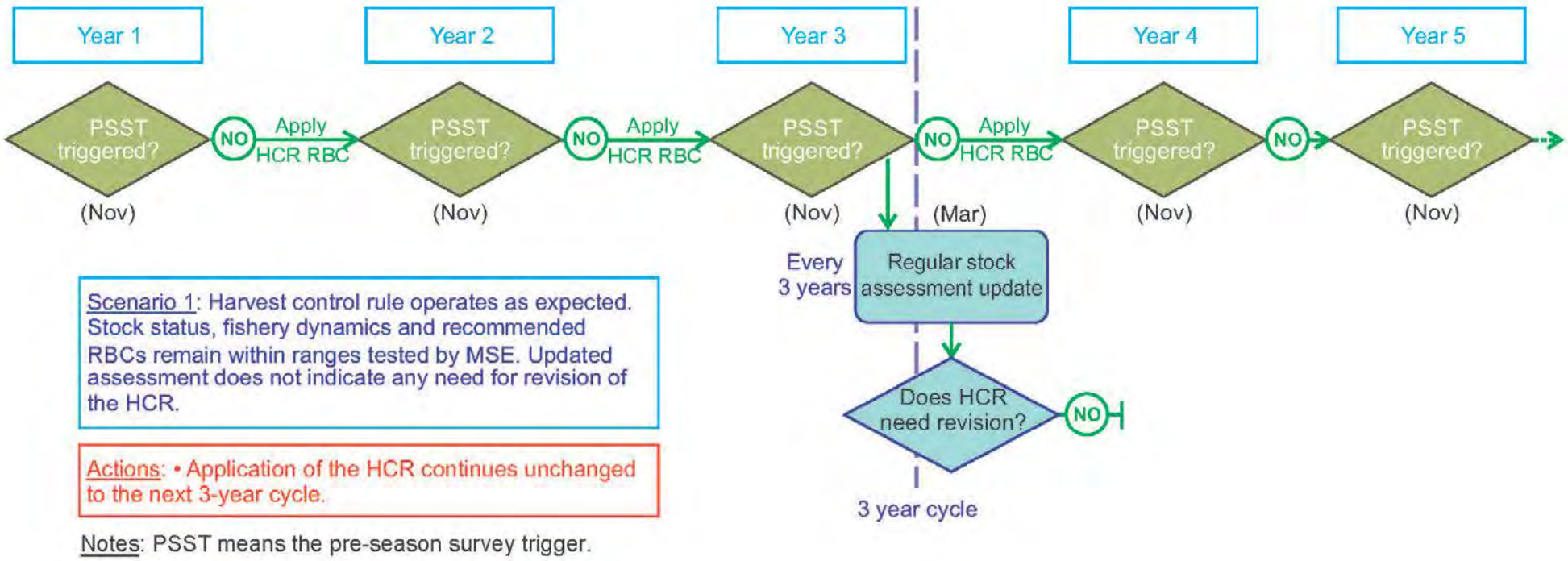


Figure 1. Torres Strait Tropical Rock Lobster Fishery decision rule scenario 1.

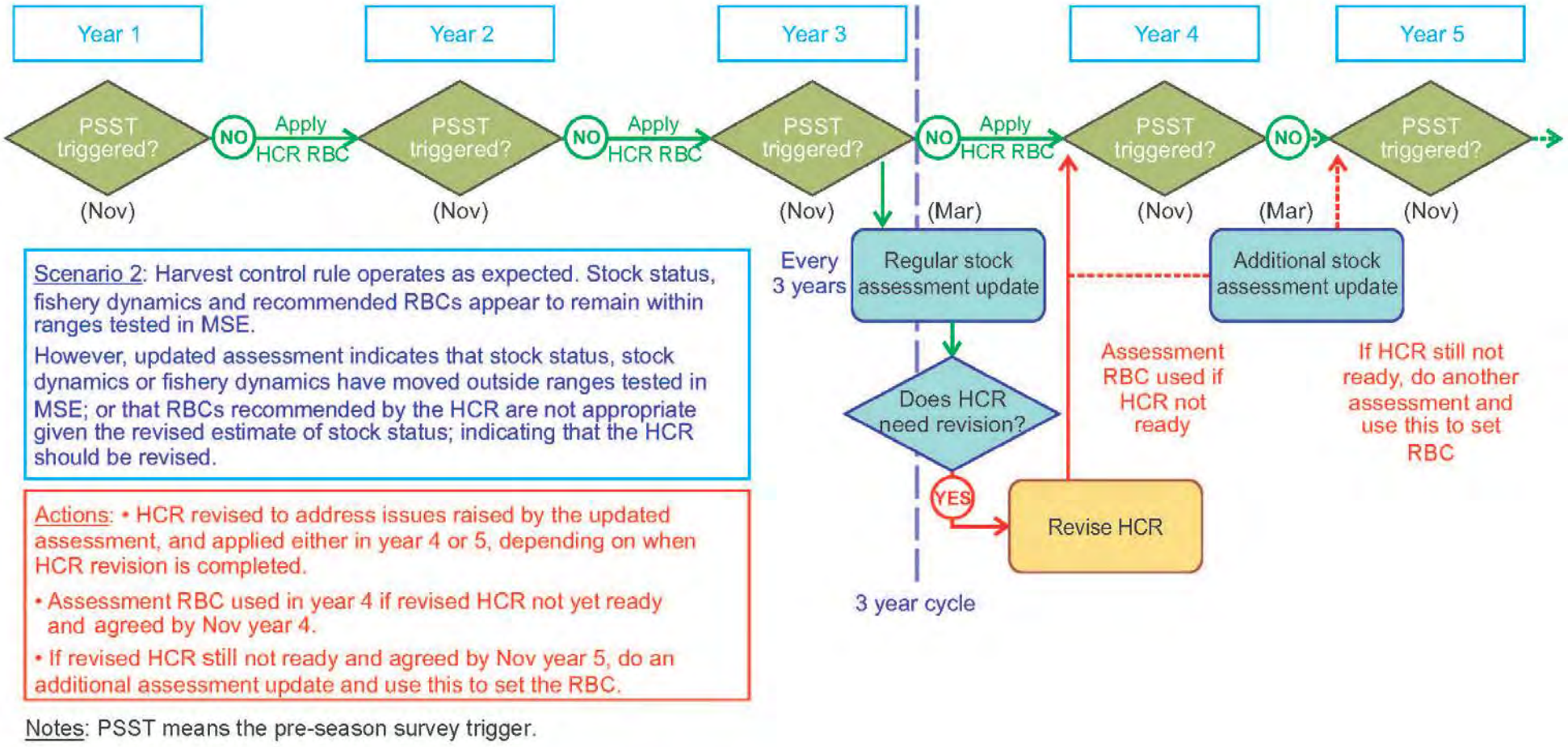


Figure 2. Torres Strait Tropical Rock Lobster Fishery decision rule scenario 2.

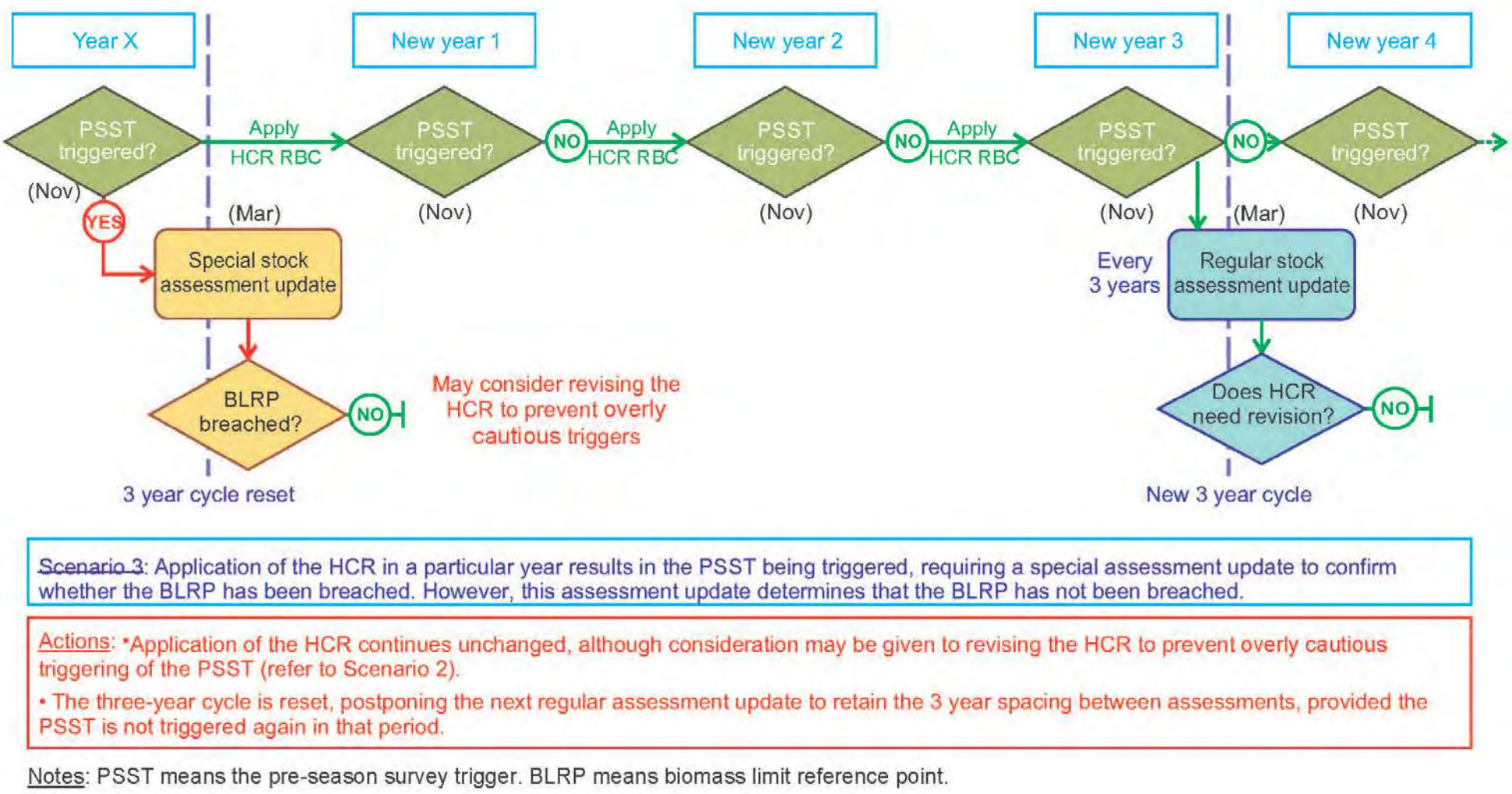
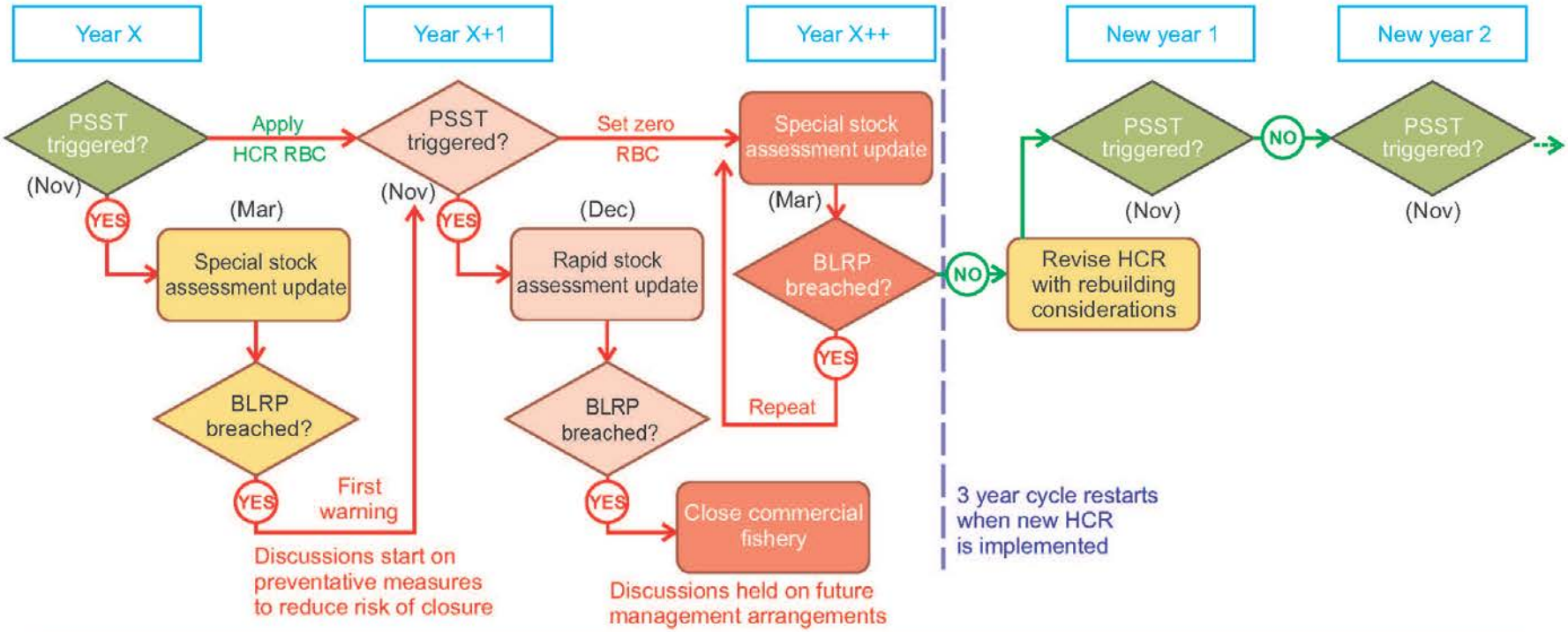


Figure 3. Torres Strait Tropical Rock Lobster Fishery decision rule scenario 3.



Scenario 4: Application of the HCR in a particular year results in the PSST being triggered, requiring a special assessment update to confirm whether the BLRP has been breached. Special assessment update confirms that the BLRP has indeed been breached.

Application of the HCR the following year results in the PSST being triggered for the second successive year, requiring a second rapid assessment update to confirm whether the BLRP has been breached a second time. Assessment update confirms that the BLRP has been breached again.

The commercial fishery is closed until an assessment update confirms that the stock has recovered to above the BLRP.

Actions: • When it has been confirmed that the BLRP has been breached the first time, discussions will be held on preventative measures to reduce the risk of closure.

• If it is confirmed that the BLRP has been breached for a second year and that the commercial fishery must be closed, discussions will be held on future management arrangements to reduce the risk of future closures.

• If the fishery is closed, annual assessments will be done until an assessment update confirms that the stock has recovered to above the BLRP.

• Before being re-implemented, the HCR will be revised to reduce the risk of breaching the BLRP in future and to incorporate rebuilding requirements.

Notes: PSST means the pre-season survey trigger. BLRP means biomass limit reference point.

Figure 4. Torres Strait Tropical Rock Lobster Fishery decision rule scenario 4.

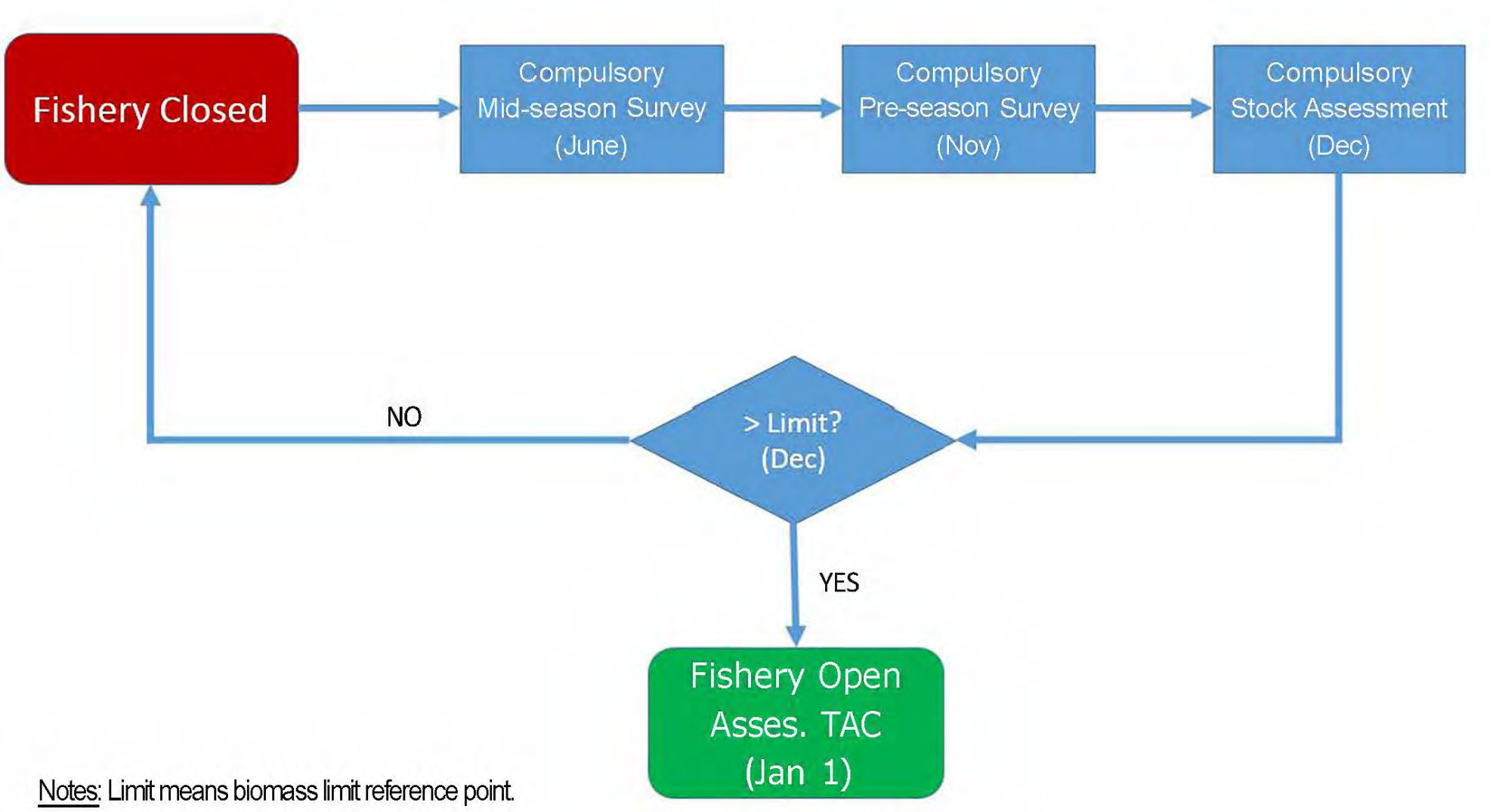
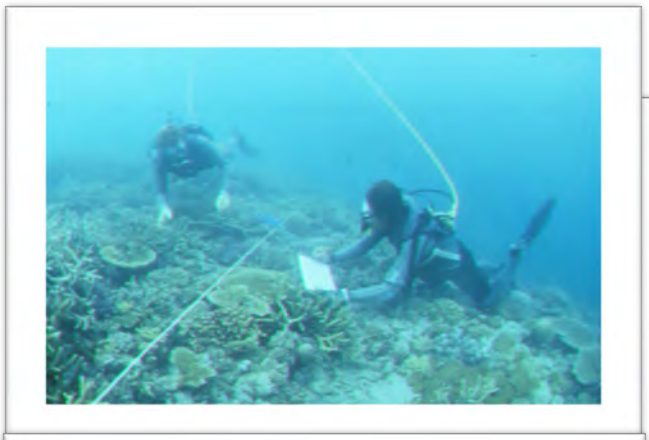


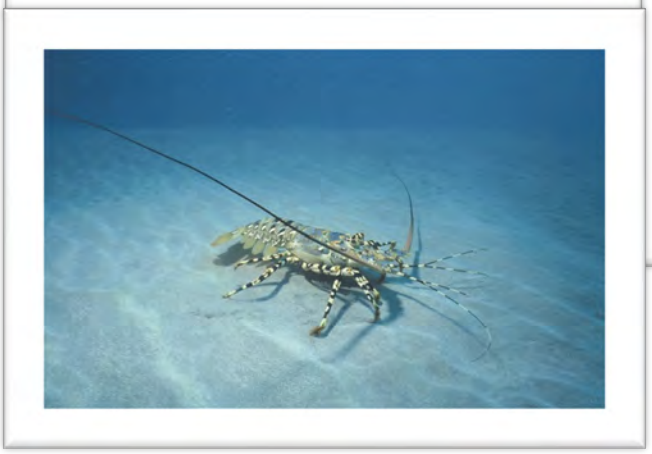
Figure 5. Torres Strait Tropical Rock Lobster Fishery closure and re-opening rule.

Attachment 7d (updated)

NON-TECHNICAL SUMMARY

Torres Strait tropical rock lobster (TRL) *Panulirus ornatus* Harvest Control Rule (HCR) development and evaluation





CSIRO/AFMA

Vers. November 2022

Éva Plagányi, Darren Dennis, Roy Deng, Robert Campbell, Trevor Hutton, Mark Tonks, Mick Haywood, Leo Dutra, Nicole Murphy, Steven Edgar, Kinam Salee, Laura Blamey

Australian Government
Australian Fisheries Management Authority

TRL HCR Non-technical Extended Abstract

Background

The Torres Strait tropical rock lobster *Panulirus ornatus* (TRL) fishery transitioned in 2019 from input controls to output controls which involves the setting of Total Allowable Catch (TAC) levels. The stock is naturally highly variable because the numbers of recruits (1+ lobsters) varies each year, and the fishers catch essentially a single age-class (2+) only. This age-class then leaves Torres Strait to breed. Hence, a TAC needs to be set annually in such a way as to ensure biological and economic sustainability consistent with the principles of the Australian Commonwealth Harvest Strategy as well as the TRL fisheries and PZJA objectives. For this reason, it is important to conduct an annual Preseason survey of Age 1+ recruits as close to the start of the fishing season as possible (November) to inform on the likely size of the fishable stock the next year. We note that 0+ and 1+ lobsters are found in different habitat or ground than 2+ lobsters.

Previously, this information together with all other sources of information and data for the fishery were input to an integrated stock assessment model that was used to set the TAC. However, there is not enough time after the Preseason survey for the TRLRAG to review an updated stock assessment; thus an alternative Harvest Control Rule (HCR) approach is now used. In addition, the TRLRAG identified potential cost savings by only conducting an assessment every three years rather than annually, and replacing this with an approach as described below. There were also additional benefits identified in reducing the frequency of running the full stock assessment model, mainly by allowing additional time to update and improve the model in the intervening years.

Harvest Control Rule

The new approach uses an empirical (data-based) Harvest Control Rule (eHCR) that can be rapidly applied to provide a Recommended Biological catch (RBC) once the catch, survey indices and other data inputs (CPUE or Catch-Per-Unit-Effort) become available. The eHCR is a central component of the Harvest Strategy, defined as "a framework that specifies the pre-determined management actions in a fishery necessary to achieve the agreed ecological, economic and/or social management objectives." A key principle is that fishery managers, fishers and key stakeholders utilise pre-agreed (and preferably pre-tested) rules as to how to adjust management recommendations given updates of data and/or model outputs (http://www.agriculture.gov.au/fisheries/domestic/harvest_strategy_policy).

The eHCR selected by the TRLRAG (August 2016), from a number of alternative candidates that were evaluated, is a mathematical formula that outputs a RBC in December for the following year. This formula is the multiple of the average catch over the last 5 years and a statistic which measures the relative performance of the fishery based on the following 5 data inputs: (1) Preseason recruiting lobster (1+) standardised relative numbers; (2) Preseason recently-settled lobster (0+) standardised relative numbers; (3) nominal CPUE (TIB sector) and (4) standardised CPUE (TVH sector) (using data available up until end of October); and (5) total catch (TIB,TVH,PNG) (using data available up until end of October). This eHCR implies that if the performance of the fishery is improving then the RBC will increase while if the performance of the fishery is decreasing then the RBC will also decrease. Over the long-term this eHCR should maintain the stock around the target biomass level. Different weightings are applied to the four abundance indices included in the relative performance statistic used in the eHCR, based on extensive testing to compare performance of alternative weightings and also on considerations of the information content and reliability of each series, as well as a preference expressed by the stakeholders to use a portfolio approach in determining the RBC. The Preseason Age 1+ index is the most reliable and direct in terms of indexing

the biomass of lobsters that will be available to be caught in the next fishing season, and hence this index is assigned the highest weighting of 70%. The Preseason 0+ index provides an early indication of the following year's recruitment, whereas the CPUE indices reflect the abundance of the large Age 2+ lobsters, the survivors of which will migrate out of the Torres Strait to spawning grounds to the East, and hence they index spawning biomass which is an important consideration in terms of ensuring the future sustainability of the stock. Each of these three secondary indices (Survey Age 0+ and CPUE (TIB and TVH)) are assigned a weighting of 10% in the eHCR formula.

Simulation testing showed that the best approach is to use the slope of the trends in the secondary indices over the last five years' data (after first

taking the natural logarithm of the data) for each of the abundance indices. This allows the RBC to be based on medium term trends in abundance, rather than on just the current abundance. Using the last five years' data gave the best performance in terms of a number of key statistics that were used to compare the performance of alternative candidate rules. Key performance statistics considered by the TRLRAG included those related to resource status (spawning biomass level, and levels relative to target reference levels), average annual catch (averaged over 20 years), average annual variability in catch, as well as risk to the fishery and risk of closure of the fishery. The eHCR candidate that included taking the natural logarithm was preferred because this has the effect of dampening some of the inter-annual variability and hence ensuring that the RBC responds to medium-term changes in resource trends rather than bouncing up or down very erratically. Similarly, a number of alternative options were explored that used the trend fitted to different numbers of years of historical abundance indices, but using the trend based on the past 5 years was shown to perform best.

The preferred eHCR therefore outputs a RBC based on the slopes of the regression lines fitted to the Preseason survey and CPUE indices, with different weightings applied to the different data sources (70% Preseason 1+; 10% Preseason 0+; 10% CPUE_TIB; 10% CPUE_TVH), and the overall resultant trend multiplied by the average of the last 5 years' catch. In essence, this will output annual catches with an average similar to the average of recent catches, but the actual value each year will be scaled up or down based on the resource status. For example if the abundance indices suggest the resource is increasing, the RBC will be increased and conversely, so as to ensure that the stock is not overfished in years when recruitment naturally fluctuates to low levels. Stakeholders also selected an additional rule to cap the total catch at 1000t in the (unlikely) event that the eHCR outputs a RBC that exceeds this tonnage.

Forecast TAC

Consistent with previous approaches, a Forecast TAC is generated each year to provide a heads-up of the likely RBC for year y+2, in case this is useful for planning purposes. The Forecast value uses the Preseason 0+ data only, and is scaled (using a multiplier of 0.85) so that on average the value is 100t less than the final TAC, as the TRLRAG previously agreed that the Forecast should be set lower than the final TAC because of greater uncertainty in predicting more than one year ahead, and also because it would be preferable to increase rather than decrease any preliminary RBC value. Simulation testing suggested that the Forecast performs reasonably in predicting future fishable biomass, and that with increased survey effort (to improve the precision of the 0+ abundance index), the precision and reliability of both the Forecast and RBC (which also uses the 0+ index) could be improved.

Stock Assessment of Resource Status

The eHCR will be applied annually to set a RBC that takes into account recent trends in resource abundance indices, but it does not provide information as to the current stock size, for example relative to important reference levels such as the target biomass level (65% of the comparable unfished biomass) and limit reference point (LRP) (32% of the comparable unfished biomass). The eHCR is tuned so that on average the stock will fluctuate around the target biomass level and avoid the limit biomass level, but to accurately assess resource status, it is necessary to do a stock assessment. A stock assessment will thus be conducted every three years to rigorously assess stock status and productivity, and check that the eHCR is working as it is supposed to. A stock assessment is also necessary to evaluate whether the spawning stock biomass drops below the LRP because if the LRP is triggered in two successive years, then the fishery is closed.

Fishery Closure Rule

As a stock assessment is only scheduled for every third year, this means that action may not be taken quickly enough if the spawning biomass drops to very low levels (which may be due to either fishery or environmental conditions), and hence an additional precaution has been built into the Harvest Strategy. Based on analysis of the historical Preseason and Midyear survey indices, a Preseason 1+ survey trigger point of 1.25 (average number of lobsters per survey transect and lower than any historically observed values) has been set, such that if this lower limit is triggered in any year, then the required action is that a stock assessment be conducted in the following year. If the stock assessment suggests that the spawning stock biomass is above the LRP, then the process continues as previously. However, if spawning biomass is assessed as below the LRP, then a stock assessment is again triggered in the following year. If the second stock assessment suggests the stock is above the LRP, then the process again continues as previously, but if the spawning biomass is below LRP (i.e. two consecutive years with spawning biomass below LRP), then the fishery is closed and appropriate action (e.g. implementing surveys, analysing size structure and environmental information) is put in place to rebuild the stock. In general, the eHCR is therefore applied every year unless the LRP is triggered in two consecutive years, or there are exceptional circumstances. Exceptional circumstances include situations where the new data collected indicate that the resource has moved outside the range for which the eHCR has been tested, or environmental conditions have an impact on the stock that is similarly outside the bounds of what the eHCR has been tested as robust to. An examples would be an extreme weather event resulting in a very low stock.

Harvest Control Rule Testing

The eHCR is a relatively simple formula for calculating the recommended biological catch each year. However, it is important to understand that although simple it has been rigorously and extensively tested using historical information and simulations of likely outcomes. Hence it has a

solid foundation based on the wealth of historical data and information for the fishery. To test the performance (in terms of meeting pre-specified objectives) and robustness (i.e. ensuring it doesn't fall over if the stock or fishers behave or change in certain ways) of the eHCR, we use the so-called 'operating model', the 2015 integrated stock assessment model that integrates all historical information (catch records since 1973, Midyear Survey data from 1989-2014, Benchmark surveys, Preseason Survey data (2005-2009; 2014-2015), catch-at-age information, size composition information). In addition, rather than using the single best-case stock assessment model, we use four versions of the model that include alternative parametrisations related to the stock-recruitment assumptions (more conservative steepness parameter; sporadic poorer auto-correlated recruitment) and the form of the assumed relationship between stock biomass and CPUE (hyperstability parameter settings). We project each model forward 20 years, generating random future recruitment scenarios that are based on what has been observed in the past, as well as future survey "data" and CPUE that are assumed collected with observation errors similar to what has been observed in the past. We test how well each alternative candidate eHCR performs by testing it using 200 replicates of each of the four operating models (i.e. 800 future scenarios). We also account for implementation uncertainty which describes the difference between the RBC allocation to each sector (not considered in this study which focuses only on the total RBC) and the actual catch of each sector. The implementation errors assumed for each sector in the testing are similar to past observed differences between "dummy" TAC allocations and actual catches, and hence are greatest for the PNG sector, followed by TIB and TVH sectors.

A large number of alternative types of eHCR rules using different combinations of data inputs were trialled to inform selection of the final rule. There is no one single correct answer in this process of Management Strategy Evaluation (MSE) testing. Rather, selection of a final eHCR is made by comparing trade-offs across a range of different performance statistics

(e.g. the trade-off between a rule that sets a very high catch is that it likely results in high risk to a resource) and also that it performs satisfactorily in meeting pre-specified objectives (such as the target biomass level). In addition, the performance of the eHCR needs to be tested using sensitivity and robustness tests, to see whether it still performs satisfactorily even if there are moderate changes in the stock, environment, fisher behaviour, surveys and other aspects of the fishery. For example, sensitivity tests were done assuming higher implementation errors, survey observation errors, future changes in catchability (which might be linked to improvements in efficiency, changes in fishing practices or environmental drivers making lobsters harder to find and catch) as well as future poor recruitment events or increases in the natural mortality rate.

HCR Selected by TRLRAG

The eHCR selected by the TRLRAG performed reasonably across a broad range of sensitivity scenarios, suggesting that it is a reasonably robust method that will respond appropriately to unforeseen future changes to adjust stock size upwards or downwards as necessary, in such a way as to substantially reduce the risk of overfishing or underfishing (i.e. not optimally utilising the resource). This is illustrated by comparing the performance with a constant catch strategy (with catch set at 680t or alternatively, the average of the past 10 years' catch). Results highlight that such a constant catch strategy poses an unacceptably high risk to the resource and importantly a substantially higher risk of invoking a closure of the fishery in the future, compared to the adaptive eHCR presented above, which adjusts catches in line with stock fluctuations. It is worth noting that pre-2015 TAC estimates were as low as 470t; hence a constant catch may result in overfishing by 200t in low stock years. Simulations suggest that to achieve the same level of risk as the adaptive eHCR being proposed, the constant catch would need to be set at a low total of 360t, which is approximately half the average catch that could be achieved using an adaptive eHCR.

Data quality requirements

The eHCR relies critically on the provision of high quality data that are provided before pre-specified deadlines. The Australian Harvest Strategy Policy allows for tiered approaches which cater for different levels of certainty about a stock. It is well recognized that increased levels of precaution are necessary as levels of uncertainty about stock status increase (e.g. if there are fewer data to inform on stock status). Hence catch or exploitation levels can be adjusted on the basis of keeping the risk approximately constant across the tiers, such that catch and exploitation rates will decrease as tier levels increase. Future work will quantify what the penalties or bonuses are that should be applied in a tier system that accounts for differences from year to year in the amount and quality of data that are available to inform the setting of a RBC. Simulations are being used to compute how much additional catch could be taken, for the same level of risk, if additional surveys (such as re-implementing a Midyear survey or extending the Preseason 0+ survey) are conducted. On the other hand, a penalty, determined by again calibrating to the same level of risk, needs to be applied to the RBC if the quality or quantity of survey other data are degraded in a particular year. As above, if there are

no survey data, then a low constant catch of 360t could be set, and if there are no data at all (i.e. no surveys, CPUE or reliable catch), then the fishery should be closed.

Adopting an eHCR approach means that it is imperative that data are collected reliably and timeously each year in order to manage the stock effectively.

Summary

In summary, the TRLRAG uses a Harvest Control Rule approach, such as is now implemented in a number of fisheries globally, including for Australia's southern rock lobster fishery. Previously, a stock assessment model was used annually to analyse fishery data and assess current status and productivity of the resource. A "best assessment" then provided the RBC and a reference-point hockey-stick HCR informed the TAC recommendation and management action. The new approach involves using a formula for providing the RBC, based on pre-specified data inputs, and therefore for setting the TAC. The formula or harvest control rule (also called a decision rule) is empirical, as it uses the data directly e.g. recent upward or downward trends in abundance indices are used directly as feedback and hence the TAC changes in the same direction. In addition, a full stock assessment using the integrated fishery model will be conducted every third year.

The eHCR has been extensively tested by simulation to provide appropriate trade-offs, taking into account a range of uncertainties and using methods that are now well established internationally and recognised as state-of-the-art approaches to successfully and optimally managing fisheries. The greatest advantages to adopting a HCR approach are that (1) it can be applied quickly and easily to set a TAC in time for the start of the new fishing season; (2) it provides a transparent and easily understandable tool for stakeholders (e.g. the effect on the RBC of negative or positive decreases/increases in stock abundance indices can be readily seen, and a spreadsheet example is provided to stakeholders for this purpose); (3) it provides a sound basis for setting TACs without compromising resource

status; (4) it properly addresses concerns about scientific uncertainty through simulation testing to ensure that feedback secures reasonably robust performance across a range of plausible alternative resource dynamics; and (5) it empowers stakeholders by allowing them to transparently assess trade-offs between key performance measures and select the most favourable option taking into account a range of biological, economic, social and cultural considerations. Another advantage of a HCR is: (6) it uses pre-agreed rules for management of the fishery thus allowing management to be pro-active instead of re-active.

Summary explanation of TRL Harvest Control Rules

RULE 1: Total Allowable Catch is equal to a base amount which is increased or decreased each year depending on an index of lobster in the Pre-season Survey *and* depending on whether trends in Catch per Unit of Effort in each fleet have increased or decreased.

The base amount is the average of the last 5 years of total catch and the rule is that the base amount must be increased or decreased according to the Pre-season Survey and fleet catch rates in order to meet the objective of sustainable management of Torres Strait marine stocks.

RULE 2: If the Pre-season Survey index falls below a value (1.25); that is lower than the lowest recorded index value then the stock assessment will be undertaken for the next year; else

RULE 3: The stock assessment is undertaken every 3 years to check if the stock is meeting the Target Reference Point and not falling below the Limit Reference Point; and

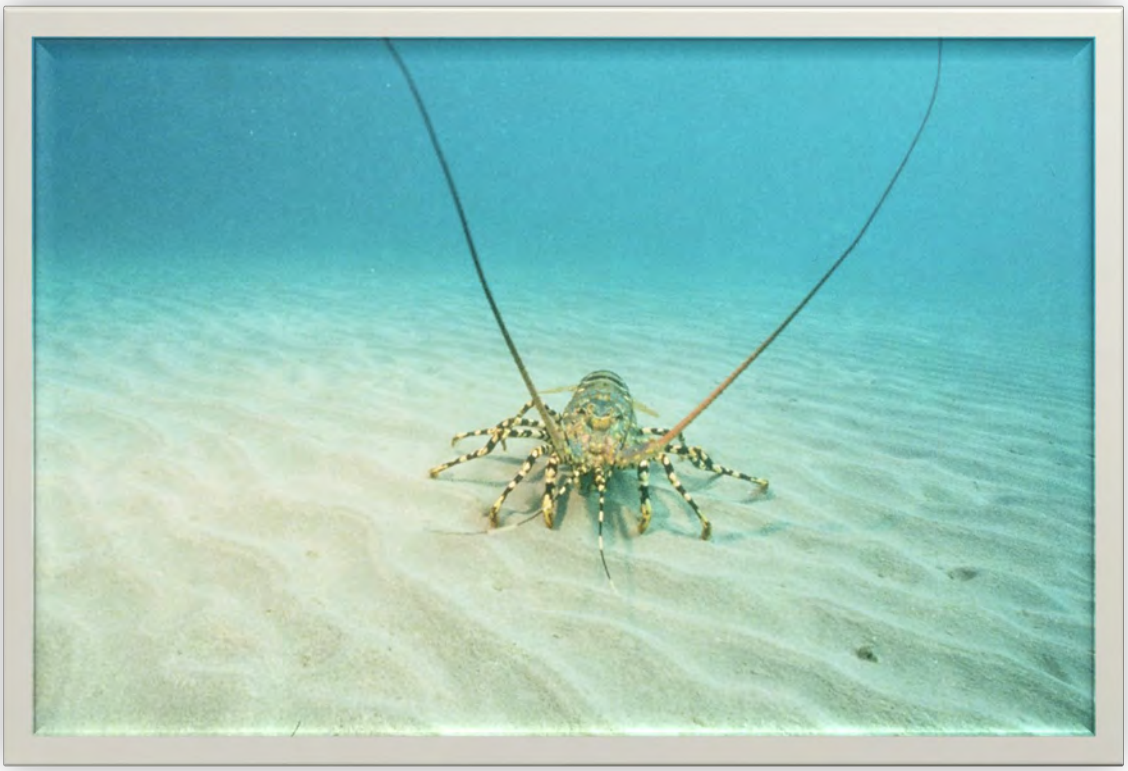
RULE 4: If the stock falls below the Limit Reference Point for two consecutive years as determined by the stock assessments in those two years then Total Allowable Catch will be the minimum (zero).

RULE 5: Finally, the maximum Total Allowable Catch is equal to 1,000 tonnes if **RULE 1** ever evokes a higher value.

Additional info: Target Reference Point is equal to 65% of the pristine total biomass.

Limit Reference Point is equal to 32% of the unfished total biomass.

Rules based on using a fixed (average) catch pose high risk for variable stocks such as TRL.



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TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Thursday Island	MEETING 35 12-13 December 2023
OUTPUTS OF THE EHCR FOR THE 2023-24 SEASON	Agenda Item 7.2 For DISCUSSION and ADVICE

RECOMMENDATIONS

1. That the RAG:
    a. **NOTE** the catch, effort and Catch Per Unit Effort (CPUE) analyses from the 2022-23 fishing season as presented under **Agenda Item 4**, including:
        (i) total reported catch of the Australian Torres Strait TRL fishery including effort trends from both TIB and TVH sectors;
        (ii) the agreed standardised Catch Per Unit Effort (CPUE) indices for the TIB and TVH sectors; and
        (iii) the total catch of the Papua New Guinea Torres Strait TRL fishery (to be provided at the meeting);
    b. **NOTE** the work undertaken by CSIRO to test the robustness of the pre-season survey presented under **Agenda Item 5**.
    c. **NOTE** the pre-season survey indices for 1+ recruiting lobsters and 0+ recently settled lobsters as presented under **Agenda Item 6**.
2. Acknowledging the discussion under **Agenda Item 7.1**, and having regard to the eHCR inputs noted above that the RAG:
    a. **CONSIDER** the Recommended Biological Catch (RBC) estimates derived through the application of the eHCR, including any ad-hoc methods required to address a lower than expected average catch multiplier (to be presented by the CSIRO).

KEY ISSUES

The empirical Harvest Control Rule (eHCR)

3. As discussed under **Agenda Item 7.1**, in recent years the TRL Fishery has experienced a series of disruptions to both the export market and the fishing sector which has resulted in lower-than-expected trends in total catch of TRL against the global TAC.
4. TRLRAG 31 (12 October 2021) and TRLRAG 32 (15 December 2021) considered two possible options for dealing with under-catch in both the 2019-20 and 2020-21 TRL Fishing seasons.
    a. **Option 1:** replace the actual catch values and substitute them with the TAC value in outlier years and use the actual catches in the three years prior and apply an average of all five years catch values.
    b. **Option 2:** noting that there has been a change in the relative proportion of the TAC caught between the TIB and TVH sectors in recent years, use the combined sector

(TIB, TVH and PNG) average catch proportion against the global TAC over the recent five-year period, capping any overcatch at 100 per cent of the TAC, and apply this proportion to the TAC for 2019-20 and 2020-21 to obtain an estimated catch value for those years.

5. Having considered both options to address the lower than expected recent two years' catch, the TRLRAG 32 recommended the application of Option 1 (to substitute the anomalous catches of 2019-20 and 2020-21 with the fishery global TAC) in the average catch multiplier in the eHCR.
6. Considering similar factors (lower than expected average catches, coupled with economic pressures on the fishery similar to that experienced in the previous season), the non-conflicted members of TRLRAG33 likewise recommended substituting Option 1 (substituting lower catches with the fishery total TAC), noting that the socio-economic factors at play within the fishery are of serious concern but cannot be addressed adequately through a lower RBC.
7. Acknowledging that the process to formally amend the eHCR and TRL HS will take time, the RAG is being asked to consider the RBC estimates derived from the application of the eHCR. This consideration should have regard to the relevant inputs to the eHCR and any ad-hoc measures that may need to be applied to manage lower than expected total catch.
8. Having regard to the outputs from the eHCR, the TRL Harvest Strategy decision rules, and the discussion under Agenda Item 3, the RAG will be asked to provide advice on a Recommended Biological Catch value for the 2022-23 fishing season (to be discussed under **Agenda Item 8**).

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Thursday Island	MEETING 35 12-13 December 2023
RECOMMENDED BIOLOGICAL CATCH (RBC)	Agenda Item 8 For discussion and advice

RECOMMENDATIONS

1. That the RAG:
    a. **NOTE** on 10 November 2023, Senator the Hon. Murray Watt determined a total allowable catch (TAC) of 200,000 kilograms of TRL in the Australian waters of the TRL Fishery for the 2023-24 fishing season.
        (i) It is expected that the TAC will be increased once the outcomes of the scientific assessment process and the TAC sharing arrangements under the Treaty between Australia and Papua New Guinea (PNG) have been taken into account.
    b. Having regard to:
        (i) the outputs of the eHCR (discussed under **Agenda Item 7.2**); the discussion under **Agenda Item 3**, and the decision rules under the TRL Harvest Strategy;
        (ii) **DISCUSS** and **PROVIDE ADVICE** on a Recommended Biological Catch for the 2023-24 fishing season.
            - noting that the RBC covers the Torres Strait Protected Zone (TSPZ) (Australia and PNG).

KEY ISSUES

Recommended Biological Catch

2. The RAG is being asked to provide advice on a RBC for the 2023-24 fishing season, having regard to:
    a. The application of the eHCR in accordance with the TRL Harvest Strategy decision rules, namely:
        (i) section 2.10 Decision Rules of the TRL Harvest Strategy which provides that if in any year the pre-season survey 1+ index is 1.25 or lower (average standardised number of 1+ age lobsters per survey transect) it triggers a stock assessment.
        (ii) Having regard to the pre-season survey results presented under Agenda Item 6, and whether the pre-season survey trigger has been triggered.
        (iii) section 2.10 Decision Rule Scenarios of the TRL Harvest Strategy which provides that under Scenario 1 or 2, if the pre-season trigger has not been triggered, the RAG should consider whether the eHCR RBCs remain within the ranges tested by management strategy evaluation (MSE).

b. The observations of fishers and discussion by the RAG on climate and ecosystem conditions, as discussed under **Agenda Item 3**.

BACKGROUND

TAC setting process

3. Under subsection 13 of the Plan, the Minister must determine a TAC for the TRL Fishery prior to the start of a fishing season. In making a TAC determination, the Minister must:
    a. consult with any advisory committee that the PZJA has established under subsection 40(7) of the *Torres Strait Fisheries Act 1984*, to provide advice relating to the TRL Fishery; and
    b. have regard to Australia's obligations under the Torres Strait Treaty.
4. Under section 13 the Minister may also consider the views of any person with an interest in the TRL Fishery or the ecologically sustainable use of the TRL Fishery and take into account the amount of TRL taken in the TRL Fishery as a result of other fishing, such as traditional fishing or recreational fishing.
5. Subsection 14 provides for the Minister to determine an increase to the TAC for a fishing season. Subsections 8-11 prescribe how a TAC is to be administered, including the issuing of a notice when the TAC for the Traditional Inhabitant sector has been reached.
6. Further background on the TAC setting process, how catch is shared between Australia and PNG, and how each sector's catches will be managed for the 2023-24 fishing season is provided in the Tropical Rock Lobster Fishery Management Arrangements Booklet 2023-24 available from the PZJA website.
7. In order to improves administrative efficiencies and streamline the overall TAC process, at their meeting on 4 October 2022 the PZJA agreed to the TRL TAC setting timeline provided at **Attachment 9a**, provided there are no exceptional circumstances which would require further PZJA consideration.
8. The exceptional circumstances which would require further PZJA consideration on the advice of the TRL RAG and TRL Working Group are:
    a. If any of the Harvest Strategy outputs are outside the bounds of the decision rules. Examples include:
        (i) If in any year the pre-season survey average standardised number of 1+ age lobsters per survey transect is 1.25 or lower; or
        (ii) If a stock assessment is triggered outside of the normal three-year stock assessment cycle;

        or
    b. In circumstances where the TRL stock abundance is exceptionally low and the final RBC is likely to fall below the start of season catch limit (200 tonnes).

Setting the start of 2023-24 season TAC

9. At its meeting on 18-19 October 2018, the TRLRAG advised that the start of season catch limit should cover 1 December through to the end of February, and be based on the maximum annual catch amount for the period 2005-2018, being 200 tonnes. This is to minimise the risk that the limit could artificially constrain fishing effort, particularly in a year of high TRL abundance.

10. The TRLRAG further advised that if needed, an additional 100 tonnes be added to the start of season catch limit amount, to account for catches from PNG.

11. It was further agreed that the start of season catch limit be overridden in seasons where the TRL stock abundance is exceptionally low and the final RBC is likely to fall below the start of season catch limit or where overridden by the Harvest Strategy decision rules. In such cases, the use of the start of season catch limit should not be used in subsequent seasons until reviewed by the TRLRAG.

12. The above approach was applied for setting the start of season TAC for the 2023-24 fishing season.

13. In accordance with the process provided at **Attachment 8a**, on 10 November 2023 the Minister determined a start of season TAC of 200,000 kgs (unprocessed weight) for the 2023-24 fishing season under section 13 of the *Torres Strait Fisheries (Quotas for Tropical Rock Lobster (Kaiar)) Management Plan 2018* (the Management Plan).

14. It is expected that the TAC will be increased once the outcomes of the scientific assessment process (as discussed during the TRLRAG35 meeting) and the TAC sharing arrangements under the Treaty between Australia and PNG (to be discussed following the TRLRAG35 and TRLWG15 meetings) have been taken into account. Any increase in the TAC is expected to be determined by the end of February 2024.

Attachment 8a

Expected timeline and process for finalising a global total allowable catch (TAC) for the TSPZ Tropical Rock Lobster Fishery

Key:

Scientific assessment and advice	PNG-Australia agreement	Administrative step for Australia

Steps	Description	Indicative timeline
PNG and Australian catch and effort data compiled	Australian and PNG catch and effort data are compiled[1].	By end October
Pre-season scientific survey	Survey data are collected and used to update TRL survey abundance indices used to calculate a recommended biological catch (RBC)[2]. Survey must be conducted in November to provide comparable results overtime and the most accurate estimate of annual lobster recruitment into the fishery.	Early November
Australian start of season TAC determined	Minister to determine a 200 tonnes start of season[3] TAC for the Australian TRL Fishery for the upcoming fishing season, as per section 13 of the *Torres Strait Fisheries (Quotas for Tropical Rock Lobster (Kaiar)) Management Plan 2018* (the Plan)[4]. Start of season TAC based on advice received from TRLRAG and TRLWG in October-November 2018. TAC to apply to Australian TRL Fishery only.	Mid-November
RBC calculation	CSIRO to use empirical Harvest Control Rule (eHCR) to calculate a RBC. Every three years (starting in 2019), CSIRO to update and run the stock assessment model to evaluate the performance of the eHCR. Preliminary stock assessment results are usually available within 4-5 weeks of the pre-season scientific survey.	Late November through to early December
TRL Resource Assessment Group (TRLRAG) and TRL Working Group (TRLWG) advice[5]	TRLRAG to review the survey results, CPUE analyses and application of the eHCR. Advice provided on a final RBC.	Mid December

[1] These data are provided to CSIRO to update catch per unit effort indices used to calculate a recommended biological catch for the coming fishing season.
[2] A RBC is the total amount of TRL that can be sustainably taken out of the water by all fishers (commercial, traditional, recreational) each season, while leaving enough in the water to breed.
[3] The Australian TRL Fishery fishing season runs from 1 December each year to 30 September the following year.
[4] The Plan is accessible online at https://www.legislation.gov.au/Details/F2018L01645
[5] Officers from PNG NFA are invited to attend all PZJA advisory forums.

	TRLWG to review TRLRAG advice. Advice provided on a final global TAC[6]. Every three years (starting in 2019), TRLRAG and TRLWG to consider preliminary results of stock assessment. Advice provided on finalising the assessment.	
PZJA agreement to final global TAC	PZJA to review TRLRAG and TRLWG advice and agree to final global TAC.	January
Agree final global TAC, shares of the TAC, cross-endorsement apportionments and any preferential entitlements	AFMA CEO and PNG NFA Director General to meet to agree, as per the terms of the Torres Strait Treaty, on: - a final global TAC as per article 23(2); - shares of the final global TAC as per article 22(1) (e.g. 15%:85% split); - cross-endorsement apportionments as per articles 23(4) and 25; - preferential entitlement to any unfished cross-endorsement apportionments as per article 25. An exchange of letters is required to formalise the agreement.	By end January
Australian final TAC determined	Minister to determine a final TAC for the Australian TRL Fishery for the fishing season, as per section 14 of the Plan. TAC to apply to Australian TRL Fishery only.	By end February
TRLRAG advice	Every three years (starting in 2019), TRLRAG to review the final stock assessment results. Advice provided on the need to review the eHCR and conduct a stock assessment in subsequent years, as per Harvest Strategy rules.	February/March
If relevant, submit any formal requests for cross-endorsement in accordance with the Cross-endorsement Guidelines (subject to input from NFA and agreement by the PZJA)	PNG and/or Australia to provide formal request to the other Party seeking cross-endorsement pursuant to article 26 of the Torres Strait Treaty. It will take approximately 6 weeks for Australia to complete the domestic processes to issue a Treaty endorsement/s[7].	By end March

[6] A global TAC is the total amount of TRL that can be sustainably taken out of the water by both Australian and PNG commercial fishers each season.

[7] Australia's domestic process include requirements to undertake native title notification pursuant to sub-sections 24HA(2) and (7) of the Commonwealth *Native Title Act 1993*, which takes a minimum of 1 month, and to seek approvals to issue a Treaty endorsement/s.

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Thursday Island	MEETING 35 12-13 December 2023
PROPOSED CHANGES TO MANAGEMENT ARRANGEMENTS	Agenda Item 9 For DISCUSSION

RECOMMENDATIONS

1. That the RAG:
   a) **NOTE** the three proposal from industry as follows:
      i) Remove moontide hookah closures.
      ii) Bring season forward 2 weeks and close 2 weeks earlier (15 November – 15 September).
      iii) Removal of free diving closure Oct – Nov for TIB fishers.
      Further details provided in **Attachment 9a** (to be provided at the meeting).
   b) **DISCUSS** these proposals and impacts they might have on any of the scientific inputs used in the management of the fishery.
   c) Having regard to the objectives of the TRL Fishery and Torres Strait Fisheries Act, **RECOMMEND** a way forward.

KEY ISSUES

2. Economic operating factors have increased economic pressures and reduced profitability in the TRL Fishery in recent years. The three proposals above have been put forward by industry members to address some of this profitability.
3. For any of the proposals, there may be consequences for the scientific inputs used in the management of the fishery. These may include impacts on:
   a) The annual pre-season survey
   b) CPUE indices
   c) Setting the start of season TAC
4. The RAG is being asked to consider points a-c above, and any other possible impacts, and suggest what steps may need to be taken to consider these.
5. The RAG is also being asked to provide advice on possible ways forward on these proposals, having regard to the objectives of the TRL Fishery and the Torres Strait Fisheries Act (further detail below).

BACKGROUND

6. These proposals have been put forward by RAG industry member Brett Arlidge and WG industry member Peter Frazis. Preliminary justification for the proposals provided by via email is as follows:
   i) “Remove moon closures – adds huge cost to entire industry and drops beach prices for everyone
   ii) Bring season forward 2 weeks and close 2 weeks earlier – will allow us to provide lobster to customers in better market, rather than worse, lifting prices for everyone

iii) Removal of free diving closure Oct – Nov – will allow TIB to earn income all year, encourage TIB activity, help utilise the resource fully, help customers have more consistent supply, support jobs in Torres and Cairns."

7. All three proposal have been considered by the TRLWG in the past, and a summary of decisions for these can be found in Table 1 below.
8. Progressing any proposal would have to be in line with the objectives of the TRL Fishery, including the objective of the Harvest Strategy, and the objectives of the Torres Strait Fisheries Act.

Objectives under the *Torres Strait Fisheries Act 1984*

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

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

Objectives of the TRL Harvest Strategy

a) to maintain the size of the TRL stock (on average), or return the stock to, 65 per cent of the original unfished size of the TRL spawning stock (TRL of breeding age) in 1973 (start of the Fishery).
b) to maintain the size of the TRL stock above a lower limit of 32 per cent of the original size of the TRL spawning stock in 1973.
c) if the size of the TRL stock falls below the lower limit two years in a row, stock rebuilding strategies are to be implemented.

TRL Fishery Management Objectives

In 2005–06, the Tropical Rock Lobster Working Group recommended new management objectives which were adopted by the Protected Zone Joint Authority (PZJA). These objectives are:

a. to maintain the spawning stock at levels that meet or exceed that required to produce the maximum sustainable yield;
b. in accordance with the TS Treaty, to protect the traditional way of life and livelihood of Traditional Inhabitants, particularly in relation to their traditional fishing for TRL;
c. to provide for the optimal utilisation, co-operative management with Queensland and PNG and for catch sharing with PNG;
d. to monitor interactions between the prawn and lobster fisheries;
e. to maintain appropriate controls on fishing gear allowed in the fishery so as to minimise impacts on the environment;
f. to promote economic development in the TS area with an emphasis on providing the framework for commercial opportunities for Traditional Inhabitants and to ensure that the opportunities available to all stakeholders are socially and culturally appropriate for the TS and the wider Queensland and Australian community; and
g. to optimise the value of the fishery.

Table 1. Summary and status of management controls and proposals for change raised over time.

Management measure	Controls	Changes proposed	Date Raised	Status
	Fishery closure (Oct – Nov)	Review fishing season dates to align with international markets	TRLWG 4 (27-28 Aug 2015)	**Complete** Amendment of the fishing season dates to enable the effective implementation of the Management Plan was considered at TRLRAG 24 (18 19 October 2019). No recommendation was made to change the fishing season for this purpose.
	Hookah closure (1 December – 31 January)	Allow free-dive and lamp fishing year round	TRLWG 4 (27-28 Aug 2015)	**Not Progressed** Last proposed for discussion at TRLWG 6 (25 26 July 2017). However, this item was not considered due to the early closure of the meeting (lack of quorum).
		12 month season for free-dive and lamp fishing for TIB boats only	TRLWG 5 (5-6 April 2016)	
		Proposal to permit lamp fishing from TIB boats only	TRLWG 5 (5-6 April 2016)	
		Requested the hookah season commence earlier (on 1 January) and possibly close again in March to allow industry to maximise the catch value in the season by fishing to the Chinese New Year market, and restricting hookah catches in March when market prices are reduced and lobster mortality is higher due to moulting and increased water temperatures and lobster discards.	TRLWG 10 (12 December 2019)	**Not Progressed**
	Moontide closures	Amend method for setting hookah closures to coincide with full moons and moult cycles	TRLWG 6 (25-26 July 2017)	**Complete** This was reconsidered at TRLWG 8 who agreed to maintain the existing methodology
		Requirements concerning the possession and use of hookah gear around hookah closure periods be considered ahead of next meeting.	TRLWG 9 (19 February 2019)	**Complete** Considered at TRLWG10, but not prioritised for progression through the following review of input controls.
	Moontide closures	Submission from Trent and Mark Dean • Submission received on 25 November 2019 from TVH TRLWG members proposing moon-tide hookah	TRLWG 10 (12 December 2019)	**Not Progressed**

		closures be removed for the 2019-20 fishing season onwards. • TVH members advised that their preference in the long-term is to remove all moon-tide hookah closures.		
		TIB members want consideration of having an additional moon-tide hookah closures to alleviate fishing pressure on home reefs and to reduce the competition pressure on free-divers from hookah divers.	TRLWG 10 (12 December 2019)	**Not Progressed**

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Thursday Island	MEETING 35 12-13 December 2023
INTERNATIONAL LOBSTER CONFERENCE	Agenda Item 10 For NOTING

RECOMMENDATIONS

1. That the RAG **NOTE** verbal update from members who attended the 12th International Conference and Workshop on Lobster Biology.

BACKGROUND

2. The 12th International Conference and Workshop on Lobster Biology was held from 22-27 October 2023 in Fremantle.

3. A number of TRLRAG members attended the conference, including scientific members and TIB industry members. Scientific Memer Eva Plaganyi and Traditional Inhabitant Member – Guda Maluligal also had the opportunity to present at the conference.

4. It is beneficial for the RAG to be up to date on science and management around the world. The RAG is therefore invited to note the experience and knowledge gained by members who were in attendance and consider the applicability of lessons learned at the conference to the Torres Strait TRL/Kaiar fishery.

INDUSTRY UPDATE – 2023 SEASON 13 December 2023

MG KAILIS LOBSTER

2023 Season

The 2023 season was one of the most difficult years in the Australian tropical rock lobster industry's history, if not the most difficult. The industry entered a 3rd year of both China trade sanctions and the Covid19 pandemic, twin catastrophes which have caused major disruptions and hardship across all elements of the industry supply chain, from fishermen, to processors, to customers and many other service providers.

Some specific events that made it even more difficult were

- **Mid-Dec 2022 to mid-Jan 2023** China lowered its Covid restrictions and the virus spread throughout the country. This brought restaurants and the country to a standstill and the world live lobster market almost stopped. Just about no live lobster from anywhere was able to move. We were forced to:
    - Tail tonnes of December live catch at a large loss
    - Delay the East Coast season opening, disrupting every vessel and diver
    - Stop buying for a 3-week period from all sectors
- **Feb-Mar** There was a very brief period of high prices in Jan for Chinese New Year, but as soon as this passed, prices collapsed in Feb-Mar
- **May** We finally had good market conditions and good prices, however this turned out to be the only good month all year as June onwards there was major disruption
- **5 Jun** Our main market for the last 2.5 years shut completely. Caused major problems. Shipments stuck in transit countries. Requirement to find completely new live lobster markets, customers, and receivers immediately. From this moment forward business has been difficult, very high risk, and it remains this way
- **22 Jul** Wild caught *Panulirus ornatus* ban enforced at all entry ports to China. Prices and markets collapsed. African and PNG lobster was no longer able to go to China and so flooded our alternate destinations with cheaper product
- **1 Aug** A surge of supply in late July and early August, and highly disrupted markets and poor flight options, meant average time to move stock from time of arrival in Cairns was 12 days
- **1 Sep** Complete ban on all P*anulirus ornatus* into China, including aquaculture product. Now illegal for *P.ornatus* to be sold in China

In a year of multiple significant challenges, the total *Panulirus* ornatus ban in China is most difficult of all. As things currently stand, it means that even if the Australian lobster trade ban into China is lifted, *P ornatus* will remain banned, while all the other Australian lobster is able to get in. The challenges this is causing for our industry can't really be overstated. We face higher costs, lower prices, and high risk of experiencing periods where live product cannot be moved. While this ban is out of our control, there are many policy settings in our control that can help us mitigate the damage, and we should all be looking to do so.

On top of this, we have some of the most difficult and expensive freight and logistics in the world. Almost no international flights have returned to Cairns, 70%-80% of stock needs to go South to Brisbane, Melbourne, Sydney before going North to SE Asian export markets, adding significant costs.

Domestic freight costs have also increased dramatically. Outer island flight costs have doubled and some even disappeared. Commercial and charter flights from Horn to Cairns costs have increased

significantly and airspace is unreliable. We have invested in tanks that can travel by SeaSwift barge to lower freight costs, but due to moon-break closures it's almost impossible to line up supply with the 1 day a week barge availability.

This is the worst set of external circumstances to face the Australian TRL industry in its history. Without changes to help mitigate these circumstances, the whole industry will continue to struggle and we can expect a prolonged period of lower prices and lower incomes for fishermen and everyone linked to the industry.

Other challenges across the industry

- Fuel costs have increased significantly.
- Equipment, repairs and maintenance costs have increased significantly.
- Our dive industry has the highest cost of production of any lobster in Australia and probably the world, as each lobster needs to be individually caught by divers in very remote areas, making us vulnerable and uncompetitive compared to other producers.
- Significant numbers of divers across all sectors are leaving the industry due to a very competitive job market and other opportunities.
- Overseas customers who our industry is completely dependent on have also been through these 3 terrible years, and are struggling to continue to support us. The risks for them are higher than they have ever been and the business is marginal. They continue to support us because of our long historical relationship. But we are pushing them to their limit of support. We can't take it for granted.
- No other lobster fishery in the country has such a restrictive calendar of openings and closures every month. All but one now have an open season all year, and the other just has a 3 month closure. No moon-breaks and constant starting and stopping of production based on the moon in any other lobster fishery.
- The cumulative effect of 3 bad years has put financial and emotional distress and pressure on everyone in the industry, and we will now enter a 4th year with even worse circumstances.
- Industry need to work together to find some pragmatic solutions .

Abundance

- Catch rates seemed higher than prior year, despite lowest ever TAC
- Low TAC hurt revenue and subsequently caused lower beach prices in every sector, EC, TVH and TIB. Lower volumes mean lower prices as it reduces our scale and we have to cover costs with lower supply. This erosion of supply due to policy settings has reduced the value of the industry, since the introduction of ITQs for TVH and Olympic quota for TIB
- TVH activity was at record lows due to the limited quota
    - One operator caught their catch diving 36% of season (68 days), another 37% (70 days), another operator took a whole boat and 5/11 dories out of the water, and still comfortably caught their quota in 100 days (54% of open days, 30% of actual fishing capacity)
    - Meanwhile TIB fishing effort is barely enough to take 50% of their quota allocation
    - This reduction in catch and revenue means lower beach prices and incomes for everyone else left in the industry. It also affects casual workers, contractors, processors, and has reduced the economic value of the industry in Torres Strait and Far North Queensland

Financial comparison 2019 vs 2023

Thanks to Chinese sanctions, revenue in the Australian lobster industry is down approximately 50%. The industries of all 4 commercial lobster species are struggling.

- Our revenue is down about 40% due to price and supply reduction in TIB, TVH and EC sectors
- QLD Unleaded cost increase from **$1.35 to $1.90/L**, up ~40% or more. Much more in Torres Strait
- Quality claims due to mortality used to be **10c vs $5.07/kg** +$5/kg higher cost
- Stock downgrade live to frozen/dump **30c vs $9.55/kg** +$9 higher cost
- Freight **$3.40 vs $8.1**/kg +$4.5 higher cost

So revenue is down 40%, and just on those few line items costs are up from $3.8/kg to $22.9/kg, an almost $20/kg increase in costs

Outlook for next year, 2024 Season

- We are heading into 2024 with conditions worse than 2023.
- China has banned all *Panulirus ornatus* and there is no indication this will be removed.
- **As things stand, if Australian lobster is allowed back into China, tropicals will still be banned, and this is the most likely scenario in 2024. This puts us in the worst situation of any Australian lobster species.**
- Our remaining routes to market are more difficult and vulnerable than they've ever been, and customers too are struggling.
- Flights out of Cairns remain very limited in capacity and very expensive.
- This dive fishery is one of the highest cost lobster fisheries in the world, uncompetitive compared to any pot/trap lobster fishery or tropicals in Africa and PNG that have significantly lower buy prices and freight costs
- To prepare for these poor circumstances we are doing everything we can internally to reduce costs and maximise efficiency, but there are numerous external items that add significant cost and reduce revenue and we need some help and support from regulators and decision makers to make the industry more efficient and resilient.
- Without some changes we can forecast a prolonged period of very depressed beach prices in all sectors.

2 Proposed changes for 2024 season

1) Removal of moon-breaks to stop surges of supply followed by shortfalls
2) Bring hookah season forward 2 weeks to 15th January 2024 and close 2 weeks earlier 15th September 2024, so that we can supply market for Chinese New Year when prices are highest

PROPOSED CHANGES DISCUSSION

1) **<u>Removal of moon-breaks</u>**
   - There are several problems with moon-breaks
     - They cause supply surges, increasing costs of freight and stock loss. Combined with freight bottle necks in Torres Strait and Cairns, they add serious cost to the industry, and subsequently force lower prices to fishermen. Under the current arrangement, our industry has 2 freight bottlenecks, and monthly surges of supply. We can't overstate how difficult this makes sales and how much extra cost it adds. Which at the end of the day mean less profit for producers and lower prices to fishermen.
     - They mean we can't time supply to the market, flights or barges and instead surges in supply are controlled by a completely arbitrary moon calendar
     - They give less flexibility to divers in TVH and TIB sector who use hookah equipment over when they can fish, reducing supply volume and revenue, and operating flexibility.
     - Stock loss has gone from 30c to $9.55/kg and freight from Torres to Cairns has increased significantly. Removing moon-breaks will help us cut down these losses.
     - Where moon closures fall this year is incredibly bad for the market
     - Fishing opens 1 Feb and closes almost immediately on 7 Feb.
     - Meanwhile Chinese New Year is on the 10th of Feb, so we will only get 6 days fishing when demand and prices will be at their highest.
     - We then won't get large supply volume again till the market is falling fast at the end of February

   - So based on the current calendar and policy settings
   -
     - January will be poor due to low supply. We will have low catch when market is at its highest and demand is high.
     - Our largest level of supply (when hookah commences in Feb and then stops for a week almost immediately) will mostly miss Chinese New Year and instead get unloaded when the market is falling fast at the end of February. It's uncertain if customers will accept big volumes then, if we haven't even supplied them when they actually really want the supply.
     - We can't stress how difficult it is to keep sales going in the current environment. Customers are facing major risk and operational difficulties, and as the season stands we are providing minimal supply when they really want it, and maximum supply when price and demand is falling
     - It is in all industry's interest to do this, as price will be at its highest, everyone will get better prices and income for their catch.

   - **No other lobster fishery in the country is this restrictive, makes it this difficult to fish, and deliberately causes this many logistics costs and problems.**

2) Shift Hookah Season forward 2 weeks and close 2 weeks earlier

- Propose to shift hookah season forward 2 weeks, then close 2 weeks earlier so that we can time our supply and catch to Chinese New Year
- Move hookah opening from 1 Feb 2024 to 15 Jan 2024
- Move closure from 30 Sep 2024 to 15 Sep 2024
- It is commonsense to have decent supply for Chinese New Year, the most important cultural event in China and for people of Chinese heritage
- Customers have provided us with great support over the last 3 difficult years, and we will need to lean on them again, perhaps quite hard just to get through the 2024 season. The least we can do is supply them as much as possible when the market is at its best.
- **This will deliver much better prices and revenue to fishermen in January and February, and then help us sustain better prices throughout the season**
- Under the current system we will get swamped with supply end of February when market is falling, and not provide it when market is at its peak. Why would we deliberately do this? It makes no sense.
- Very simple change to bring hookah season forward 2 weeks, then close 2 weeks earlier so that we can maximise prices to fishermen and the value of the industry.

- Chinese New Year dates:
    - 10 Feb 2024
    - 29 Jan 2025
    - 17 Feb 2026
    - 7 Feb 2027
    - 26 Jan 2028

Changes in Other Lobster Fisheries

South Australia

Government has been proactive in helping fishermen adapt to the difficulties of China trade sanctions and the COVID pandemic

- Southern Zone
    - Brought season opening forward 1 month to 1st September instead of 1st October. Closure Jun-Aug (3 months instead of 4)
    - License fees were reduced by 50%
- Northern Zone
    - Completely removed season dates, so fishermen can catch all year around instead of 4 month closure

Some of the reasons stated:

- Premier Malinauskas, “These sensible changes to support the industry are backed by the science, and allow for greater flexibility and market access, whilst maintaining the sustainability of Rock Lobster”
- In the face of Chinese trade sanctions and the Covid pandemic to ease pressure on the industry

- To provide fishers with additional time to catch their allocated quota and better align catch timings and supply with export market demand
- Greater flexibility to access international markets
- South Australian Research and Development Institute (SARDI) indicates "the change in season length does not pose a threat to stock sustainability as both the Southern Zone and Northern Zone Rock Lobster fisheries are managed under a Total Allowable Commercial Catch, meaning no more Rock Lobster will be taken as a result of these changes, than is currently the case"
- Studies showed removal of closure would have no impact on sustainability of stock

Western Australia

- 2020, 2021 and 2022 seasons all closures removed to address market issues and allow fishermen more time to catch the TAC and to time their catch to the market. For 3 years they opened the calendar year of fishing to all year to help the industry, in far contrast to our policy settings here in the Torres Strait and Queensland TRL fisheries

NSW and Victorian lobster

- Jurisdictions have no closures

By contrast, in the Tropical Rock Lobster industry:

- We have restrictive and complicated season dates, with complete disregard to market and the significantly changed conditions under the China trade ban and COVID pandemic
- To date there has been no help or support to industry and no changes to regulations despite facing a diabolical set of circumstances
- Industry have been left to manage these challenges alone
- These are 2 simple changes will help reduce costs significantly, increase revenue, help us get better beach prices to fishermen of all sectors, and get through what is looking like another challenging year.

Links to changes in other Australian lobster fisheries

https://www.pir.sa.gov.au/alerts_news_events/news/fishing_and_aquaculture/fishing_season_extended_for_sa_rock_lobster_industry

https://www.abc.net.au/news/2016-06-14/rock-lobster-winter-fishing-ban-removed-in-sa/7509770

https://www.fish.wa.gov.au/Documents/rock_lobster/rock_lobster_management_changes_-_september_2020.pdf

https://westernrocklobster.org/wp-content/uploads/2022/07/WRL-Annual-Stock-Assessment-Report-2022.pdf

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) **Thursday Island**	**MEETING 35** **12-13 December 2023**
OTHER BUSINESS	**Agenda Item 11** **For DISCUSSION**

RECOMMENDATIONS

1. That the RAG **NOMINATE** any other business for discussion.

TROPICAL ROCK LOBSTER RESOURCE ASSESSMENT GROUP (TRLRAG) Thursday Island	MEETING 35 12-13 December 2023
DATE AND VENUE FOR NEXT MEETINGS	Agenda Item 12 For DISCUSSION

RECOMMENDATIONS

1. That the RAG **NOMINATE** a date and a venue for the next meeting noting proposed meeting dates in the table below alongside key agenda items.

Proposed Date	Key agenda items
June 2024 (during a moontide closure) (TBC)	TRLRAG Data Sub-Group (meeting 2) - Assess and identify improvements to fisher dependent data inputs to the Torres Strait TRL Fishery assessment framework - Consider a draft data plan
June 2024 (TBC)	TRLRAG (meeting 36) - Consider amendments to the eHCR and TRL Harvest Strategy - Consider any related intersessional work undertaken by CSIRO - Discuss research and data needs planning, including: • Consider Data Sub-Group meeting outcomes and future work • Discuss research priorities and any updates to the five-year research plan.
10-11 December 2024	TRLRAG (meeting 37) - Consider results of the November 2024 pre-season survey - Consider CPUE analyses for the 2023-24 fishing season - Consider the recommended biological catch (RBC) estimates derived through the application of the empirical harvest control rule (eHCR) under the TRL Harvest Strategy and provide advice on a RBC for the 2024-25 fishing season - Consider any intersessional work undertaken by CSIRO