Australian Government

Australian Fisheries Management Authority

AFMA Climate Risk Framework

Integrating climate impacts and risk into TAC/E setting

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Version	Updates	Approver
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Executive Summary

The impact of climate change on Commonwealth fisheries is becoming increasingly evident. The effects of climate change on marine ecosystems are accelerating and the Intergovernmental Panel on Climate Change (IPCC) projections indicate that fish production will be further affected within the relatively short term (e.g. 10 years), to the point where management advice that doesn't consider this change could be rendered invalid[1].

AFMA is developing a Climate Risk Framework to integrate climate risk into TAC/E decisions. The Framework is based on a risk assessment approach, similar to that which has been utilised in other fisheries internationally to integrate ecosystem and environmental considerations and uncertainty into catch settings.

The AFMA Climate Risk Framework is a three-step process that seeks to:

- Assess the climate risk to a species, based on the best available information,
- Consider whether the stock assessment or harvest strategy already account for climate change effects, or if the TAC/E or management arrangements are already sufficiently precautionary, and if not,
- Assess climate risk in relation to the stock status and identify appropriate precautionary adjustments.

This Framework is intended as a transitional mechanism, to enable rapid integration of climate risk into TAC/E decision-making until such time as climate impacts are more explicitly integrated into harvest strategies, stock assessments and/or Ecological Risk Assessments.

Climate change has the potential to effect fish stocks in both negative and positive ways, and there are some species in Commonwealth fisheries that could benefit from the environmental shifts being driven by climate change. The purpose of this Framework is to identify and respond to the risk of deleterious impacts on fish stocks due to climate change, consistent with AFMA's legislative obligation to implement the precautionary principle. However, AFMA recognise that identifying and responding to beneficial impacts of climate change is also an important element of adaptation.

The Framework is one element of a broader program of climate adaptation work being undertaken by AFMA. Other activities include communication materials, standing agenda items on climate change in RAGs and MACs, development of fishery specific climatic and environmental indicator reports, and stakeholder workshops to discuss fishery specific adaptation responses to both positive and negative climate impacts.

This paper presents the latest Draft of the Framework, which has been revised in response to consultation with a number of stakeholders and experts. The Framework detailed below has been approved by the AFMA Commission for trial implementation in key AFMA Fisheries in 2024.

[1] Duplisea DE, Roux MJ, Hunter KL, Rice J (2021) Fish harvesting advice under climate change: A risk-equivalent empirical approach. PLOS ONE 16(2): e0239503. https://doi.org/10.1371/journal.pone.0239503

Introduction

Climate change is already impacting Australia's marine ecosystems and fisheries in a range of complex ways. Australian waters are becoming warmer and more acidic, sea-levels are rising, major ocean currents are changing, and extreme weather events are becoming more severe. The effects of climate change on marine ecosystems are accelerating and projections from the Intergovernmental Panel on Climate Change (IPCC) indicate that fish production will be further affected within the next decade[2].

AFMAs legislative obligations include the need to ensure that the exploitation of fisheries resources is conducted in a manner consistent with the principles of ecologically sustainable development, which includes the exercise of the precautionary principle. To ensure that AFMA continues to meet these objectives, a program of work to adapt Commonwealth fisheries to climate change is being undertaken. AFMA's Climate Adaptation Program is implementing a range of measures to incorporate climate change information and risks into decision making frameworks, to ensure that management of Commonwealth fisheries is adaptive to the impacts of climate change.

1.1 Information on the impacts of climate change on Commonwealth Fisheries

An increasing amount of information, research and data is available on the sensitivity of fish stocks to climate change and associated impacts on current and future stock status. This information is being considered by AFMAs Resource Assessment Groups (RAGs), Management Advisory Committees (MACs) and managers, as contextual information for management discussions for Commonwealth-managed stocks.

Information on climate sensitivity of Commonwealth-managed fish stocks includes:

1. Attribution studies of counterfactual simulations: Sophisticated ecosystem modelling of existing and projected climate impacts is available for some Commonwealth species, for example climate forced modelling using CSIRO Atlantis ecosystem simulations for key species in the Southern and Eastern Scalefish and Shark Fishery (SESSF) (Fulton et al, in publication). Models of Intermediate Complexity for Ecosystem assessments (MICE) being undertaken for some Commonwealth fisheries, are also more specifically fit. These robustly fit models have good model skill scores (i.e. have real information content that exceeds what would be gained from a time series alone).
2. Preliminary projections of change in abundance due to climate change is available for most Commonwealth fish species from the FRDC Project "Guidance on Adaptation of Commonwealth Fisheries management to Climate Change"[3]. These projections come with varying levels of confidence and additional interpretive comments (e.g. likely geographic

[2] Duplisea DE, Roux MJ, Hunter KL, Rice J (2021) Fish harvesting advice under climate change: A risk-equivalent empirical approach. PLOS ONE 16(2): e0239503. https://doi.org/10.1371/journal.pone.0239503

[3] Fulton, E.A., van Putten, E.I, Dutra, L.X.C., Melbourne-Thomas, J., Ogier, E., Thomas, L. Rayns, N., Murphy, R., Butler, I., Ghebrezgabhier, D., Hobday, A.J. (2021) Guidance on Adaptation of Commonwealth Fisheries management to climate change. CSIRO Report for FRDC. Hobart. CC BY 3.0

shifts) for some species. They are based on quantitative models that consider additional factors not picked up in the sensitivity assessments described below.

3. An assessment of climate sensitivity based on life history characteristics is available for all fish species in Commonwealth fisheries[4]. This information poor assessment provides a climate sensitivity rating of 'low', 'medium' or 'high' for each species.

'Climate and Ecosystem Status Reports' are also available for key fisheries, drawing upon readily accessible climatic and environmental data and trends. The first iterations of these reports are relatively high level, containing hindcast and forecast information on indicators such as sea surface temperature, ENSO cycle status, chlorophyll-a and fishers' observations. These reports are still in their infancy in terms of development and use in Commonwealth fisheries, however as the indicators are refined and their relevance and influence on stock abundance and distribution is better understood, these will also provide an insight into climate impacts and risks for some stocks.

Over time, the Climate and Ecosystem Status Reports could evolve to include more sophisticated population and environmental indicators of climate-influence. A number of Australian researchers have been leaders in the field of identifying ecosystem indicators and have close connections with US and EU groups who are applying indicators in this way. Lessons gained from that network indicate that it presents a useful framework which can be adapted to Australian conditions and available information (and refined through time as has occurred elsewhere). Potential indicators that could be considered in future, to provide more sophisticated insight into climatic impacts and ecosystem shifts, can be found in the Alaska Marine Ecosystem Status Reports and in a list proposed by NOAA for US fisheries in Link et al (2021)[5].

1.2 Quantitative integration of climate change into TACs

Ideally the influence of climate and ecosystem factors on stocks would be integrated quantitatively into stock assessments and harvest strategies, so that they would directly influence Recommended Biological Catches (RBCs). This could be done in several ways, each of which have pros and cons, for example:

- Include time-varying (or more recent estimates of) life history and productivity parameters in stock assessment models. This could be done via specific environmentally influenced relationships for parameters or via disaggregation of processes (such as breaking natural mortality down in terms of predation, environmental and other static background components);
- Integrate environmental variables (where there's a strong enough relationship with stock productivity) into the stock assessment, such that the RBC accounts for environmental influences;
- Modify Harvest Control Rules (HCRs) so that they account for environmental variables (e.g. reference points or management levers linked to Sea Surface Temperature (SST) or other informative index of ecosystem state), this could include a "floating B_{lim}" which responded in a precautionary way to environmentally influenced trends in biomass;

[4] Fulton, E.A., van Putten, E.I, Dutra, L.X.C., Melbourne-Thomas, J., Ogier, E., Thomas, L. Rayns, N., Murphy, R., Butler, I., Ghebrezgabhier, D., Hobday, A.J. (2021) Guidance on Adaptation of Commonwealth Fisheries management to climate change. CSIRO Report for FRDC. Hobart. CC BY 3.0

[5] Link, J.S., Karp, M.A., Lynch, P., Morrison, W.E., and Peterson, J. Proposed business rules to incorporate climate-induced changes in fisheries management. – ICES Journal of Marine Science, 78: 3562-3580

- Introduce a 'Dynamic B_0' approach, which reflects the non-stationarity of stocks resulting from variables including climate-driven shifts.
- Ecosystem modelling integrated into stock assessment considerations – such as checking for unintended ecosystem consequences or driver interactions; or deriving time varying parameter values, reference points or exploitation rates from the ecosystem model (as has been done in a small number of systems in the USA and Scandinavia). Or joint climate informed "ecoviability" envelopes that look to find levels of fishing pressure that account for climate influenced productivity, economic and social objectives (as have been calculated for a small number of fisheries in Europe); and/or
- Ecosystem model-based indicators used to change single species target F, which could be implemented via specific environmental triggers and meta-rules.

These potential approaches can be considered by RAGs for key species likely to be impacted, to ensure future stock assessments are appropriately integrating climate influences. However, many of these approaches are complex and unlikely to be implemented in the near-term. A fully quantitative integration may also not be necessary, possible or cost effective for many species.

1.3 A transitional mechanism to integrate climate risk and impact

AFMAs legislative obligations include the need to ensure that the exploitation of fisheries resources is conducted in a manner consistent with the principles of ecologically sustainable development, which includes the exercise of the precautionary principle. The precautionary principle requires AFMA to address uncertainty and account for known risk, and potential risks, in decision making[6]. Given increasing evidence that climate change is having a deleterious impact on a number of Commonwealth fish stocks, and the understanding that climate change is accelerating[7], a mechanism to integrate climate risk into TAC/E setting is needed in the short term, while more sophisticated longer-term solutions are being developed.

While climate change may also have beneficial effects on some stocks, those changes are not being addressed by this Framework, the purpose of which is to mitigate risks to sustainability. Management and response to beneficial effects of climate change are captured in broader climate adaptation action.

The stock assessments and harvest strategies in most AFMA fisheries do not yet explicitly integrate climate and ecosystem factors, and therefore impacts of climate change on stock productivity and abundance is not included in the production of an RBC. Such 'climate-ready' stock assessments are unlikely in the near-term for most species and may never be necessary or possible for some species. However, looking to how climate research and information has been

[6] OECD Joint Working Party on Trade and Environment (2002) *Uncertainty and Precaution: Implications for Trade and Environment*, OECD, September.
Peterson D (2006) *Precaution: principles and practice in Australian environmental and natural resource management*. 50th Annual Australian Agricultural and Resource Economics Society Conference, NSW.

[7] Duplisea DE, Roux MJ, Hunter KL, Rice J (2021) Fish harvesting advice under climate change: A risk-equivalent empirical approach. PLOS ONE 16(2): e0239503. https://doi.org/10.1371/journal.pone.0239503

used formally and informally in other jurisdictions internationally, semi-quantitative or qualitative options are already used in some jurisdictions. Australia can learn lessons from those cases.

Risk assessment approaches are utilised widely in fisheries, including in assessing and responding to ecological risks in Commonwealth fisheries using the Ecological Risk Management Framework. The climate sensitivity assessments available for all Commonwealth fish stocks (discussed above) are compatible with the Productivity, Susceptibility Analysis (PSA) method (using many of the same characteristics to judge risk).

A risk table (see Dorn & Zador, 2020[8]) is being utilised in Alaskan groundfish fisheries to support TAC decision making in the North Pacific Fisheries Management Council (NPFMC). In these fisheries RBC estimates and final TAC levels are presented alongside relevant information around assessment uncertainty or modifications, population dynamics not explicitly addressed in the model, and ecosystem state. This provides the context for the final decision, particularly when there are lower catch recommendations than the 'acceptable biological catch' due to ecosystem/environment concerns (including climate impacts). The use of this Alaskan risk table is dependent on informative ecosystem indicators that have been identified and refined through time in Alaska (see for example the Alaska Marine Ecosystem Status Reports).

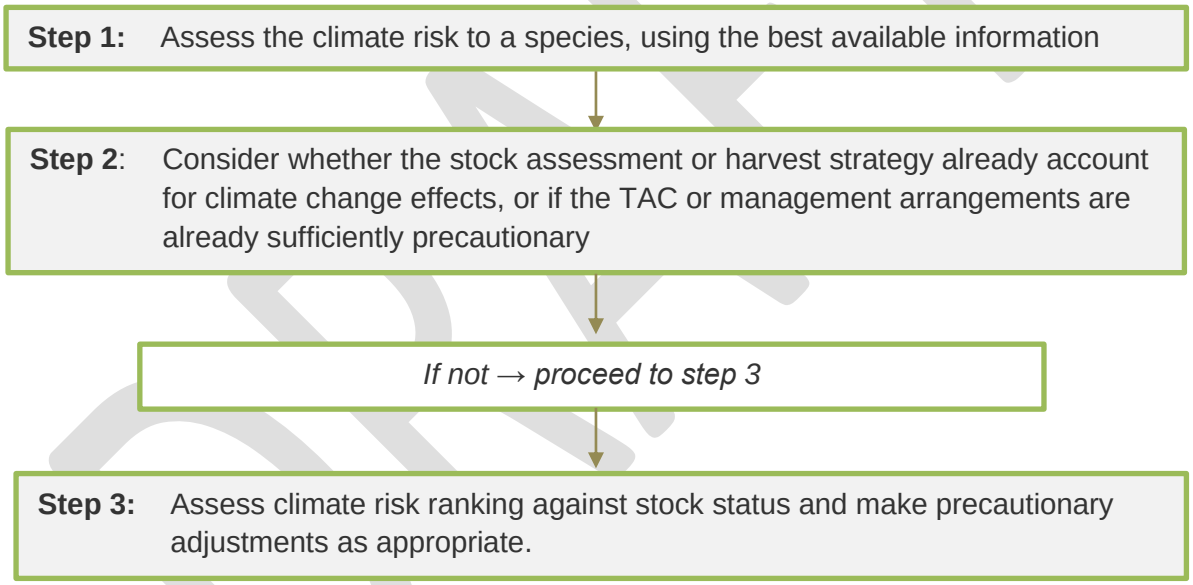
[8] Dorn, M. & Zador, S. (2020) A risk table to address concerns external to stock assessments when developing fisheries harvest recommendations. Ecosystem Health and Sustainability. Vol. 6, Issue 1. https://doi.org/10.1080/20964129.2020.1813634

2. Draft AFMA Climate Risk Framework for Commonwealth Fisheries

A transitional mechanism for AFMA is being developed to formalise the integration of climate sensitivity and risk into TAC/E decisions. The draft mechanism, the “Climate Risk Framework”, is based on a risk assessment approach, similar to that which has been utilised in other fisheries internationally to integrate ecosystem and environmental risks and uncertainty into TAC/E decision making.

The purpose of this framework is to rapidly identify risk from climate-driven changes, based on information on hand. Then, depending on the risk, to consider whether additional precautionary adjustments can and should be made to the TAC/E for that coming year. The approach has been specifically designed to fit the existing information available on sensitivity of Commonwealth species to climate change, and enable rapid assessment in a data-poor context. It is intended to provide the structure to then respond to the identified risk in a single TAC/E setting cycle.

The draft AFMA Climate Risk Framework is a three-step process:



These steps are described further below.

Step 1: Assess the climate risk to a species, using the best available information

The RAG, utilising the best available climate information for the species, undertake a qualitative climate risk ranking using the criteria set out in Table 1 below. The RAG should draw upon the most robust information source available for the species – with 1 (attribution studies or counterfactual simulations) being the most robust and 3 (climate sensitivity assessment) being the least robust – along with contextual information on the state of relevant environmental and climatic indices (4). Only a few species are likely to have attribution studies or counterfactual simulations available (information source 1), while most species will have preliminary projections and climate sensitivity assessments (information sources 2 and 3) available to draw upon. AFMA will support the RAG by ensuring the available information for the species of interest is available.

	Information source			
Climate risk ranking	**1. Results of attribution studies or counterfactual simulations *(where available)***	**2. Preliminary projections of change in abundance due to climate change from Fulton et al (2021)[9]**	**3. Climate sensitivity assessment from Fulton et al (2021)**	**4. Climate and ecosystem indicators**
High	Climate change is the primary driver of stock depletion	Abundance will decline by >20% by 2040 with moderate to high confidence or Abundance is predicted to decline by >40% with low confidence		Relevant climatic or ecosystem indicators show adverse signals in the near history and in short-medium term predictions
Uncertain	Where no information is available, significant uncertainty exists in available modelling and/or assessments, or both increases and decreases are considered equally possible.			
Medium	Climate change is contributing to a decline in stock abundance	Decline of 10-20% in abundance through to 2040 with medium or high confidence Or Projections suggest abundance will decline by 10-40% but confidence in the assessment is low	If projections are not available, where climate sensitivity has been rated medium to high	General climatic or ecosystem indicators indicate changing system productivity (e.g recent marine heatwave in the fishery region)
Low	Climate change does not have an influence on the stock Or The productivity of the stock benefits from climate driven system changes	Abundance will remain stable through to 2040 (or predicted change is less than ±10%) Or Projections predict abundance will increase by >10% with medium or high confidence	If projections are not available, where climate sensitivity has been rated low	General climatic or ecosystem indicators indicate no change in system productivity Or Relevant indicators show conditions that are known to benefit stock productivity

Table 1 AFMA Climate Risk Framework – Step 1: Climate Risk Ranking Criteria

Implementation of Step 1: It is the role of the RAG to assess a species climate risk ranking against Table 1, utilising the most robust information available. Information source/s, rationale and risk ranking are to be recorded by the RAG and provided in advice to the MAC and AFMA Commission.

Additional points of guidance:

- The assessment should be done on the species at a scale appropriate to how the TAC is set – i.e. if the TAC is for species x in species y fishery, then this should also apply to the assessment of climate risk.

[9] Fulton, E.A., van Putten, E.I, Dutra, L.X.C., Melbourne-Thomas, J., Ogier, E., Thomas, L. Rayns, N., Murphy, R., Butler, I., Ghebrezgabhier, D., Hobday, A.J. (2021) Guidance on Adaptation of Commonwealth Fisheries management to climate change. CSIRO Report for FRDC. Hobart. CC BY 3.0

- If two equally robust pieces of information indicate different risk rankings, the highest risk ranking is to be used.
- If increased variability is predicted for a species, the ranking should be based upon the likely overall trend over time, or where a trend is not clear, the species should be ranked 'Uncertain'.
- If no information on a species exists, information from similar species that are data rich can be used to inform the assessment.

Step 2: Assess whether the stock assessment or harvest strategy already account for climate change effects, or whether the TAC/E or management arrangements already sufficiently precautionary

Once the climate risk ranking has been determined, the RAG then considers whether the science informing the RBC/TAC/E already integrates climate change effects. The influence of climate change on stocks can be integrated quantitatively into stock assessments and harvest strategies in a number of different ways, including (but not limited to):

- Time-varying (or recent estimates of) life history and productivity parameters in stock assessment models and projections;
- Linking parameters in stock assessments to environmental variables;
- HCRs and/or MSEs that account for environmental variables;
- Using 'Dynamic B_0';
- Ecosystem modelling integrated into stock assessment; and/or
- Ecosystem model-based indicators that change single species target F.

If the RAG determines that climatic and ecosystem effects are not accounted for in the science used to inform the RBC/TAC/E, then the RAG and the MAC should consider whether the TAC or management arrangements are already sufficiently precautionary. This could for example include where economics or operational restrictions on the fishery prevent the RBC from being caught, where a significant component of the stock is protected through closures or other fishery restrictions, or where pre-season surveys are used to rapidly detect and respond to productivity changes.

Integration of climate and ecosystem effects in the science should be described by the RAG, along with any discount factors that have already been included in the RBC. The RAG and the MAC should describe and record any mechanisms that integrate additional precaution into the management arrangements.

Where the RAG does not consider the arrangements sufficiently precautionary in light of climate risks, then they should proceed to Step 3.

Step 3: Consider the need for precautionary adjustments to the TAC/E, commensurate with climate risk and stock status

Where the science or management arrangements in place for a species do not yet integrate climatic or ecosystem effects or risks, then the need for precautionary adjustments to the TAC/E should be considered. The potential consequences of climate impacts on a stock are exacerbated for stocks at lower biomass levels, therefore the need for precautionary adjustments to the TAC/E, will depend on the status of the stock combined with the climate risk ranking established in Step 1.

Options to integrate additional precaution into a TAC/E for the forthcoming year could include:

- Using more precautionary parameter inputs in the stock assessment (e.g. recent estimates or averages of recruitment of growth),
- Using an RBC from more pessimistic scenarios,
- In empirical assessments, use reference points from a period with compatible (or similar) climatic characteristics (e.g. a period with similar productivity profile in terms of prevailing environmental conditions),
- Do not recommend a Multi-Year TAC (MYTAC), and/or
- Where concern remains that climate risk is not sufficiently accounted for and other precautionary adjustments cannot be taken, then a "climate buffer" could be included in the TAC/E.

The mechanisms that are available and appropriate will depend on the fishery, species, and the sophistication of the stock assessment. While all options may be available for some species with a Tier 1 stock assessment, for some data poor species the climate buffer may be the only adjustment available in the forthcoming season.

Table 2 provides guidance on the options that should be considered for a species, depending on the stock status and climate risk ranking of a species (as established in Step 1). The stock status of a species is categorised based on the proximity of the biomass to the Limit Reference Point (LRP) or the Target Reference Point (TRP), with guidance on appropriate responses differing depending on whether a species is below the LRP, near the LRP (20-35%B_0 or proxy), near the TRP (35-48%B_0 or proxy) or above the TRP (>48%B_0 or proxy). Differential management responses based on proximity to reference points is consistent with the Commonwealth Harvest Strategy Policy. Note that under Commonwealth fisheries harvest strategies, species below the LRP would typically not have a TAC/E assigned, unless they were in a multi-species fishery in which case a bycatch TAC/E may be assigned. As such, this column and associated guidance only applies to those species.

		Stock status			
		Below LRP *(see additional guidance notes)*	**Near LRP:** 20-35%B_0 (or proxy)	**Near TRP:** 35-48%B_0 (or proxy)	**Above TRP:** >48%B_0 (or proxy)
Climate risk ranking	**High**	**Reduce the bycatch TAC/TAE** Use one or more options: - Pessimistic scenarios and/or projections - Review parameter inputs - Use reference points from compatible periods - Buffer - Reduce TAC/E of associated species	**Reduce the RBC/TAC/TAE** Use one or more options: - Review parameter inputs - Pessimistic scenarios and/or projections - Use reference points from compatible periods - No MYTAC - Buffer	**Consider reduction to RBC/TAC/TAE** Review options: - Review parameter inputs - Use reference points from compatible periods - No MYTAC - Buffer	**Maintain usual approach** - Monitor abundance indices - Monitor environmental and climatic indices
	Medium	**Reduce the bycatch TAC/TAE** Use one or more options: - Pessimistic scenarios and/or projections - Review parameter inputs - Use reference points from compatible periods - Climate buffer	**Consider reduction to RBC/TAC/TAE** Review options: - Review parameter inputs - Use reference points from compatible periods - No MYTAC - Climate buffer	**Consider reduction to RBC/TAC/TAE** Review options: - Review parameter inputs - Use reference points from compatible periods - No MYTAC - Climate buffer	**Maintain usual approach** - Monitor abundance indices - Monitor environmental and climatic indices
	Uncertain	**Consider reduction to bycatch TAC/TAE** Review options: - Review parameter inputs - Use reference points from compatible periods - Climate buffer	**Consider reduction to RBC/TAC/TAE** Review options: - Review parameter inputs - Use reference points from compatible periods - No MYTAC - Climate buffer	**Maintain usual approach** - Monitor abundance indices - Monitor environmental and climatic indices	**Maintain usual approach** - Monitor abundance indices - Monitor environmental and climatic indices
	Low	**Maintain usual approach** - Monitor abundance indices - Monitor environmental and climatic indices	**Maintain usual approach** - Monitor abundance indices - Monitor environmental and climatic indices	**Maintain usual approach** - Monitor abundance indices - Monitor environmental and climatic indices	**Maintain usual approach** - Monitor abundance indices - Monitor environmental and climatic indices

Table 2: AFMA Climate Risk Framework – Step 3: Guidance on the need for precautionary adjustments, based on climate risk ranking and stock status

Implementation of Step 3:

- RAG to provide advice on appropriate and available precautionary adjustment mechanisms within the current TAC/E setting cycle.
- MAC to provide advice to the Commission on if and what precautionary adjustments to the TAC/E may be appropriate.
- The Commission decide on the application of any adjustment to the final TAC/E.

Additional guidance notes

- Species that are below the LRP: Species with a stock status below the LRP are generally not given a TAC/E (or the fishery is closed), unless they are in a multi-species fishery in which case a bycatch TAC/E may be assigned. The "Below LRP" column therefore only applies to species that have a bycatch TAC/E.
- Application of a climate buffer: If a 'climate buffer' is considered an appropriate option to adjust the TAC/E for a stock, the RAG and then MAC should use their expert judgment to recommend the size of the buffer, with consideration for the following factors:
    - The climate risk rating and stock status of the species,
    - Information and modelling available on the impact climate change is having (or is predicted to have) on the species,
    - Information on the role of the species in the ecosystem and fishery,
    - Stock, climate and environment indicators and trends,
    - Other discounts already included in the development of the RBC, and
    - Other mitigating factors in the management of the fishery (e.g. spatial closures).

  A weight of evidence approach should be taken, with clear rationale for any recommendation provided on the size of the climate buffer. The AFMA Commission will determine the TAC/E for the species, including any climate buffer.

Short term versus long term responses

The Framework, in particular Step 3, identifies options to respond to climate risk in the TAC/E for the forthcoming fishing year. This recognises that the TAC/E is one of the primary management levers that allows for short term adaptation and risk mitigation. It is however acknowledged that longer term adaptation of fisheries to climate change, which may include changes to other parts of a fisheries management regime, may also be necessary. These longer-term, and more comprehensive, adaptation plans are being progressed by AFMA through the Climate Adaptation Program.

It is noted however that in the process of implementing the Framework, longer term responses may be identified and subsequently prioritised by the RAG, MAC or Commission. These for example could include:

- Improving data and information for species identified as 'uncertain',
- Considering changes to the stock assessment schedule based on species' risk ratings,
- Reviewing stock assessments to integrate climate or ecosystem effects, or
- Consideration of spatial management measures to mitigate climate risk.

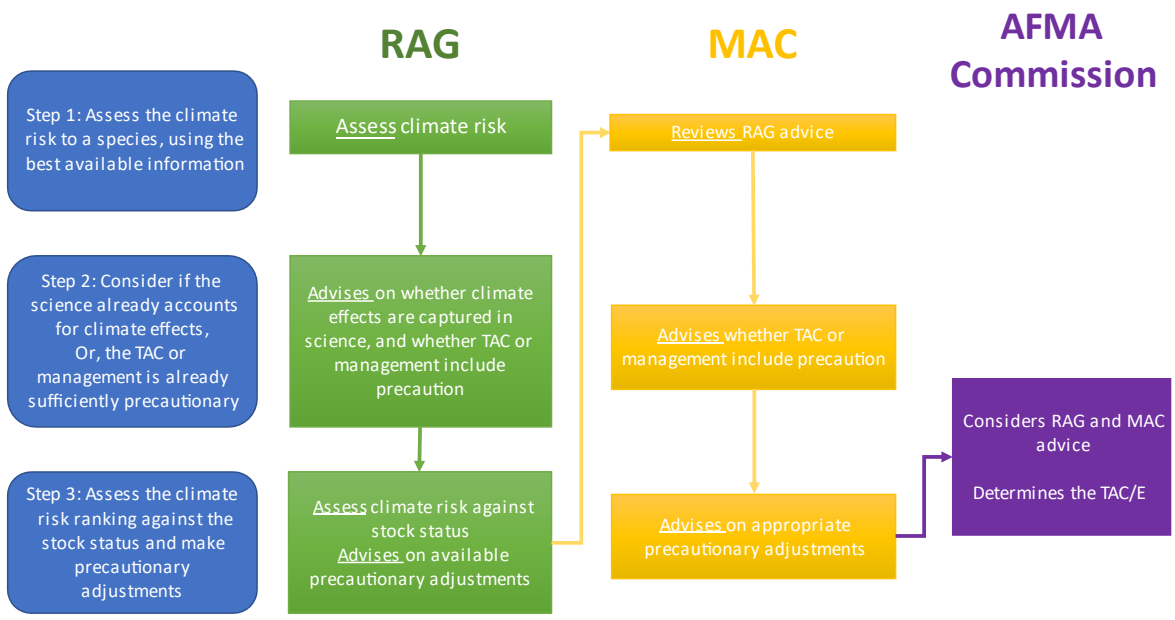
These longer-term considerations are not explicitly addressed in the Framework but are encouraged as part of the usual RAG and MAC processes.

3. Implementation of the Climate Risk Framework

Scope: The Climate Risk Framework is being developed with the intent that (when fully operational) it will be applied to all Commonwealth species for which a TAC will be set. Implementation of the Framework will be undertaken within the existing TAC/E setting process, and will therefore be implemented by the RAGs, MACs and the AFMA Commission (with the support of AFMA fishery managers) during the meetings where species TAC/Es are discussed.

Roles: The differing role of the RAGs, MACs and AFMA Commission in the application of the Framework are proposed alongside each step above and outlined in Figure 1 below.

Figure 1: The role of RAGs, MACs and the AFMA Commission in implementation of the Climate Risk Framework



The outcome of the RAG and MAC assessment of a species against the Framework would be included in their advice to the AFMA Commission, as part of the TAC/E recommendation. Implementation guidance will be developed to accompany the Framework and available information to support its application will be provided to RAGs, MACs and the AFMA Commission by AFMA Fishery Managers.

Form: It is proposed that the Framework is provided as guidance to those involved in the TAC setting process, rather than established as policy. This will enable improvement of the guidance over time, based on implementation experience, and to allow regular refinement of the Framework as RAG and MAC understanding, climate impact research, and climatic and ecosystem indicators available for Commonwealth fisheries evolve.

Time and resources: The draft Framework has been developed as a rapid assessment tool which does not require new research or data to implement, although it may trigger discussion on future

data collection or research priorities. The risk ranking criteria have been drafted to fit the information on climate sensitivity and risk currently available to AFMA, which should allow RAGs and MACs to make a rapid assessment of the climate risk of a species. The RAGs and MACs, who have a robust understanding of a species stock assessment and management, should also be able to proceed through 'Step 2' relatively rapidly. After the first year of implementation, the outcomes of Steps 1 and 2 will only change if/when new information becomes available, the stock assessment changes or management arrangements change.

Implementing 'Step 3' (the consideration of additional precautionary adjustments, where warranted) may generate substantive discussion within the RAGs and MACs, especially when the Framework is first implemented. A trial implementation will be undertaken to test the Framework and get a better understanding of the time and information required by RAGs, MACs, AFMA and the Commission to implement this process.

Over the next 3-5 years, elements of the Framework will be superseded for some species by more formal integration of climate risk and environmental influences into stock assessments, ERAs and harvest strategies. As such the continued application of the Framework should be reviewed.

3.1 Trial implementation of the Climate Risk Framework

A trial implementation of the Framework is being undertaken in 2024 using the following approach:

1. The Framework will be trialled on key fisheries, including the SESSF, NPF, Torres Strait, SSJF and sub-Antarctic fisheries.
2. An informal small working group will be established consisting of one or more AFMA fishery managers, stock assessment scientists, and ecologist/climate scientists, with supplemental expertise for the fisheries being assessed.
3. The informal small working group will undertake the following:
    a. Confirm the species on which the Framework is to be trialled,
    b. Conduct a draft assessment of the selected species against the Framework, and
    c. Prepare a retrospective analysis on at least 2 species to assess what results the Framework would have generated had it been applied over an appropriate past period.
4. The assessment undertaken by the small working group is to be provided to the relevant RAGs and MACs for review where possible (dependent on RAG/MAC meeting dates). The RAG and MAC will include the trial outcomes, for example purposes, alongside their standard TAC/E advice to the AFMA Commission.
5. Experience with trialling the Framework through the small working group, RAGs and MACs will be used to identify and address gaps and issues, and to develop implementation guidance.
6. Communication and consultation with broader stakeholders on the draft Framework will continue throughout 2024. The results of the trial implementation will inform these communications as they become available.
7. A briefing on the feasibility and utility of the Framework based on the trial implementation will be provided to the AFMA Commission after the completion of the trial.