



Australian Government

Australian Fisheries Management Authority

Adaptation of Commonwealth fisheries management to climate change

**Macquarie Island Toothfish Fishery Climate Adaptation
Workshop**

**21st August 2023
Hobart, Australia**



Contents

1	Introduction	2
2	Workshop Approach	2
3	Workshop Summary	3
3.1	Update on current science on climate impacts in the MITF	3
3.2	Observations of on-the-water changes	3
3.3	MITF Impact Pathways	4
3.4	Industry adaptation options	6
3.5	Management adaptation options	6
3.6	Adaptation Priorities	7
4	Next steps for MITF climate adaptation	8
	Appendix A - Workshop participants	9

1 Introduction

AFMA has been working with CSIRO and FRDC over a number of years to improve our understanding of climate impacts on Commonwealth fisheries. In 2021 the FRDC 'Guidance on Adaptation of Commonwealth Fisheries management to climate change project' was completed, providing key adaptation resources including climate sensitivity analyses for all Commonwealth fisheries and species, and the 'Adaptation of fisheries management to climate change handbook'.

AFMA is working to ensure that climate impacts are routinely and explicitly incorporated into the management of Commonwealth fisheries. Foundational elements of the AFMA Climate Adaptation Program include ensuring that information on climate impacts is provided to RAGs and MACs, Climate and Ecosystem Status Report cards with readily available indicators of ecosystem status and trends are developed, and workshops are held with stakeholders in key fisheries to discuss climate impacts and adaptation options. The Adaptation of fisheries management to climate change handbook ('the Adaptation Handbook'), is being used as the framework for these discussions.

Sub-Antarctic ecosystems and fisheries are considered likely to experience profound changes as a result of climate change. Building upon the discussions and outcomes of a Climate Adaptation Workshop held with stakeholders for the Heard Island and McDonald Islands (HIMI) Fishery in May 2023, AFMA convened a Climate Adaptation Workshop for the Macquarie Island Toothfish Fishery (MITF) in Hobart in August 2023. This workshop had the following objectives:

- Build a shared understanding of current science on existing and predicted climate impacts in the MITF,
- Review the outcomes of the HIMI Fishery Adaptation Workshop to identify differences in climate impacts and adaptation in the MITF, and
- Identify priority operational and management adaptation actions for the MITF.

This report provides a summary of the workshop discussions and outcomes and suggests next steps in adaptation of the MITF to climate change.

2 Workshop Approach

The MITF Climate Adaptation Workshop involved managers, industry, scientists and other stakeholders (see Appendix A for participant list). The workshop agenda included:

- An update on recent research on existing and predicted climate impacts on the MITF, with presentations provided by CSIRO,
- Observations from industry on variability in the fishery,
- Mapping of potential climate change impacts on the MITF,
- Workshopping industry and management adaptation options, and
- Prioritisation of adaptation options.

The impact mapping and adaptation options sessions used methods and contents from the [Adaptation of fisheries management to climate change Handbook](#) (Fulton et al., 2020), which is designed to support stakeholders to assess the risk of climate change to species and identify adaptation actions to mitigate those risks. The Handbook was produced as part of the project [Adaptation of Commonwealth fisheries management to climate change](#) (FRDC 2016-059).

3 Workshop Summary

3.1 Update on current science on climate impacts in the MITF

A brief overview and preliminary findings from the “Environmental and ecosystem drivers of catch efficiency within Australia’s subantarctic Patagonian Toothfish (*Dissostichus eliginoides*) fisheries” project was presented by Ryan Downie and Rich Hillary (CSIRO).

Key points arising from the presentations and subsequent discussion included:

- The waters around Macquarie Island have seen a general warming trend over time and an increase in the variability in salinity.
- Macquarie Island is a highly dynamic oceanographic region that experiences high velocity variable currents.
- These currents, and the mixing of different water bodies contribute to variability in bottom temperatures and significant interannual variability in salinity.
- The community composition is predominantly fish and appears to have increased in biomass over time, which differs from HIMI which comprises majority crustaceans.
- The fishery experienced a dip in the catchability of toothfish in 2016-17.
- The increased water temperature may be benefiting fish condition.

3.2 Observations of on-the-water changes

Workshop participants, particularly industry representatives, discussed the changes that they have seen on the water and if/how these correlated with some of the scientific information presented.

Points arising from the discussion included:

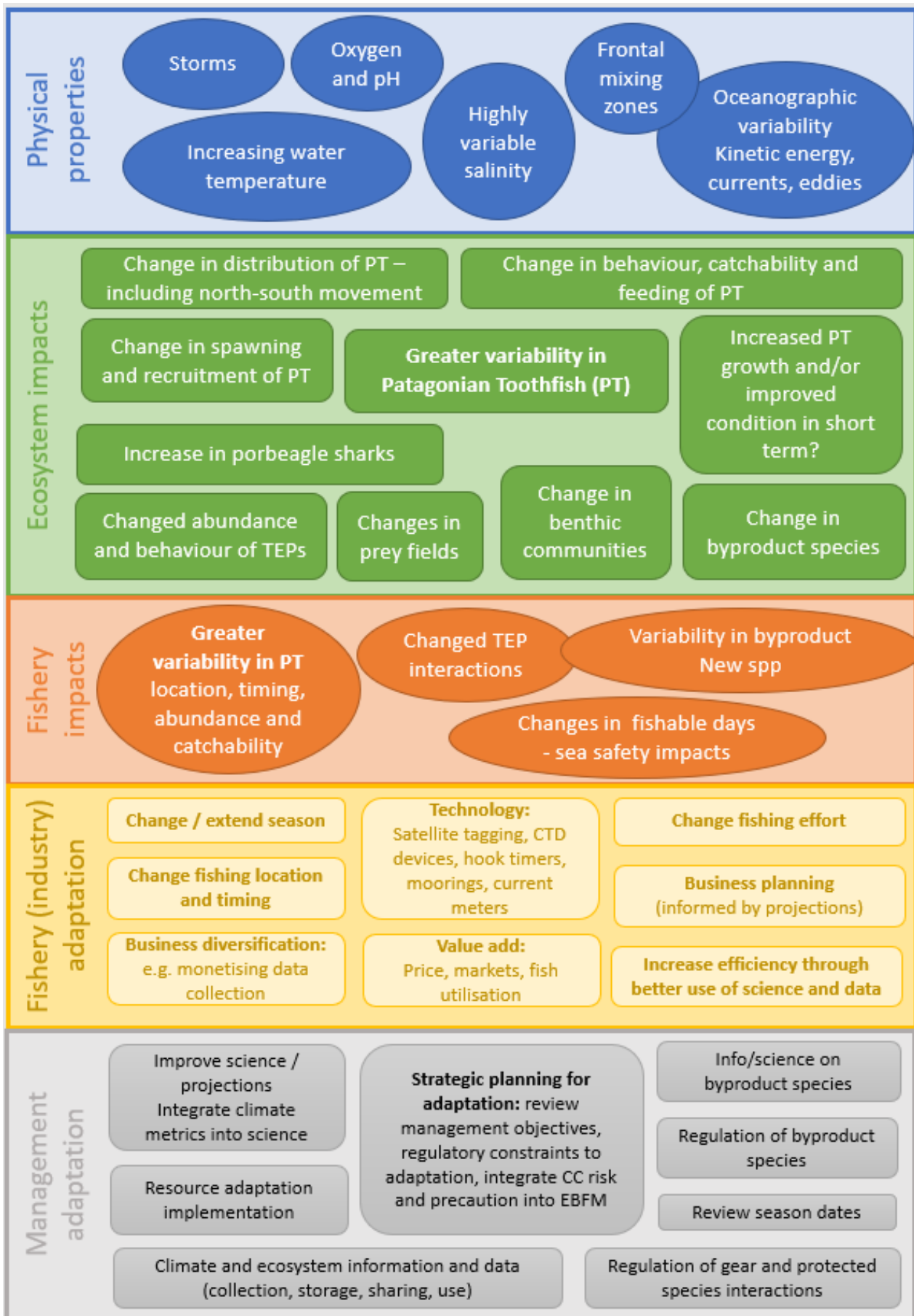
- Catch is more spatially volatile in the MITF.
- Industry reported that the fish condition is generally looking OK.
- Catchability generally decreases as the water temperature decreases, and increases when the water warms. Similarly fishing is less productive when the weather (winds and seas) are poor.
- Fish have been observed to stay in a ‘home’ area – as tag and recapture often occurs at the same location.

3.3 MITF Impact Pathways

Building impact pathways is a useful way of capturing a broader understanding of how the system works. This method involves drawing pathways showing the chains of potential impacts of climate change on other parts of the system. Mayne (2015) suggests that drawing impact pathways collaboratively helps workshop participants understand: a) issues related to management and implementation (e.g. how to monitor if an intervention is successful and how to manage interventions adaptively), b) causal links and identify potential unintended links and consequences (evaluate interventions), and c) adequately scale the range of interventions. Diverse views and expertise are important to include in drawing impact pathways as they provide a rich picture of potential interventions and impacts, based on expert opinion of how changes to the environment can influence the fishery. Impact pathways are useful for understanding how changes in the environment can influence the fishery and design adequate interventions.

Impact pathways for the HIMI fishery were developed in a workshop in March 2020 and further refined in a stakeholder workshop in May 2023. Participants at the MITF workshop reviewed the impact pathways drafted for HIMI and discussed how the impacts and potential responses for the MITF may differ, resulting in some new elements being added and some other elements being removed or revised.

The following components were identified by workshop participants as key system components for inclusion in the impact pathways for the MITF fishery.



3.4 Industry adaptation options

The workshop discussed the adaptation options available to industry that were identified for the HIMI Fishery and noted that many of those options remain relevant to the MITF, including:

- Change / adjust fishing season
- Change fishing location
- Investing in new technology, including toothfish satellite tagging, deploying CTD (conductivity, temperature, depth) devices, hook timers, mooring and current meters to improve data collection.

Additional operational adaptation options discussed for the MITF included:

- Utilising climate science and projections to inform business planning and increase efficiency,
- Monetising data collection,
- Changing fishing effort and timing of fishing,
- Exploring value adding opportunities including price, markets and greater fish utilisation.

3.5 Management adaptation options

The workshop discussed the management adaptation options identified for the HIMI fishery and noted that many of them remained relevant for the MITF, including:

- Investment in research to improve projections and better understand climate change impacts on diet, trophic relationships, target species, byproduct and fishery operations.
- Reviewing management objectives and policy settings.
- Reviewing, revising and developing management arrangements to account for climate related shifts, including in relation to byproduct and protected species.
- Capacity building and information sharing on climate impacts and adaptation across other toothfish fisheries and associated stakeholders.

A number of additional management adaptation options were also identified for the MITF:

- Undertaking strategic planning for adaptation to inform future management and identify resource needs, regulatory settings that constrain adaptation and baseline data needs.
- Reviewing regulatory settings that constrain flexibility and adaptation, including season dates, gear regulations, health certification and biosecurity requirements, and marine park regulations.
- Integrate climate change risk and precaution into management, including Ecosystem Based Fisheries Management (EBFM).

3.6 Adaptation Priorities

The workshop discussed priorities for climate adaptation actions in the MITF in groups according to their primary role in the fishery: industry, management and science. The groups established the following priorities for their areas of interest:

Industry group priorities

1. Implementing flexible management arrangements
 - Responsible entity: AFMA
2. Increased collection of climate change data (fishery and environment)
 - Responsible entity: Industry, scientists
3. Improved forecasting and scenario modelling
 - Responsible entity: Industry, scientists and AFMA

Management group priorities

1. Integrating climate change into harvest strategy reference points and/or alternative management approach (including identifying the science required for assessments and data gaps)
 - Responsible entity: policy, management, scientists, industry and conservation stakeholders
2. Undertake ecosystem modelling, beginning with scoping what is required to build an ecosystem model for the MITF
 - Responsible entity: scientists and conservation stakeholders
3. Increasing fishery independent data collection (to inform ecosystem models and improve climate integrated science)
 - Responsible entity: scientists, government, industry and conservation stakeholders

Science group priorities

1. Ecosystem baseline survey (structure and dynamics)
 - Responsible entity: scientists
2. Operationalise “real time” predictive tools
 - Responsible entity: scientists
3. Metapopulation linkages
 - Responsible entity: scientists

4 Next steps for MITF climate adaptation

The MITF Climate Adaptation Workshop provided an opportunity for important discussions between industry, scientists, managers and others, on the existing and potential impacts of climate change and what adaptation in the MITF might look like. The informal environment enabled the linking up of ideas, observations and research, bringing together knowledge from across different stakeholders. Ideas to refine, advance and align research were presented, operational adaptation options were aired and potential management adaptation actions were identified.

Further work on climate adaptation was discussed throughout the day and next steps identified included consideration of the workshop outcomes by SARAG, and the integration of workshop considerations and outputs into research prioritisation and management decisions. Participants highlighted the need for continued strategic planning for climate adaptation in the MITF fishery by AFMA and industry, including more active consideration of adaptive management and business planning. Continued communication of information and knowledge on predicted climate impacts, as science and understanding evolves, will be integral to this process.

Appendix A - Workshop participants

Alice McDonald (facilitator)	AFMA
Brad Milic	Australian Longline Fishing
Bruce Wallner	SARAG Chair
Cara Masere	AAD
Claire Wallis	AFMA
Dale Maschette	IMAS
Danait Ghebregabhier	AFMA
Heather Johnston	DAFF
Heather Patterson	DAFF
Lyn Goldsworthy	SouthMAC Member
Malcolm McNeill	Australian Longline Fishing
Phillippe Ziegler	AAD
Pia Bessell-Browne	CSIRO
Rachel Baird	SouthMAC Chair
Rhys Arangio	Austral Fisheries
Rich Hillary	CSIRO
Ryan Downie	CSIRO
Selina Stoute	AFMA
Tim Ward	SARAG Member
Simone Retif	AAD
Sean Kebbel	Austral Fisheries
David Carter	Austral Fisheries
Jaimie Cleeland	AAD
Justine Johnston	AFMA