

# **Department of Agriculture and Water Resources – submission to the inquiry into the current and future impacts of climate change on marine fisheries and biodiversity**

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## Introduction

Fishing, like other extraction and production activities that are reliant on the natural environment, is subject to considerable biological uncertainty. For wild capture fisheries the abundance, availability and location of stock can be highly variable, both within and between seasons. In addition to harvest uncertainty, commercial fishers need to manage fluctuations in the cost of fishery inputs (such as fuel, labour, vessel repairs and maintenance) and in the price of fish as determined by market availability and trading conditions. Government policies and fisheries management policies are important in supporting Australian fishers to adapt to changing biological conditions and stock abundance in a flexible and cost-effective manner.

The Department of Agriculture and Water Resources (the department) develops and implements policies to ensure Australia's agricultural, fisheries, food and forestry industries remain competitive, profitable and sustainable, and supports the sustainable and productive management and use of rivers and water resources. This includes the promotion of better resource management practices, innovation, self-reliance and improved access to international markets. The department also works with industries, governments and the community to develop Australia biosecurity policies to strengthen animal and plant disease prevention, preparedness and response capabilities. The department has more than 4000 staff working in offices, airports, mail centres, shipping ports, laboratories and abattoirs; located in regional centres, rural communities and capital cities.

The Commonwealth has direct jurisdictional responsibility for Commonwealth waters, defined as being from three to 200 nautical miles from the intertidal zone. These include a number of important fisheries and significant environmental ecosystems. The department and its portfolio agencies, support the sustainable management and use of Australian fisheries by administering the Australian Government's fisheries legislation, regulating fishing activity in Commonwealth waters, developing policies and programmes to promote sustainable and profitable fishing businesses consistent with legislated environmental protections and international obligations, leading Australian engagement in international fisheries, providing economic and scientific analyses of Australian fisheries resources, investing in fisheries research development and extension activities and providing policy and technical advice on marine pest biosecurity.

The Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) is the research arm of the department. ABARES provides scientific and economic advice, research, analysis, forecasting, and statistics on the fisheries sector to government and private sector decision-makers, and represents Australia at scientific committees of regional fisheries management organisations.

The Australian Fisheries Management Authority (AFMA) is responsible for the management of Commonwealth fisheries, Australian boats fishing on the High Seas and deterring illegal foreign fishing in the Australian fishing zone. AFMA sets management actions and monitors compliance with regulations. AFMA is headed by a Commission that is guided by Commonwealth fisheries legislation when making fisheries management decisions, which includes ensuring the sustainable exploitation of fisheries resources.

The Fisheries Research and Development Corporation's (FRDC) role is to plan and invest in fisheries research, development and extension activities in Australia. The FRDC was formed as a statutory corporation on 2 July 1991, under the provisions of the *Primary Industries Research and Development Act 1989 (PIRD Act)*. The FRDC is part funded by a levy on Commonwealth fisheries and contributions from the states.

## Management of Australian Fisheries

The Australian Fishing Zone is the third largest in the world, covering nearly nine million square kilometres. It extends to 200 nautical miles from the Australian coastline and also includes the waters surrounding our external territories, such as Heard and Macdonald Islands in the Antarctic.

Despite having a large fishing zone, Australia's commercial catch tonnage ranks 60th in the world and represents only 0.2 per cent of the world's total wild capture fisheries of 90 million tonnes. This is due to a lack of large river flows, limited nutrient runoff and the absence of substantial upwelling of cold nutrient-rich water that would otherwise yield prolific fish habitats. Nonetheless, Australian waters support a highly diverse array of more than 4000 marine species, many of which are endemic and part of globally significant marine ecosystems, such as the Great Barrier Reef.

Australia's commercial fishing and aquaculture industry employs around 14 000 people (8000 directly and 6000 indirectly). In 2014-15 the gross value of Australian fisheries and aquaculture production was \$2.76 billion. Of this, the commercial wild capture fishing industry had an estimated total production value of \$1.6 billion, with the Commonwealth-managed part of the production valued at \$348 million<sup>1</sup>. Australia's wild-catch fisheries are managed by eight jurisdictions.

Policies outlined in this submission apply to Commonwealth managed wild capture fisheries. The states and the Northern Territory also have management frameworks to accommodate exogenous impacts on their fisheries, including those arising from changes in climatic conditions. Such adaptive measures may include bag and catch limits, gear restrictions, temporal and spatial closures and vessel limitations.

Aquaculture is largely regulated by the states and territories. However the Australian Government contributes to this sector through national programmes for research, quarantine, aquatic animal health, food safety and environmental management in certain circumstances, and by negotiating market access and trade.

The recreational fishing sector is also regulated by the states and territories which prescribe catch restrictions and undertake compliance and enforcement activities. Some states licence recreational fishing which generates revenue to support recreational fishing infrastructure such as boat ramps and scaling tables in addition to sectoral representation and development. The Commonwealth provides national leadership on recreational fishing issues where relevant. The Commonwealth has also committed to establishing a National Recreational Fishing Council, conducting a national recreational fishing survey and recognising the interests of recreational and Indigenous fishers in Commonwealth fisheries legislation.

The Commonwealth fisheries policy framework seeks to manage the risk to all species impacted by the commercial harvest of Commonwealth fisheries resources. This framework includes the *Commonwealth Fisheries Harvest Strategy Policy* which provides the basis for managing the harvest of commercial fish species in Commonwealth fisheries. It is supported by the *Commonwealth Policy on Fisheries Bycatch* which provides the basis for a transparent and systematic approach for the assessment, management and monitoring of fisheries bycatch.

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<sup>1</sup> ABARES, Fishery status reports 2016.



## Implications of climate change on fisheries

Research to date has indicated the implications of a changing climate suggests impacts on the marine environment can be expected and likely to be ongoing. While the nature and extent of these impacts and their implications for fish stocks are difficult to predict, climate change is anticipated to result in greater seasonal variability in the availability, abundance and location of species targeted by commercial fishers.

Flexibility and resilience have long been characteristic of the commercial fishing industry, owing to changes in the business environment over recent decades and the natural variability of marine ecosystems. Fishers adapt how, when and where they fish so as to optimise their operations for their professional requirements. These features demonstrate a capacity to respond to uncertainty and change, whatever form it may take.

Research to date suggests that climate change will result in both challenges and opportunities for the commercial fishing industry. For example, it may result in the decline in abundance of some fish stocks or limit aquaculture operations for certain species, but concurrently may lead to increased production or range extension for other fish stocks. Access to some stocks may increase thereby allowing fisheries operations to expand and competition for particular stocks or sites may grow as a result. This is likely to create new opportunities for some fisheries, including where tropical species shift southward.

However, increased temperatures are likely to adversely impact stocks that have limited habitats and mobility. This will most adversely impact highly localised aquaculture operations. For example increasing temperatures already evident in Tasmania will result in Atlantic salmon being cultivated close to their upper thermal limits of optimal growth and may therefore result in decreased productivity.

Research undertaken by the CSIRO concludes that, while climate change is an important issue for Commonwealth fisheries, other issues such as markets, input costs and overexploitation are likely to have a greater effect and be a higher priority for fisheries policy and management in the short term.

The marine environment is a highly variable natural system and fisheries management involves working with uncertainty. Uncertainty can come from many sources apart from climate change. These include the lack of information, precision of measurements and changing environmental variables such as ocean currents, upwellings and climatic conditions. An adaptive management approach based on transparent, systematic risk identification, assessment and mitigation will be employed to ensure potential, unacceptable impacts are identified and appropriately managed.

Commonwealth fisheries are managed using a management framework that is flexible and able to adjust fishing effort in response to estimated stock levels. The existing framework includes feedback systems, regular monitoring and assessment which allows timely responses to changing environmental conditions. This includes taking into account external environmental factors and increases the capability of the current management system to respond to the challenges posed by climate change.

## Measures in place to manage the implications of climate change on fisheries

The commercial harvest of fish resources in Commonwealth waters is primarily managed by AFMA. The Commonwealth's management of fisheries is underpinned by a risk-based approach using best available science to inform stock assessments, pre-determined decision rules

predicated on harvest strategies and world's best practice risk assessment processes (ecological risk assessments (ERA)). This ensures fisheries and the species that interact within them are managed for long-term sustainability and profitability.

Stock assessments for commercial or target stocks calculate estimates of population size while harvest strategies are used to recommend sustainable catch levels based on estimated stock size. These are used within the harvest strategy framework to control the level of harvest (through total allowable catch (TAC)) and promote profitability. TAC limits are set annually and controlled through fishing allocation rights (through the allocation of individual transfer quotas).

A harvest strategy is a fishery-specific management tool that outlines processes for monitoring and assessing the biological and economic conditions of commercial fish species and setting pre-determined decision rules for management responses to stock levels. Based on analysis of this information, catch limits are set to prevent over-fishing and promote profitability.

Harvest strategy frameworks and the stock assessments methodologies that underpin them allow management practices to inherently respond to uncertainty. The same can be said for the ERA process designed for non-target species. The ERA methodology adopted in Commonwealth fisheries accommodates uncertainty and is routinely updated to remain current. This framework is responsive to changes in species biology which affects productivity or fish susceptibility to changing fishing practices, technologies or gear.

Management of non-target species or 'bycatch' is guided by the government's bycatch policy which aims to minimise the overall impact of fishing activity on bycatch populations. Input controls are also used to limit the intensity of fishing in certain circumstances. This can include spatial and temporal closures and gear restrictions.

The Commonwealth publishes annual fishery status reports that provide the Australian community with a high degree of confidence that commercial fisheries are being managed for long-term biological sustainability and economic profitability. In cases where the reports conclude that stocks are being overfished, the community can be confident that management arrangements will be put in place to ensure stocks are restored to acceptable levels.

### **Implications of climate change on marine biosecurity**

Increased temperatures will bring with them biosecurity challenges. Farmed aquatic animals may face increasing levels of stress and disease. The exposure of cool water species to longer periods of higher water temperatures may result in reduced productivity and profitability, as warmer water has less oxygen and can stress cold water species such as abalone and salmon. This can both reduce growth rates and make them more susceptible to diseases. Short term impacts such as this can already be seen on a seasonal basis in some areas.

The temperature tolerance ranges of all invasive marine species have not been well established and while some species are predominantly tropical and some are predominantly temperate, many have broad latitudinal ranges. While it is possible for warming oceans to restrict the range of temperate species in Australia, tropical and warmer water species may also expand their range.

One of the typical characteristics of invasive species, including marine species, is their adaptability to broad ranges of environmental conditions. This adaptability may allow colonisation of new locations if the environmental conditions are suitable and there is a pathway for the invasive species to get to new locations. While climate change will alter port environments at different rates, depending on the characteristics of the port, it is expected that



the rate of change will be relatively gradual. Therefore climate change may have little effect on the range of established invasive marine species in the short term.

There are many exotic marine species in Australian ports that do not currently exhibit invasive characteristics. Changing environmental conditions, including those resulting from climate change, will lead to changes to marine community structures. This may favour or disadvantage exotic species that are currently considered benign.

The changes observed in the East Australian Current over recent decades are an example of the influences climate change may have on other ocean currents in the future. The changes bring with them the potential for new diseases or pest species to be transported via ocean currents to previously unexposed environments; the consequences of which are difficult to predict.

### Measures in place to manage the implications of climate change on marine biosecurity

Currently, states and the Northern Territory and industries have biosecurity measures in place to mitigate the effects of diseases and pests where this is possible. The Commonwealth coordinates response and preparedness and promotes consistency in national policies, underpinned by the *Biosecurity Act 2015*.

Current biosecurity management in state and Northern Territory jurisdictions allows for detection, response and management of current, new and emerging disease and pest issues. Some additional flexibility of application may be required as a result of climate change effects; for example a disease not previously encountered in one jurisdiction may emerge with increasing water temperatures, and may not be covered by existing policies or legislation. All states and the Northern Territory have updated or are currently updating biosecurity legislation and policies. While individual biosecurity threats may change, the fundamental principles of preparedness, response and management apply.

Marine pests are distributed to new environments through two main vectors: ballast water carried by ships and the growth of organisms on the hulls of ships (biofouling).

The *International Convention for Control and Management of Ship's Ballast Water and Sediments* (Ballast Water Convention) comes into force on 8 September 2017. The Ballast Water Convention specifies methods for management of ballast water. The Ballast Water Convention will set a timetable for all ships travelling internationally to install on-board ballast water management systems which are designed to treat ballast water to kill entrained organisms.

Approval of ballast water management systems requires testing over a range of water temperatures in which ships will operate. While the temperature range for testing of ballast water management systems is still being finalised by the International Maritime Organization (IMO), it is expected that management systems will be required to be tested and shown to be effective over the range of 0 to 40 degrees Celsius. This temperature range could be expected to cover sea water temperatures that may occur in a changing climate for some decades to come.

Consistent with this, the department is currently developing a regulatory system to manage risks of marine pest introduction through biofouling. The regulatory approach, based on guidelines developed by the IMO, will require active and regular management of biofouling on vessels to reduce the risk of translocation of exotic species. While the temperatures of environments where vessels are operating may influence the species on a particular vessel, and perhaps the growth rates of those species, the regular activities for management of biofouling on vessels should be relatively unaffected by long term gradual changes in temperature expected under a changing climate.

## Conclusion

Although it is likely there will be varied and possibly significant impacts on the marine environment due to longer-term changes in climatic conditions, the Australian Government has flexible and robust arrangements in place for the sustainable management of Commonwealth fisheries. Management systems have the flexibility to respond to increases or decreases in stocks regardless of cause, generally through changes in TAC limits. In addition, fishing access rights offer flexibility in effort and methods which allow limited adjustment to fishers to change fishing methods according to prevailing conditions.

These management systems have evolved over many years to account for the large variability and uncertainty already present in the marine environment. Australian fishers and the broader community can be confident that the government has established frameworks that will identify impacts on fish stocks and adjust fishing efforts accordingly to ensure stocks are kept at sustainable levels. In addition, there are adequate and continually improved biosecurity measures for protecting against and monitoring for biosecurity incursions.