

Chapter 5

Adapting to climate change: Policy and regulatory responses

5.1 The following two chapters examine measures that can be taken in response to the effects of climate change on marine fisheries and biodiversity. Submissions and witnesses called for greater attention to be given to the impacts of climate change as well as urgent action to address the influence of human activities on the climate.¹ Given the targeted focus of this inquiry, however, this report instead concentrates on proposals that specifically address how to respond to the effects of climate change on the marine environment.

5.2 This chapter focuses on the evidence received about the adequacy of regulatory regimes involving the marine environment in the face of climate change. These include fisheries management arrangements, marine protected areas and whether relevant legislation and approaches to decision-making are adequate for dealing with the known and projected effects of climate change.

5.3 In considering these proposals, it is instructive to take into account the Australian Government's overall approach to managing climate risks. This is outlined in the *National Climate Resilience and Adaptation Strategy*, which was released in December 2015.² The Fisheries Research and Development Corporation (FRDC) explained that this strategy informs '[m]uch of Australia's climate science investment'. The FRDC noted that the strategy 'specifically affirmed a set of principles to guide effective adaptation practice and resilience building'. The principles are as follows: shared responsibility; factoring climate risks into decision making; an evidence-based, risk management approach; helping the vulnerable; collaborative, value-based choices; and revisiting decisions and outcomes over time.³

5.4 In addition, evidence was received about the Australian Government's responsibilities under Commonwealth legislation regarding the risks of climate change for marine biodiversity and fisheries, as well as research, information and reporting relating to climate change that the government supports. Policies and programs are

1 For example, see Australian Institute of Marine Science (AIMS), *Submission 10*, p. 8; Mr Michael Baron, Owner, Eaglehawk Dive Centre, *Committee Hansard*, 21 February 2017, p. 16; Professor Iain Suthers and Dr Adriana Verges, Sydney Institute of Marine Science (SIMS), *Committee Hansard*, 16 March 2017, pp. 30–31.

2 See Department of the Environment and Energy (DoEE), 'National Climate Resilience and Adaptation Strategy', www.environment.gov.au/climate-change/adaptation/strategy (accessed 15 December 2016).

3 Fisheries Research and Development Corporation (FRDC), *Submission 2*, p. 4.

discussed in this chapter where relevant; however, the submissions from government departments and agencies provide further detail about these matters.⁴

5.5 This chapter commences with the evidence received arguing there is merit in updating environment and resource management legislation and decision-making processes to account expressly for the implications of climate change. How regulatory arrangements could be changed to aid climate change adaptation in various sectors is also discussed. Specifically, this chapter examines fisheries management arrangements, marine biodiversity protections, and biosecurity measures and monitoring systems.

Accounting for climate change in legislation, decision-making practices and administrative arrangements

5.6 The objects of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) include the protection of the environment, especially those aspects of the environment that are matters of national environmental significance, the promotion of 'ecologically sustainable development through the conservation and ecologically sustainable use of natural resources' and promoting the conservation of biodiversity.⁵ Among other things, principles of ecologically sustainable development include:

- that decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations;
- the principle of inter-generational equity—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations; and
- the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making.⁶

5.7 The Environmental Defenders Offices of Australia (EDO) called for 'Commonwealth legislation, particularly conservation and natural resource management legislation...to be fundamentally re-oriented to focus on, and be ready for, a future affected by climate change'. EDOA noted the existing objects of the EPBC Act, but argued that 'to assist species to adapt under future climate change scenarios, the EPBC Act should incorporate a new object specifically referring to strengthening ecosystem resilience and adaptive capacity of ecosystems, and facilitating adaptation'. Similarly, the EDOA submitted that the *Great Barrier Reef Marine Park Act 1975* 'does not specifically refer to the need to promote climate change adaptation'. In particular, the EDOA argued that the Act 'does not specifically

4 For example, see DoEE, *Submission 19*.

5 *Environment Protection and Biodiversity Conservation Act 1999*, s. 3(1).

6 *Environment Protection and Biodiversity Conservation Act 1999*, s. 3A.

facilitate the inclusion of climate change concerns within zoning plans and plans of management'.⁷

5.8 EDOA envisaged that refocusing and realigning Commonwealth laws in response to climate change would involve the development of 'clear objectives'. Ms Susan Higginson, Chief Executive Officer, Environmental Defenders Office New South Wales (EDO NSW), explained:

Like all good laws, the objectives and goals need to be clearly articulated, so that we are all on the same page. Those goals need to promote ecosystem resilience and adaptive capacity; recognise that ecosystems need to be the foundation of decision-making, planning and management; and adopt risk and management frameworks that can actually respond to climate change. Climate-ready laws provide a decision-making framework containing robust and rigorous climate change mitigation and adaptation principles that are appropriate and adaptable to implement actions to local conditions.

A whole-of-law approach is what we need, and it needs to be adopted, including necessary amendments to current legislation. That has to include legislation that is relevant, but not necessarily specifically focused on conservation. It is essential that climate change considerations for adaptation are included in policy formulation, planning, program management, project design and project implementation.⁸

5.9 Examples of state government laws and management reports which do not directly reference climate change were also noted.⁹ However, the committee was also informed of state legislation and policies that refer to climate change. Dr Alan Jordan, Principal Research Scientist, New South Wales Department of Primary Industries (NSW DPI), provided the following explanation of how climate change is approached in New South Wales marine legislation:

There are four major categories. At the highest level—there is a hierarchical approach to tease out the level of detail required—one of those key ones is climate change. It stands out there, and land based impacts and resource use are the other two key ones. The difference with the climate change one—we recognise that a lot of the data out there in terms of projections are 2100 projections. We recognised early on that the time frame for the other risk assessments around land based risks et cetera were more a 20-year horizon, recognising that that is still a long horizon for government to work towards. We recognised that a 20-year horizon in the climate change space was

7 EDOs of Australia (EDOAs), *Submission 4*, pp. 4, 7, 10. See also Ms Susan Higginson, Chief Executive Officer, Environmental Defenders Office New South Wales (EDO NSW), *Committee Hansard*, 16 March 2017, p. 9.

8 Ms Susan Higginson, EDO NSW, *Committee Hansard*, 16 March 2017, p. 8.

9 For example, Professor David Booth referred to a report on the status of fish stocks compiled by the New South Wales Department of Primary Industries (NSW DPI), which he described as 'an amazing document of over 400 pages', but which 'makes almost no mention of the effect of climate change on those species'. The professor added that 'temperature is mentioned a number of times but not directly the change in climate'. *Committee Hansard*, 16 March 2017, p. 3.

probably inadequate, so we also added in a 50-year horizon in the risk assessment, and you will see within the documentation that it is the only area where we took a 20-year and a 50-year projection, with a clear understanding that risks are generally trending up.¹⁰

5.10 In its submission, EDOA commented in detail on how it considers the EPBC Act should be amended to improve the regulatory framework for how the effects of climate change on marine fisheries and biodiversity are managed. Overall, EDOA argued that:

...climate change impacts should be mandatory considerations in the various decision-making processes under the EPBC Act, and incorporated throughout assessments and management plans. This should include marine bioregional planning, critical habitat listings, and threat abatement planning.¹¹

5.11 In particular, EDOA considered that a 'key gap in the climate readiness of the EPBC Act' is the lack of a 'greenhouse trigger'; that is, a requirement for proposals to be referred to the Commonwealth if they are likely to be a significant contributor to climate change.¹² Essentially, a greenhouse trigger would require that a project which generated levels of greenhouse gas emissions over a certain threshold would be referred to the Minister for the Environment and Energy for determination as to whether it is a 'controlled action', in which case environmental assessment and approval of the project under the EPBC Act would be required.

5.12 The introduction of a greenhouse trigger has been considered previously, most notably by the 2009 independent review of the EPBC Act conducted by Dr Allan Hawke. The greenhouse trigger proposed by the Hawke Review would have 'a threshold of at most 500,000 tonnes of carbon dioxide equivalent emissions'. However, Dr Hawke's recommendation was made with reference to the Carbon Pollution Reduction Scheme (CPRS), a cap and trade emissions trading scheme proposed by the Rudd Government. Dr Hawke recommended that an interim greenhouse trigger be introduced until the CPRS commenced (after which the trigger would sunset).¹³

5.13 Legislation to establish the CPRS did not pass the Senate and the introduction of an interim greenhouse trigger was not pursued as part of the carbon price subsequently developed by the Gillard Government. In discussing the recommendation for an interim greenhouse trigger, the Gillard Government's 2011 response to the Hawke Review explained that an interim greenhouse trigger was not required because it expected investors would account for the carbon price in their

10 Dr Alan Jordan, Principal Research Scientist, NSW DPI, *Committee Hansard*, 16 March 2017, p. 48.

11 EDOA, *Submission 4*, p. 8.

12 EDOA, *Submission 4*, p. 7

13 A Hawke, *Report of the Independent Review of the EPBC Act 1999*, 2009, Part 1, pp. 22, 30.

investment decisions.¹⁴ Accordingly, the government response did not agree to the introduction of an interim greenhouse trigger. However, the carbon price developed by the Gillard Government was abolished in 2014 by the Abbott Government.

5.14 EDOA also expressed concern that the *Reef 2050 Long-term Sustainability Plan*¹⁵ is, in its view, unenforceable. Ms Higginson argued that attention should be given to enforcing strategies such as the Reef 2050 Plan. Ms Higginson explained:

I know there are many different philosophical approaches to regulation, but, at the end of the day, the jury is well and truly in—and has been in for a long time—on the idea that when something is unenforceable the likelihood of achieving it is much lesser than if something is enforceable. The reef plan, while it has some good aspirations, is unlikely to receive the type of funding and attention that is required when it is simply not enforceable. It is clear how we make things enforceable; we pass laws and we work hard to get those laws right, and then it is enforceable. It makes sense: treasuries and departments are willing to put more resources into mechanisms that are required to be achieved by governments and agencies.¹⁶

5.15 Finally, a proposal for a fundamental change in how ocean-related responsibilities are distributed between government departments and agencies was put forward. Dr Trevor Ward and Professor David Booth argued that over decades policymakers have attempted, but failed, to 'resolve the conundrum of management of the "Ocean Commons"'. Dr Ward and Professor Booth argued that there is a need to establish an 'effective integrated system for management of our oceans', and that the establishment of a National Oceans Commission could assist in this endeavour.¹⁷ Professor Booth explained that such a Commission would support 'better governance for the oceans' through by coordinating existing Commonwealth and state agencies without taking on direct regulatory functions.¹⁸

5.16 Their vision for the roles and responsibilities of a National Oceans Commission was articulated in detail in Dr Ward and Professor Booth's joint submission. The submission stated:

...the National Oceans Commission would be statutory but non-regulatory, in the sense that the Commission would not legally control the activities of other agencies, governments, companies or citizens. There are (probably)

14 Australian Government, *Response to the report of the independent review of the Environment Protection and Biodiversity Conservation Act 1999*, 2011, www.environment.gov.au/system/files/resources/605a54df-7b33-4426-a5a8-51de24b29c71/files/epbc-review-govt-response.pdf (accessed 30 November 2017, p. 27).

15 The Reef 2050 Plan, which was released by the Australian and Queensland Governments in March 2015, provides a framework for protecting and managing the Reef. The Plan is discussed in Chapter 6.

16 Ms Susan Higginson, EDO NSW, *Committee Hansard*, 16 March 2017, p. 12.

17 Dr Trevor Ward and Professor David Booth, *Submission 23*, pp. 1–2.

18 Professor David Booth, *Committee Hansard*, 16 March 2017, p. 2.

largely sufficient mechanisms in place to implement any required changes to onground actions. The Commission envisaged here would act with 'carrot' rather than 'stick' to coordinate emerging activities, issue public information about key aspects of ocean health, performance assessments about existing and proposed resource activities, and set directions for future innovations and activities that support enhanced resilience of the oceans ecosystems and environments. To be an effective force in the public arena, the Commission will need to be fully independent, authoritative, internally consistent, and public in all its activities, with a funding base and support that is commensurate with the high level of importance of the issues/activities.¹⁹

5.17 The submission argued that the Commission would help enhance the quality of ocean ecosystems through various primary objectives. These objectives would 'be framed to provide support to agencies, the private sector, and community groups for the purpose of maintaining and enhancing (where necessary) integrated ecosystem-based management of Australia's Oceans'. It was suggested that these primary objectives would involve setting outcome-based ocean quality standards, coordination and advocacy, producing publicly available reports on ocean quality, and supporting collaborative research activities.²⁰

5.18 Although few stakeholders commented on the concept of a National Oceans Commission, those that did expressed support.²¹

5.19 Examples of coordinating mechanisms formed to improve governance of the oceans and to overcome gaps in existing bureaucratic arrangements have been pursued in other countries, such as the United States of America. Under President Barack Obama, an Interagency Ocean Policy Task Force was established that led to the creation of a National Ocean Council. The National Ocean Council comprised cabinet secretaries, agency heads and other key officials and was charged with implementing the Obama Administration's National Ocean Policy.²²

19 Dr Trevor Ward and Professor David Booth, *Submission 23*, p. 4 (emphasis omitted).

20 *Submission 23*, pp. 4–5 (emphasis omitted). The joint submission provides further detail on how the Commission could be structured and its possible functions.

21 See Ms Lowri Pryce, Executive Officer; Mr Simon Rowe, Program Manager—Environment, OceanWatch Australia, *Committee Hansard*, 16 March 2017, p. 45.

22 See National Archives (United States), The Obama White House, 'National Ocean Council', <https://obamawhitehouse.archives.gov/administration/eop/oceans> (accessed 13 November 2017).

Fisheries management

5.20 Based on international experience, there is potential for a changing environment to challenge existing fisheries management arrangements and access rights. For example, the Institute for Marine and Antarctic Studies (IMAS) noted:

...as waters warmed, mackerel has expanded rapidly into Iceland since 1996 and now supports a commercial fishery (1700 t in 2006 to 120,000 t in 2009). This climate-driven change in distribution underpinned the 'mackerel wars' between EU and Iceland...²³

5.21 Austral Fisheries noted that the 'specific adaptations to climate change which our fisheries will be subject to are hard, if not impossible, to evaluate with certainty'. Austral suggested that responses to issues presented by climate change should be considered on a 'fishery-by-fishery basis, if not on a species-by-species basis'.²⁴ Austral added that any changes 'should only be made after careful scientific assessment of the impacts which, in turn, necessitates an effective, comprehensive, long-term scientific program to monitor and evaluate indicators of climate change'.²⁵

5.22 Evidence from entities involved in fisheries management suggested there is a strong basis for current management arrangements to cope with challenges that climate change may present. CSIRO submitted:

Australia has a strong record in fisheries management supported by robust science that positions us well to cope with the impacts of climate change. By global standards our fisheries are well managed. For example, it has been estimated that less than 15% of assessed fisheries are overfished, with an improving trend, compared to 30% globally. Australia's fisheries jurisdictions have generally adopted ecosystem-based fishery management as a policy goal. This is consistent with the growing international demand for environmentally friendly products. Spatial management and participatory or co-management are also key features of the fishery management system.²⁶

5.23 Similarly, the FRDC stated that 'Australia's policy and management frameworks are well placed to respond because they are already adaptive and flexible'.²⁷ In addition, the Australian Fisheries Management Authority (AFMA) advised that it is 'planning to assess the ability of our management system to cope under various future scenarios'.²⁸ AFMA's Chief Executive Officer provided the

23 Institute for Marine and Antarctic Studies (IMAS), *Submission 1*, p. 25 (citations omitted).

24 In developing this point, Austral discussed the particular circumstances of the Northern Prawn Fishery and the sub-Antarctic fisheries. See Austral Fisheries, *Submission 6*, p. [6].

25 Austral Fisheries, *Submission 6*, pp. [4], [6].

26 CSIRO, *Submission 15*, p. 8.

27 FRDC, *Submission 2*, p. 2.

28 Australian Fisheries Management Authority (AFMA), *Submission 9*, p. 4.

following summary of how the fisheries management regime and AFMA's management approach can take climate change related effects into account:

Sound fisheries management by definition seeks to be robust to changes in the distribution and abundance of living marine resources. There are many drivers that change the distribution and abundance of those resources in addition to fishing. Those drivers are both living and non-living. They can be complex and difficult to predict, and climate change is one of those. AFMA is actively working to understand the threats and opportunities as a result of impacts of climate change. We seek to ensure that our management is robust to climate change impacts. We're helping to assist industry to adapt to the impacts of climate change on their fishing practises and seeking to remove management barriers to adaptation, and also seeking to understand and mitigate the impacts of climate change on illegal foreign fishing threats in Australian waters in our region.²⁹

5.24 Changes to fisheries management arrangements have been implemented at a state level; for example, in New South Wales 'a more holistic approach to coordinated management of the coastal zoning in marine estate' has been pursued through the creation of the New South Wales Marine Estate Management Authority. Dr Alan Jordan from the NSW DPI provided the following evidence about the new arrangements:

We have been conducting a comprehensive statewide environmental social and economic risk assessment over the last two years or so to identify the environmental assets and the social and economic benefits that the New South Wales community derives from marine estate, and what the threats are to those benefits. A key component of that threat assessment is clearly climate change, as one of the overarching components of pressures or stressors that are impacting on the marine environment.³⁰

5.25 As noted previously, climate change is also one of many factors affecting commercial fishing. The Government of South Australia submitted that the 'many and varied factors which challenge the management of fisheries resources...are a key driver for fisheries management to be responsive and flexible to changing needs and requirements'.³¹

5.26 Nevertheless, the FRDC argued that 'fisheries management needs to be more agile in order to take advantage of opportunities that arise through climate change'. Although the FRDC considered 'it is generally too early to specifically constrain/increase quota and access provisions due solely to climate change', it argued

29 Dr James Findlay, Chief Executive Officer, AFMA, *Committee Hansard*, 20 October 2017, p. 8.

30 Dr Alan Jordan, NSW DPI, *Committee Hansard*, 16 March 2017, p. 46.

31 Government of South Australia, *Submission 21*, p. 2.

that harvest management arrangements should be continually improved, in accordance with key 'smart principles'.³²

5.27 In addition, IMAS indicated that some specific challenges for fisheries management arising from climate change will be encountered. It submitted:

As with other impacts of climate change, impacts of climate change on marine species will create 'winners' (i.e., a new commercial species in an area) and 'losers' (i.e., loss of an important species, or introduction of a new pest), re-shaping the pattern of human well-being between regions and different sectors and potentially leading to substantial conflict (i.e., Who accesses a new resource? Who pays to remove a new damaging pest?). Successful management changes will therefore involve trade-offs and complex decisions around who pays for adaptation and how could/should resource allocation change—communication on climate change thus becomes very important.³³

5.28 EDOA argued that the legislation administered by AFMA should be amended to include specific references to climate change. EDOA argued that the *Fisheries Management Act 1991* is generally focused on 'managing species rather than ecosystems'. In the face of climate change, EDOA argued that '[h]ealthy ecosystems, supporting sustainable fishing opportunities, must become the new focus'. To ensure this, the EDOA argued that AFMA should be given robust obligations to consider climate change' when performing functions under the Fisheries Management Act. According to EDOA, these obligations could include:

...requirements to develop strategies and scenarios through modelling of future impacts and changes in location of fish habitats, and for accommodating adaptive management strategies into plans of management. Consideration should also be given to explicit powers to make emergency declarations or management decisions based on climate change impacts, for example to prevent fishing in a particular area if oceanic conditions change and it becomes a critical breeding area. AFMA requires the tools to allow it to react quickly and efficiently as climate change impacts are realised.³⁴

5.29 Another challenge arises from the limited 'socio-economic data for the marine sector and associated communities'. IMAS considered that this lack of data would present difficulties for evaluating the 'effects of potential management changes and/or adaptation options'.³⁵

32 The smart principles identified by the FRDC are sustainability, adaptability, flexibility and responsiveness 'all underpinned by science such as stock assessment and bio-economic knowledge commensurate to the size and value of the particular fishery. FRDC, *Submission 2*, p. 16.

33 IMAS, *Submission 1*, p. 41.

34 EDOA, *Submission 4*, p. 12.

35 IMAS, *Submission 1*, p. 5.

Quota setting and access rights

5.30 AFMA highlighted the measures it uses to manage fisheries, including harvest strategies, total allowable catches (TACs) and individual transferrable quotas (ITQs).³⁶ AFMA considers that the output controls it uses are 'robust and flexible and, along with other management strategies, are able to adapt to the variability inherent in fisheries including climate change'. AFMA added that it:

...is aware that climate change will lead to greater variability in the distribution and abundance of fish and other marine species, both spatially and temporally, and that management strategies will need to adapt accordingly.³⁷

5.31 AFMA is updating its fisheries management strategies with respect to climate change. As part of this process, existing fishery management strategies and their ability to cope with climate change under various scenarios will be tested.³⁸ AFMA also advised that it is working with CSIRO on a 'decadal projections project' which aims to determine 'which fish stocks in which areas may increase or decrease and whether there are any spatial range movements in those species as well'. This project, which is due to be completed early in 2018, is intended to inform consideration of fisheries management arrangements.³⁹

5.32 CSIRO commented on output controls used to manage fisheries. CSIRO suggested that the targets and reference points set 'will need to be conservative to consider species resilience in the face of change'. In addition, current and projected climate change impacts should be incorporated in management strategy evaluation models to improve the reliability of future stock status projections.⁴⁰ A similar recommendation was made by IMAS.⁴¹

5.33 On the Great Barrier Reef specifically, the GBRMPA submitted that, to support commercial fishing, recreational fishing and the future biodiversity of the Reef, management arrangements need to 'protect the resilience of target and non-target fisheries species and their habitats'. The GBRMPA suggested that maintaining high stock levels would provide a useful buffer to protect fish populations from extreme weather impacts and 'cumulative pressures from human activities'.⁴²

36 AFMA's existing management strategies are outlined at AFMA, *Submission 9*, pp. 3–4.

37 AFMA, *Submission 9*, p. 1.

38 AFMA, *Submission 9*, p. 5.

39 Dr Nick Rayns, Executive Manager, Fisheries, AFMA, *Committee Hansard*, 20 October 2017, p. 9.

40 CSIRO, *Submission 15*, p. 23.

41 IMAS recommended that climate change impacts on key assessment parameters should be incorporated into routine fishery stock assessments and the development of harvest strategies that account for a changing environment. IMAS, *Submission 1*, p. 32.

42 Great Barrier Reef Marine Park Authority (GBRMPA), *Submission 20*, p. 2.

5.34 CSIRO reasoned that any changes to the availability or sustainability of a stock due to climate change should 'impact on quota setting rather than on access rights'; as such, CSIRO concluded that the proportional distribution of access rights 'should be relatively unaffected by climate change'. Nevertheless, CSIRO observed:

Inflexible access rights where any change requires involved and costly legal processes could hamper adaptive management. The access provisions and their implementation will need to take account of potentially rapidly changing conditions and therefore should not hamper the need for equally rapid management responses.⁴³

5.35 IMAS, however, is of the view that '[g]reater innovation in the development of rights-based systems should be considered. IMAS noted that that the ITQ regime has generally 'resulted in a move away from owner-operators that personally harvest the resource, to investors who own the access rights and lease it to harvesters'. IMAS argued that investors 'often have limited connection to the operating area and tend to be less accepting of negative impacts that reduce quota'.⁴⁴ IMAS acknowledged that 'access rights are unlikely to be changed'; however, it suggested that governments 'should look at ways that they can be used for improved socio-economic benefits that can enhance benefits to society and be more flexible to adapt and respond to climate change'. IMAS referred to the Community Development Quota Program in Alaska as an example of a 'more innovative use of rights based systems'.⁴⁵

5.36 Austral Fisheries reasoned that shifts in species ranges of toothfish stocks observed in the sub-Antarctic fisheries may, if they become more regular or occur with greater intensity, necessitate changes to 'our operations, and possibly management regimes, to take those shifts into account'. Austral explained:

For example, like in situations where fisheries are temporarily closed due to hazardous algal blooms, it may be necessary to change seasonal access to sub Antarctic fisheries, at times of the year when toothfish availability may be more stable.⁴⁶

5.37 The Productivity Commission (PC) recently considered quota arrangements and fishery access arrangements in its 2016 inquiry into marine fisheries and aquaculture. In its final report, released in May 2017, the PC recommended that the Australian, Victorian, Queensland and Tasmanian Governments should develop policies 'to guide the allocation of access to fisheries stocks between different sectors'. The PC recommended that, at a minimum, these policies should outline triggers for review of existing allocations between sectors; the review process; and the key

43 CSIRO, *Submission 15*, p. 23.

44 IMAS referred to analyses of ITQ systems in Australia and New Zealand that indicate access right holders generally resist lower TACs 'when cuts were required during periods of low recruitment consistent with climate change...' IMAS, *Submission 1*, p. 32 (citation omitted).

45 IMAS, *Submission 1*, p. 32.

46 Austral Fisheries, *Submission 6*, p. [6].

considerations that will guide decisions. The PC further recommended that the Commonwealth, state and Northern Territory governments should 'consider a move to trading of access rights between the commercial and recreation sectors in the longer term for suitable, higher value fisheries'.⁴⁷

5.38 In its response to the PC's report, the Australian Government expressed support for these recommendations and noted that a Commonwealth resource sharing policy is under development.⁴⁸

Fishery boundaries and jurisdictional arrangements

5.39 Responsibility for fisheries management in Australia depends on geographical boundaries. Under current arrangements, determined by the Offshore Constitutional Settlement (OCS) agreement between the Commonwealth, states and the Northern Territory:

- the states and the Northern Territory have jurisdiction over waters up to three nautical miles seaward of the low water mark; and
- the Commonwealth has jurisdiction over waters from three nautical miles to the edge of Australia's exclusive economic zone (200 nautical miles seaward of the low water mark).⁴⁹

5.40 Under the OCS, the Commonwealth, states and the Northern Territory may agree to alter management responsibility arrangements for particular fisheries. That is, the parties could agree to pass management responsibility exclusively to the Commonwealth or to an adjacent state/Northern Territory. Fisheries can also be managed as part of a joint authority between the Commonwealth and the States/Northern Territory. At present, there are 59 OCS agreements that determine how cross-jurisdictional stocks are to be managed and four joint fisheries authorities.⁵⁰ Recreational fishing is regulated by the states/Northern Territory.⁵¹

47 Productivity Commission, *Marine fisheries and aquaculture*, no. 81, 19 December 2016, pp. 81, 83

48 Australian Government, *Response to the Productivity Commission report: Inquiry into regulation of the Australian marine fisheries and aquaculture sectors*, May 2017, pp. 3–4.

49 Productivity Commission, *Marine fisheries and aquaculture*, p. 47.

50 Productivity Commission, *Marine fisheries and aquaculture*, p. iv.

51 Productivity Commission, *Marine fisheries and aquaculture*, p. 188; Dr James Findlay, AFMA, *Committee Hansard*, 20 October 2017, p. 10; D Borthwick, *Review of Commonwealth fisheries: legislation, policy and management*, p. 16; cited in Senate Environment and Communications References Committee, *Factory freezer trawlers in the Commonwealth Small Pelagic Fishery*, November 2016, pp. 5–6.

5.41 The PC has published the following background information regarding the origin and purpose of OCS fisheries arrangements:

In their early conception, OCS fisheries arrangements were to improve the management of cross-jurisdictional fisheries by having such fisheries operate under a single law, a single set of management rules and a single licensing regime. From the first OCS fisheries arrangement, however, the 'single jurisdiction' model has not always been followed. The first arrangement was for the Bass Strait Scallop Fishery in 1986, where jurisdiction was shared between the Commonwealth—which was given responsibility for the central portion of Bass Strait—and Tasmania and Victoria, which were given responsibility for areas within 20 nautical miles of their respective coasts. This arrangement remains in effect today.

The 1991 OCS fisheries arrangements between the Australian and New South Wales Governments, and 2006 amendments to the *Fisheries Management Act 1991* (Cth) marked further moves away from the single jurisdiction model. New South Wales' 18 OCS fisheries arrangements all involve shared jurisdiction with the Commonwealth over a number of stocks. The 2006 amendments provided for a fishery to be managed according to the laws of different jurisdictions in different areas provided those areas do not overlap—that is, the amendments explicitly provided for the shared management of a single fishery.⁵²

5.42 Due to the expected changes in the distribution of fish stocks, submitters considered that existing fishery boundaries and jurisdictional arrangements might need to be reviewed in future. IMAS submitted:

Management within State jurisdiction boundaries is likely to become ineffective for species that straddle these borders and are likely to change their distribution under climate change impacts. Consideration of a whole of stock management approach as climate change alters the dynamics and distribution of fish stocks may be required. Increased cooperation between fisheries management agencies across State boundaries and across State–Commonwealth waters is essential.⁵³

5.43 AFMA also noted that:

- current fishery boundaries 'may have to change or be removed as a result of climate change or else may impact fisher ability to capture fish when fish abundance shifts geographically'; and
- 'there may be a need to amend current [OCS] arrangements between Australian jurisdictions as species move and/or change in abundance'.⁵⁴

52 Productivity Commission, *Marine fisheries and aquaculture*, p. 190.

53 IMAS, *Submission 1*, p. 30.

54 AFMA, *Submission 9*, pp. 4–5.

5.44 Dr James Findlay, Chief Executive Officer, AFMA, commented:

The current fisheries are all defined by a combination of the species area and method. Over time, we have seen that those are becoming less efficient. If they were initially a good idea, they are becoming less of a good idea as we are seeing changes occur in the distribution of the abundance of fish. We have lines on water...that fish don't take too much notice of, and so we're seeing this blurring of fish between management jurisdictions and it's starting to undermine the initial intent of those agreements.⁵⁵

5.45 Ms Jo-anne McCrea, Australian Fisheries and Seafood Manager, World Wildlife Fund, noted that the multi-jurisdictional arrangements are linked to issues with access rights. Ms McCrea stated:

A traditional fisheries management arrangement would give a particular entity access rights usually to a species, or series of species, in a particular area. As species move and change, those access rights may become less relevant. If you have access rights to snapper on the east coast of Australia, which are in Queensland but are all now in New South Wales, those systems do not work for that. This also brings in the issue of the multiple jurisdictional nature of our Australian fisheries, particularly for those coastal fisheries...I can certainly see benefits from a climate change adaptation perspective around better cross-border arrangements with those.⁵⁶

5.46 In response to these challenges, Ms McCrea considers that access rights should be in a form that 'is flexible enough to respond to changing species distributions and also respond to changing levels of productivity'.⁵⁷

5.47 Ms McCrea called for an 'ecosystem-based approach to management'. Ms McCrea explained:

Climate change, marine species and habitats...do not recognise jurisdictional limits and boundaries. Nothing short of a fully-integrated regulatory system is what is required now if we are to get this right.

Sectorial legislation is currently oriented around activities, projects and non-ecosystem-based delineations. For example, fisheries management is centred on a species or on catch techniques rather than on ecosystems. This clearly limits the ability to respond to marine ecosystem changes. Currently across Australia, there are inconsistencies in approaches to marine fisheries and biodiversity which are resulting in inconsistent protection measures for individual species across jurisdictions. Only some states currently mention and recognise climate change in relevant marine legislation, and even in these jurisdictions there is no proper integration of

55 Dr James Findlay, AFMA, *Committee Hansard*, 20 October 2017, p. 12.

56 Ms Jo-anne McCrea, Australian Fisheries and Seafood Manager, World Wildlife Fund, *Committee Hansard*, 16 March 2017, p. 33.

57 Ms Jo-anne McCrea, World Wildlife Fund, *Committee Hansard*, 16 March 2017, p. 34.

climate change and climate change adaptation into decision-making frameworks.⁵⁸

5.48 AFMA advised that it is considering regional management strategies 'as an alternative to fixed fishery boundaries where multiple fisheries areas are combined and harvest is managed for the entire area'.⁵⁹

5.49 The PC considered jurisdictional arrangements in its 2016 inquiry into marine fisheries and aquaculture. In its final report, released in May 2017, the PC stated that:

The rigidly defined geographic boundaries specified in many OCS fisheries arrangements are not suited to providing dynamic regulatory responses to changing fish populations and distributions arising from climate change.⁶⁰

5.50 The PC also noted that the management of fisheries according to jurisdictional borders can create other adverse consequences.⁶¹ The PC stated:

Multiple regulatory systems add to the cost of managing a cross-jurisdictional fishery. Further, where the rules of those systems are inconsistent or do not sufficiently take each other into account, there are higher risks of over- and under- fishing, unequal treatment of fishers, higher compliance costs and administrative inefficiency. Problems with a number of cross-jurisdictional fisheries have been recognised for many years, but reform in this area has generally been limited.⁶²

5.51 The PC noted that effects related to climate change are likely to increase these adverse consequences.⁶³

5.52 In response to the issues presented by the multi-jurisdictional approach to fisheries management, the PC did not recommend pursuing a single-jurisdictional model. In doing so, the PC noted that it considers changes to the OCS are unlikely as the current arrangements were set following agreement and legislation passed by all affected jurisdictions. The PC added that, in its view, 'it is unlikely that the OCS will change unless all jurisdictions agree that there are sufficient problems (or foregone opportunities) to warrant such a reform'.⁶⁴ Moreover, the PC identified other issues with a single jurisdiction model. The PC explained its reasoning as follows:

58 Ms Susan Higginson, EDO NSW, *Committee Hansard*, 16 March 2017, pp. 8–9.

59 AFMA, *Submission 9*, p. 5.

60 Productivity Commission, *Marine fisheries and aquaculture*, p. 197.

61 These included 'additional administrative and compliance costs, unequal treatment of fishers, constraints on productivity growth, high levels of waste through discarding of fish, and sub-optimal management of both target stocks and bycatch'. Productivity Commission, *Marine fisheries and aquaculture*, p. 187.

62 Productivity Commission, *Marine fisheries and aquaculture*, pp. 187–88.

63 Productivity Commission, *Marine fisheries and aquaculture*, p. 187.

64 Productivity Commission, *Marine fisheries and aquaculture*, p. 188.

In principle, the single jurisdiction model, which would bring all fisheries under a consistent management approach, has the most merit. In practice, the costs of shifting all fisheries to management under a single jurisdiction (which, for practical reasons, would have to be the Commonwealth) are likely to be prohibitive and create new efficiency costs associated with federal management of inshore fisheries...The case for reform is also somewhat diminished by the relatively small number of stocks affected by shared management and the existence of well-working intergovernmental arrangements for a number of those stocks. In short, the model would have merit if governments were starting from scratch, but they are not, and it is very uncertain that the benefits from reform would outweigh the costs.⁶⁵

5.53 Instead, the PC concluded that:

The costs and risks of shared fishery management will be reduced if all governments adopt known best practice approaches to core tasks (such as stock assessments and harvest controls), routinely seek to implement reciprocal or consistent arrangements in relation to catch controls and data collection, and regularly review the terms of intergovernmental agreements underpinning shared management.⁶⁶

5.54 AFMA and the Department of Agriculture and Water Resources (DAWR) agreed that it would be desirable to streamline the OCS arrangements. Dr James Findlay, CEO, AFMA, advised that work is underway to change memorandum of understanding and underlying OCS agreements regarding the management arrangements between AFMA and the states/Northern Territory. Dr Findlay stated:

The minister signed off on changes in Western Australia last year, with regard to the jurisdictional boundaries between fisheries, and we're working actively at the moment with South Australia, Victoria and New South Wales on making further changes to those agreements.⁶⁷

65 Productivity Commission, *Marine fisheries and aquaculture*, p. 204.

66 Productivity Commission, *Marine fisheries and aquaculture*, p. 25.

67 Dr James Findlay, AFMA, *Committee Hansard*, 20 October 2017, p. 12.

Recreational fishing

5.55 Options proposed in response to the likely impact of climate change on recreational fishing included:

- ocean forecasting tools 'to monitor and help recreational fisheries adapt to a changing ocean';⁶⁸
- licensing for recreational fishing, with the revenue collected to be used for improving resilience (habitat and fisheries productivity) and to 'enhance recreational amenity';⁶⁹ and
- acquiring 'regular, comprehensive data collection across Australia' about recreational fishing to inform fishery stock assessments and ecosystem risk assessments, and to ensure protected species interactions are monitored.⁷⁰

5.56 On the need to enhance data collection arrangements for recreational fishing, AFMA submitted:

Given recreational fishers now take more catch than commercial fishers for some key fish stocks and a major proportion of many others, a greater investment in this area would be beneficial. This equally applies to protected species interactions with recreational fishing for which there is little monitoring or data at all.⁷¹

5.57 Dr James Findlay, AFMA's Chief Executive Officer, explained AFMA's position on recreational fishing further at a public hearing. Dr Findlay stated:

Recreational use of our resources is a major and growing component. It's important socially and economically, and it's also important biologically. Any natural resource manager seeking to manage fisheries in Australia needs to take account of the impact of recreational fishing but also its economic and social importance in terms of ensuring its performance is maintained and improved in the future. We are strong believers that you can't manage what you don't measure. At the moment we're concerned there are significant gaps in the data collection around recreational fishing, and the anecdotal report suggests that that catch is increasing. But we're also seeing recreational fishers playing a significant role in policy-making and playing a more significant role in management, and we think that's critical,

68 The Sydney Institute of Marine Science (SIMS) referred to 'forecasting tools are being used to predict the seasonal migration of dolphinfish to inform anglers of fish distribution and to improve the deployment of Fish Aggregation Devices'. SIMS, *Submission 8*, p. 4 (citation omitted).

69 FRDC, *Submission 2*, p. 13.

70 AFMA, *Submission 9*, p. 4. See also AFMA, *Submission 50 to Productivity Commission inquiry into marine fisheries and aquaculture*, April 2016, www.pc.gov.au/data/assets/pdf_file/0003/198462/sub050-fisheries-aquaculture.pdf (accessed 21 August 2017), pp. 4–5.

71 AFMA, *Submission 9*, p. 4.

but, again, we need to understand what their impact is and what they want to achieve.⁷²

5.58 The FRDC noted that in regions which are more populous 'recreational fishing effort is substantial'. The FRDC submitted that 'it is timely to start tracking recreational effort and catch as a major input to fisheries management arrangements'.⁷³

5.59 Several other submitters expressed support for improved monitoring of recreational fishing. Mrs Patricia Beatty, Executive Officer, New South Wales Professional Fishermen's Association, argued that commercial fishing is 'absolutely monitored' with licence requirements necessitating catch records. Whereas it is considered that 'a magnifying glass' is on commercial fishing under the current management arrangements, Mrs Beatty argued that 'very little' is understood about recreational and Indigenous fishing efforts.⁷⁴

5.60 Professor Iain Suthers from the Sydney Institute of Marine Science (SIMS) agreed with AFMA's concerns about the need to enhance data collection arrangements for recreational fishing. Professor Suthers provided the following comments to explain his concerns:

It is true that for a number of species such as the famous red snapper *Pagrus auratus* the recreational catch is likely to be bigger, and in some areas twice as big, as the commercial catch. If you are trying to manage a system and understand the effects of climate, you need to understand recreational catch. We only have these sorts of output controls—by that I mean a bag limit, a size limit, a season or even a spatial closure—but we do not have any input controls and we cannot regulate it if you want to go fishing with your kid.⁷⁵

5.61 Dr Alistair Hobday from CSIRO argued that recreational fishers 'offer a great opportunity for collecting additional information' given the number of recreational fishing vessels widely dispersed around the coast. Dr Hobday stated:

If recreational fishers used logbooks, as commercial fishermen do, we would have much more information on catch and effort. It is the effort part of fishing that is the most important part in understanding whether abundance is increasing or decreasing. So there could be more voluntary programs that encourage fishers to record their catches and provide them. We do that in dedicated research projects, but there is no comprehensive program that I am aware of.⁷⁶

72 Dr James Findlay, AFMA, *Committee Hansard*, 20 October 2017, p. 10.

73 FRDC, *Submission 2*, p. 13.

74 Mrs Patricia Beatty, Executive Officer, New South Wales Professional Fishermen's Association, *Committee Hansard*, 16 March 2017, p. 18.

75 Professor Iain Suthers, SIMS, *Committee Hansard*, 16 March 2017, p. 25.

76 Dr Alistair Hobday, Senior Principal Research Scientist, CSIRO, *Committee Hansard*, 17 March 2017, pp. 10–11.

5.62 In demonstrating how non-scientists, including recreational fishers, can contribute to improved understanding of the marine environment, the success of the Redmap (Range Extension Database and Mapping project) program developed by IMAS was noted. The Redmap website enables fishers and divers to submit photographic records of 'species they observe outside their expected distributions'; that is, 'species that may be shifting where they live as a function of warming waters'.⁷⁷

5.63 CSIRO added that 'many jurisdictions in Australia, including the Commonwealth, do take into account recreational catches as far as they can when they are doing assessments on the status of fish stocks'.⁷⁸ Dr Alan Jordan, Principal Research Scientist, NSW DPI, also noted that the New South Wales Government has 'a very active program in monitoring assessment of recreational catch and effort and distribution'. Dr Jordan explained:

I think it was only early last year that we published a very comprehensive report—which is a publicly available document—that was part of a standardised national survey approach to quantifying the catch of recreational fishers. That was based on a nationally agreed methodology where we would ring a randomised number of people and interview them about their catch, and then we would have a subset of them that would actually keep a diary and they would log every time they went out there and fished: what species they caught, where they went, what their effort was et cetera. So there is a very detailed report. I think the science that underpins that understanding now is orders of magnitude better than it was even five years ago. We are now starting to explore opportunities to use newer technologies to do that in terms of using both helicopter surveys and drones for monitoring the distribution of fishers up and down the coast.⁷⁹

5.64 Nevertheless, there is a view that the greater use of technology could support improvements in how recreational fishing activity is accounted for in fisheries management. Professor Suthers explained:

We can now monitor boat movements. With increasing technology, efficiency of motors, GPS technology and weather forecasts, these recreational boats are moving far beyond the traditional three-nautical-mile limit and going well out towards the continental shelf sometimes. It is staggering. There are fairly simple commercial radar systems—they are worth about 40 grand, which is a lot, with the software and so on—that monitor boat activity. If you have boat activity, then you have effort, and from effort you can apply certain parameters based upon the boat-ramp surveys to say how many fish have been caught in two hours of fishing.⁸⁰

77 IMAS, *Submission 1*, p. 9.

78 Dr David Smith, Acting Science and Deputy Director, Oceans and Atmosphere, CSIRO, *Committee Hansard*, 17 March 2017, pp. 10–11.

79 Dr Alan Jordan, NSW DPI, *Committee Hansard*, 16 March 2017, p. 49.

80 Professor Iain Suthers, SIMS, *Committee Hansard*, 16 March 2017, p. 25.

5.65 Licensing arrangements were suggested as a means by which information about recreational fishing could be obtained. As part of its inquiry into marine fisheries and aquaculture, the PC compared the licensing regimes in place across Australia. In New South Wales, the PC noted that a licence is required for all recreational fishing activities and in 2014–15 nearly 500,000 licences were in force. However, the New South Wales licensing system includes several categories of exemptions.⁸¹ Similar exemptions apply in the Victorian licensing scheme. The Western Australian and Tasmanian licensing systems are limited in scope; instead of applying to all recreational fishing they are 'oriented to valuable species and to certain methods of fishing'. In South Australia, the only regulatory requirement applies to rock lobster pots (which must be used to catch southern rock lobster for personal use) and in Queensland and the Northern Territory, no licence is required for marine fishing (although in the Northern Territory a temporary licence is required for fishing on and over Indigenous land and adjoining waters).⁸²

5.66 The PC further noted that, with the exceptions of Victoria and Tasmania, jurisdictions have licensing arrangements for charter boat operators.⁸³ Although the keeping of logbooks that capture information about fishing catch and effort is required as part of licensing regimes,⁸⁴ stakeholders consider there are limitations with this reporting framework. Mrs Patricia Beatty, Executive Officer, New South Wales Professional Fishermen's Association noted that, in addition to the various licensing exemptions in New South Wales, voluntary logbooks mean that complete coverage of fishers is not achieved. Mrs Beatty observed:

There is no doubt that there is a large range of recreational fishers. It might be us, who go out once a year or a couple of times of year, but there are also those who go out every weekend with mates and hit it hard. There is such a range of users in the recreational fishing sector that we have not been able to track their impact on the resource. We do know for a fact that there are a number of species across the Australian east coast where the recreational take is higher than the commercial take, yet, from the creel surveys that were undertaken, there is no additional monitoring on those species.⁸⁵

81 Categories exempted from the licence requirement include: people under 18 or over 60 years of age; an adult assisting a person under the age of 18 years; an Aboriginal Australian; and the holders of pension or veterans affairs concession cards. See Productivity Commission, *Marine fisheries and aquaculture*, p. 126; Mrs Patricia Beatty, New South Wales Professional Fishermen's Association, *Committee Hansard*, 16 March 2017, p. 18.

82 Productivity Commission, *Marine fisheries and aquaculture*, p. 126.

83 Productivity Commission, *Marine fisheries and aquaculture*, p. 126.

84 Productivity Commission, *Marine fisheries and aquaculture*, p. 126.

85 Mrs Patricia Beatty, New South Wales Professional Fishermen's Association, *Committee Hansard*, 16 March 2017, p. 18.

5.67 The PC considered the regulatory treatment of recreational fishing in its report on marine fisheries and aquaculture. The PC concluded that:

The management of recreational fishing should be based more on evidence about the extent, nature, impact and value of recreational fishing activities. This would contribute to improved management of catch-constrained stocks and resource allocation decisions, and more generally support sound decision making on the management of fishing activity, and on additional services and facilities for fishers.⁸⁶

5.68 The PC recommended that 'well-designed licensing systems provide the means for collecting this information without imposing undue regulatory burden on fishers or government'. The PC continued:

Licensing systems already exist in some States. They deliver current, although partial, information on participation. In comparison to States without licensing, which rely on periodic surveys for participation data, licensing systems provide governments ready and reliable sampling frames for the collection of other information that may be needed to inform management, such on fishing methods, catch, locations and the value derived from fishing.⁸⁷

5.69 Consequently, the PC recommended that licence frameworks should be introduced in jurisdictions without licensing for independent recreational marine fishing (Queensland, South Australia and Northern Territory). The PC further recommended that existing regimes be expanded; that is, the exemptions used in New South Wales and Victoria should be reduced, and the scope of licencing regimes in Western Australia and Tasmania broadened to include all recreational fishing activity. Furthermore, the PC recommended that the Victorian and Tasmanian Governments introduce licensing for marine charter boat operators. In addition, the PC recommended that the Australian Government 'should consider licensing if it takes on greater responsibility for the management of recreational catch'.⁸⁸

5.70 Finally, OceanWatch Australia, which is recognised by the Australian Government as the natural resource management (NRM) organisation for Australia's marine environment, argued that greater funding for marine NRM activities would, in addition to commercial fishing outreach, enhance its ability to reach recreational and Indigenous fishers. Ms Lowri Pryce, Executive Officer, OceanWatch Australia

86 Productivity Commission, *Marine fisheries and aquaculture*, p. 129.

87 Productivity Commission, *Marine fisheries and aquaculture*, p. 129.

88 Productivity Commission, *Marine fisheries and aquaculture*, p. 131–32.

commented that greater investment in marine NRM operations would 'given our track record, would be a low-risk and high-return investment'.⁸⁹

More timely management responses

5.71 Stakeholders commented on the timeliness of management responses. One issue is the need to collect information more frequently so that up-to-date information is used. Mrs Patricia Beatty from the New South Wales Professional Fishermen's Association commented on this with reference to how information from logbooks is used:

Currently, log books are the major commercial monitoring tool. Log books are required to be provided to DPI Fisheries once every month, and then that is entered into the system. I think the last New South Wales status report was in 2014, so it is not compiled and looked at and analysed on the spot or within six months—that is my impression from the discussions we have had with DPI Fisheries. And the log book is the way the majority of our fisheries are monitored. We do have two fisheries in New South Wales—lobster and abalone—that are currently under quota, and therefore the data on their catch statistics is captured electronically, so it is a lot faster for them, but we do not have that across New South Wales fisheries for the majority of our fisheries. It is a very antiquated, paper-based system that is filled out by the fishers, sent in after a month or so and then sent in to be hand entered by DPI Fisheries. You can imagine that that does take time.

5.72 Mrs Beatty argued that research and monitoring needs to occur in real-time to support adaptive management responses. Mrs Beatty explained:

When we talk about real time, we are looking at the moment at a very antiquated system where you are not seeing data and then data analysis; you are probably looking at a year before you are getting an absolute understanding of what is going on. Then we have the added issue that most catch log books are based on CPUE—catch per unit effort. CPUE is well known to be not the best indicator of how a stock abundance is going on. If you have an aggregating species per se—such as a lot of the offshore species, which might be considered aggregating species—CPUE is not a good indicator of the abundance of the aggregating species, because it is not until the species is pretty much gone that you start seeing a drop in the

89 Ms Lowri Pryce, OceanWatch Australia, *Committee Hansard*, 16 March 2017, p. 37. The following examples of activities intended to result in voluntary change of attitudes, behaviours and practices were provided: '...helping recreational fishers understand the link between marine debris and their abandoned waste fishing tackle, bait or line; helping farmers understand the link between river estuarine health and fencing cattle from riparian zones; helping port authorities understand the connection between vessel anchorages and avoiding marine habitat degradation; helping fishers on the back of vessels understand the connection between good product quality and better animal welfare; and helping ordinary people understand that their actions at school, at work and at home have an impact downstream'.

levels. So there is a number of species that CPUE should not be used for, but that is what your systems are based on.⁹⁰

5.73 It was suggested that management responses needed to more rapidly respond to the information collected. CSIRO's submission commented on how it can be up to two years before data collection informs management action. Dr Hobday from CSIRO noted that this timeframe is often the case for stock assessments 'where information has to be gathered, cleaned and processed, and there is a model to produce some answers, and then the management group decides on what it is going to implement'. Dr Hobday observed, however, that other management processes 'can be much more rapid'. Dr Hobday explained:

One example is with in-season closures. That would be when the quota is reached earlier in the season. A fishery can be closed at that particular time. Other examples are with dynamic spatial management. We provide information to [AFMA] on the likely distribution of tuna on the east coast of Australia. They were updating that six hours after we provided them with information, and then fishers would have two days to respond to those new zoning arrangements on the east coast of Australia.⁹¹

5.74 Dr Hobday concluded that, in some instances, reducing the duration of the management process would be 'very difficult'. To address this issue, Dr Hobday suggested that a precautionary approach can be taken to assessments to account for how 'a two-year time gap might mean that things have changed over that period of time'.⁹²

Marine biodiversity protections

5.75 Submitters commented on the effectiveness of efforts to protect biodiversity through the use of marine protected areas, as well as the arrangements for threatened, endangered and protected species.

Marine protected areas

5.76 Marine protected areas (MPAs), which include marine parks/reserves, are intended to help protect and maintain biodiversity. Australia has the largest network of marine reserves in the world.⁹³ This network was established in 2012 by the Gillard Labor Government, however, the reserves were put on hold by the Abbott–Turnbull Government.

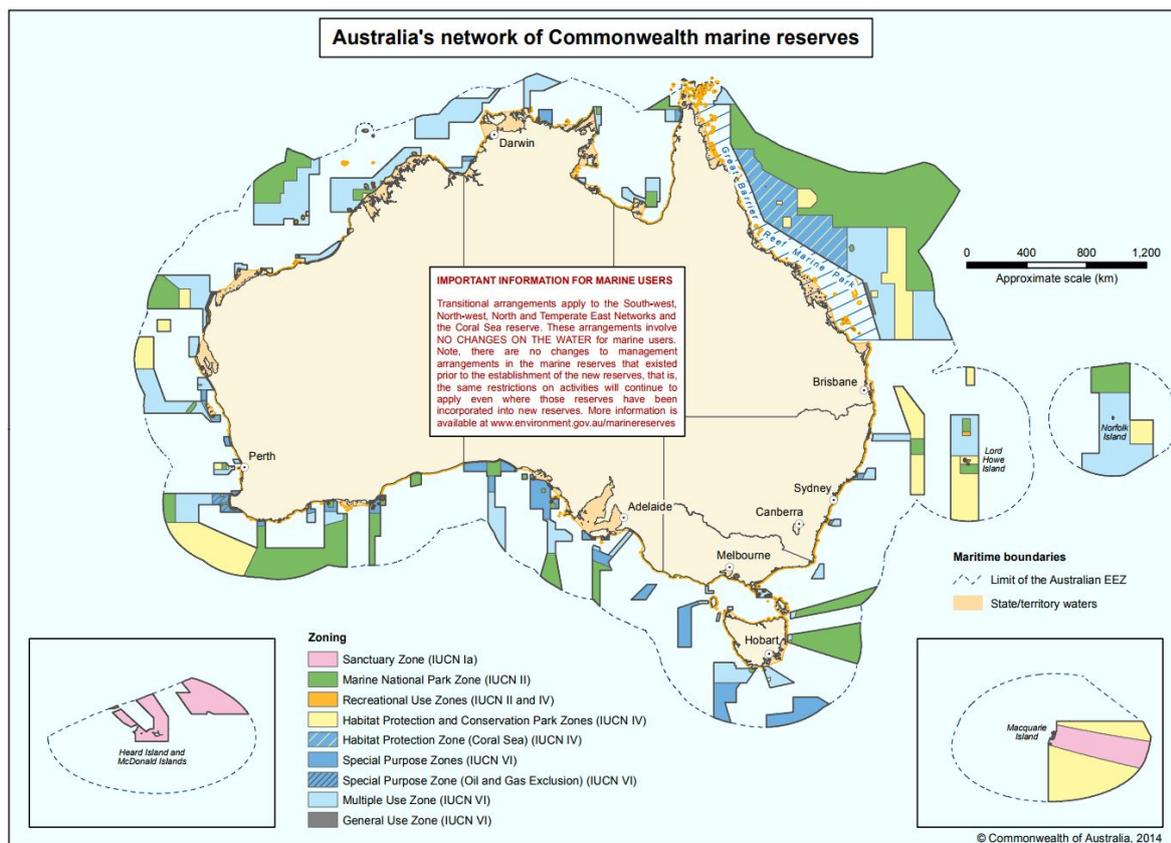
90 Mrs Patricia Beatty, New South Wales Professional Fishermen's Association, *Committee Hansard*, 16 March 2017, p. 15.

91 Dr Alistair Hobday, CSIRO, *Committee Hansard*, 17 March 2017, p. 6.

92 Dr Alistair Hobday, CSIRO, *Committee Hansard*, 17 March 2017, p. 6.

93 DoEE, 'Commonwealth marine reserves – Overview', www.environment.gov.au/topics/marine/marine-reserves/overview (accessed 15 December 2016).

Figure 5.1: Australia's network of marine parks



Source: DoEE, 'Australian marine parks', www.environment.gov.au/topics/marine/marine-reserves (accessed 27 October 2017).

5.77 The current Government's draft management plans propose deep cuts to the protective zoning declared by the Governor-General in 2012 in marine parks around Australia's coastline, including iconic areas such as the Coral Sea, the Great Australian Bight, Geographe Bay, the Kimberley and the Gulf of Carpentaria.

5.78 Downgrades to protective zoning are also proposed to a number of longstanding marine parks declared over the last 30 years, including at Middleton Reef in the Lord Howe Island Marine Park and Mermaid Reef at the Rowley Shoals.

5.79 The draft plans propose to revoke 40 million hectares of high-level green zone/marine national park (sanctuary zones which keep marine ecosystems functioning in their natural state without the pressure of mining or fishing). This is an area twice the size of the state of Victoria and representing almost half of the marine national parks in the network of 44 marine parks. What is proposed by the Turnbull Government is equivalent to revoking half of Australia's national parks on land, and is unprecedented globally.

5.80 Australia used to have a bipartisan legacy of marine protection, stretching back over 40 years to the Whitlam and Fraser Governments. In 1998, having secured an agreement from the Australian and New Zealand Environment Conservation Council (ANZECC) to declare the world's first network of science-based marine

parks, in 2004 the Howard Government set what has been described as the 'gold standard' for marine park management by declaring green zones in 34 per cent of the Great Barrier Reef Marine Park.⁹⁴ Between them, the Howard and Gillard Governments declared 60 federal marine parks and completed the network.

5.81 The current government's proposed cuts are not science-based—CSIRO recommends that each marine park should have at least one green zone/marine national park. Yet 16 of the marine parks would have no high-level protection under the Government's 2017 proposals.

5.82 The Government's own Expert Science Panel recommended that all primary conservation features have at least some representation within green zones/marine national parks. Yet the draft plans leave 259 of Australia's primary conservation features and 20 entire biological regions unrepresented in high protection.

5.83 Reefs protected in green zones/marine national parks have significantly higher numbers of fish, and are recovering much faster from cyclone and coral bleaching damage than adjacent unprotected reefs. One study in the Great Barrier Reef found that: 'The difference in the amount of Coral Trout between the protected areas and what's next door is 80%, an 80% difference in the biomass between the protected areas and what's immediately adjacent to it'.⁹⁵

5.84 Between July and 20 September 2017, the Director of National Parks consulted on draft management plans for the marine parks. The final plans will require approval by the Minister for the Environment and Energy and will be in place for ten years from the date specified by the Minister after they have been tabled in both Houses of Parliament.⁹⁶ At the time of writing, the final management plans had not been made.

5.85 Various submitters highlighted the benefits of MPAs for building resilient marine ecosystems in the face of climate change. For example, IMAS noted that effective MPAs 'comprise one key tool for reducing future climate-related changes in biodiversity'.⁹⁷ The FRDC submitted that no-take marine reserves provide 'important

94 See UNESCO, Mission Report: Reactive Monitoring Mission to Great Barrier Reef (Australia) 6th to 14th March 2012, June 2012, <http://whc.unesco.org/mwg-internal/de5fs23hu73ds/progress?id=iFhLHlkxWS8QC2gdXKuruIxjSlrnkCiyPfHugH0FAPw.&dl> (accessed 30 November 2017), p. 34.

95 AIMS, 'Twice the coral trout in Great Barrier Reef protected zones', www.aims.gov.au/docs/media/latest-releases/-/asset_publisher/8Kfw/content/27-march-twice-the-coral-trout-in-great-barrier-reef-protected-zones (accessed 29 November 2017)

96 DoEE, 'Australian marine parks', www.environment.gov.au/topics/marine/marine-reserves (accessed 27 October 2017).

97 IMAS, *Submission 1*, p. 34. A list of reasons is provided at pages 34 to 35 of the submission.

benchmarks or reference points to understand and track change and to gauge the effectiveness of our marine management'.⁹⁸

5.86 Professor Iain Suthers, SIMS, stated:

In New South Wales there is a complication for MPAs because of urbanisation and run-off from the land, which has a synergistic effect. Nevertheless, where you have these MPAs you do find increased biodiversity. Even the harshest critics of MPAs—of which there are a lot in this state—agree that biodiversity is definitely protected within these MPAs. Partly that is because you have space that is taken up by the native species. If you have, say, harvesting of timber, you allow in weeds that can move into that space. So I think my colleagues are absolutely correct, and there is evidence that these marine protected areas do support greater biodiversity, including a persistence of kelp. Also, the abundance of fish that derive benefit from the habitat is quite remarkable, and that then has tourism benefits as well.⁹⁹

5.87 However, IMAS is of the view that the current MPAs are inadequate for safeguarding marine biodiversity and the current MPA network 'is poorly-designed for resisting impacts of climate change'. It argued that there are 'numerous large gaps' in the current MPA network and that most no-take zones are of a small size.¹⁰⁰ IMAS outlined features it considers should be included in an MPA network to best maintain biodiversity in a changing climate.¹⁰¹

5.88 Professor David Booth argued that building resilience in marine ecosystems is a necessary response to climate change. Professor Booth stated that increased resilience can occur if other stressors, such as pollution and fishing, are controlled. Professor Booth argued that marine park networks can assist in this regard; however, he is concerned by the current approach to these parks. Professor Booth explained:

One solution that will help in part will be marine park networks where fish can thrive, at least in sanctuary zones, and where we can see the full size spectrum of fish species, which an ecosystem needs to function properly. At the moment I am concerned the Commonwealth marine reserve network is floundering—pardon the fishy pun. It has been eroded and it has also

98 FRDC, *Submission 2*, p. 17.

99 Professor Iain Suthers, SIMS, *Committee Hansard*, 16 March 2017, p. 22.

100 IMAS, *Submission 1*, pp. 34–35.

101 IMAS cited a paper that argued features needed for MPAs include: '(i) no-take zones with large north-south dimensions, allowing species to shift internally with warming climate, (ii) such zones to be distributed without major (>200 km) gaps as a north-south network, facilitating poleward range shifts, (iii) all major marine habitat types and biodiversity features to be protected from exploitation within at least one MPA, (iv) the MPA network to include considerations of connectivity with deeper water and adjacent habitats'. The paper cited is AD Olds, KA Pitt, PS Maxwell, RC Babcock, D Rissik, RM Connolly, 'Marine reserves help coastal ecosystems cope with extreme weather', *Global Change Biology*, vol. 20, 2014, pp. 3050–58. IMAS, *Submission 1*, pp. 34–35.

been delayed. So I would like to see the management plan for that brought to fruition.¹⁰²

5.89 EDOA argued that the 'establishment of a comprehensive, adequate and representative system of no-take marine protected areas...is vital'. EDOA stated:

In a climate change context, appropriately placed MPAs should be provide climate refugia, maximise functional connectivity between protected areas to enhance the potential for range shifts, protect areas in which key ecological processes occur e.g. feeding aggregations and breeding or spawning grounds, and be situated to allow for a range of species dispersal distances, which for some species, are predicted to change with increasing sea temperatures.¹⁰³

5.90 Witnesses from SIMS acknowledged that the split in jurisdictional responsibilities between Commonwealth and state waters has complicated marine management for decades. Nevertheless, it was suggested that 'connectivity' between Commonwealth and state reserves could be improved. Dr Adriana Verges explained:

In terms of the Commonwealth marine reserves, one of the problems that we have identified with them is that there is no connectivity between them and the state reserves. I think that is important. This could be easily fixed, because connectivity is probably one of the things that can be helpful in terms of protecting ecosystems from climate change. By protecting an entire corridor that is connected between the coast and inshore, you would be helping with that.¹⁰⁴

5.91 AFMA, however, argued that from a fisheries management perspective, no-take MPAs 'are relatively clumsy' compared to other regulatory tools AFMA can use. In particular, AFMA highlighted the various management approaches available to it which can be adjusted rapidly if needed.¹⁰⁵ AFMA explained that a key distinction between its management tools and no-take MPAs is that MPAs 'are developed over a long period of time using particular criteria and when the underlying environment changes they tend not to be moved in response'.¹⁰⁶ Overall, Dr Findlay summed up AFMA's views on MPAs as follows:

[O]ur position is not no MPAs. At the end of the day, the public has the right to decide on its use of the marine environment. If MPAs are going to be used to manage some particular elements of biodiversity, which they're good at, then we support that. Our concern is that if there's a view that they

102 Professor David Booth, *Committee Hansard*, 16 March 2017, p. 2.

103 EDOA, *Submission 4*, p. 5 (footnotes omitted).

104 Professor Iain Suthers; Dr Adriana Verges, SIMS, *Committee Hansard*, 16 March 2017, p. 27.

105 These include regulating the type of gear fishermen use, the types of species they are allowed to catch, and spatial and temporal management techniques.

106 Dr James Findlay; Dr Nick Rayns, AFMA, *Committee Hansard*, 20 October 2017, p. 13.

could be well used to manage fisheries resources or manage the impacts from fishing then we think we have better tools available to us to do that.¹⁰⁷

Threatened, endangered and protected species

5.92 One of the challenges IMAS identified regarding the effects of climate change on commercial fishing relates to changes in the behaviour of conservation species. For example, changes in the spatial or temporal overlap between conservation and commercial species could occur or conservation species could move out of protected areas. As a result, conservation species could become more vulnerable to 'overexploitation or accidental by-catch'.¹⁰⁸

5.93 The Department of the Environment and Energy (DoEE) noted that many conservation advices and recovery plans for listed threatened marine species and ecological communities 'recognise changes in ocean temperature, salinity, water clarity, ocean acidification, sea level and/or the frequency or severity of cyclones and storms as potential threats'. The DoEE added:

Managing the impacts of climate change on listed species and ecological communities remains a significant challenge, as there is limited information on the full extent of the impacts and limited options to directly alter marine ecosystems. Recovery efforts therefore focus on increasing the resilience of species and ecological communities by reducing the human impact on the marine environments, such as by minimising disturbance to coastal and beach environments and managing any significant impacts of commercial and recreational fishing.¹⁰⁹

5.94 Ms Susan Higginson, Chief Executive Officer, EDO NSW, argued that the threatened ecological communities and critical habitat lists 'are in desperate need of attention' to ensure adequate protection under the EPBC Act is provided. Ms Higginson argued:

An assessment of ecological communities and species at risk from climate change is urgently required. We have not done that work and there is no proposal yet to do that work. This could be included, for example, in a comprehensive national ecosystems assessment for Australia. Greater flexibility and the development of recovery and threat-abatement plans could enhance their use for marine regions and ecosystems in the key principles of marine biodiversity adaptation—being the need to reduce human threats and stresses to build resilience and well-functioning ecosystems—to focus on ecosystem or landscape-scale management. Marine bioregional planning could also be an effective tool in the management of the marine environment on an ecosystem basis, but the

107 Dr James Findlay, AFMA, *Committee Hansard*, 20 October 2017, p. 13.

108 IMAS, *Submission 1*, p. 25.

109 DoEE, *Submission 19*, p. 5.

EPBC Act provisions need to be expanded to include climate change impacts as a mandatory consideration in the planning process.¹¹⁰

Biosecurity measures and monitoring systems

5.95 In its submission, the DAWR recognised that increased water temperatures will cause biosecurity challenges. Under the current biosecurity arrangements, the Commonwealth coordinates 'the response and preparedness and promotes consistency in national policies, underpinned by the *Biosecurity Act 2015*'. The states and the Northern Territory jurisdictions are responsible for the detection, response and management of current, new and emerging diseases and pest issues.¹¹¹

5.96 The Queensland Government submitted that 'part of the prevention and preparedness strategy is to predict the pest species most likely to arrive and establish in the changed environmental conditions'.¹¹²

5.97 On the transportation of marine pests to new environments from ballast water, which is regulated by the Australian Government, the DAWR highlighted the International Convention for Control and Management of Ship's Ballast Water and Sediment (Ballast Water Convention), which commenced on 8 September 2017. The Ballast Water Convention establishes standards and procedures for the management and control of ships' ballast water and sediments.¹¹³ Amendments made to the Biosecurity Act were made in 2017 to ensure Australia is compliant with the Ballast Water Convention.¹¹⁴

5.98 The DAWR has been developing a regulatory approach to manage the risks of marine pests being introduced through biofouling. The DAWR submitted that the regulatory system would be based on guidelines developed by the International Maritime Organization and 'will require active and regular management of biofouling on vessels to reduce the risk of translocation of exotic species'.¹¹⁵ The 2017 amendments to the Biosecurity Act enable the DAWR to 'look at hull fouling as a biosecurity risk'.¹¹⁶

5.99 Mr Ian Thompson, a first assistant secretary at the DAWR, explained that the DAWR is implementing a national biosecurity surveillance program to enable better identification of biosecurity threats before they arrive. Mr Thompson added that, in

110 Ms Susan Higginson, EDO NSW, *Committee Hansard*, 16 March 2017, p. 9.

111 Department of Agriculture and Water Resources (DAWR), *Submission 18*, p. 6.

112 Queensland Government, *Submission 14*, p. 2.

113 DAWR, *Submission 18*, p. 6.

114 *Biosecurity Amendment (Ballast Water and Other Measures) Act 2017*.

115 DAWR, *Submission 18*, p. 6.

116 Mr Ian Thompson, First Assistant Secretary, Sustainable Agriculture, Fisheries and Forestry Division, DAWR, *Committee Hansard*, 20 October 2017, p. 13.

response to threats that have arrived, the DAWR is working on developing a mechanism 'for responding to marine emergencies with industries and for acting quickly when they happen'. This mechanism, which is intended to 'provide the same sort of partnership response in the marine environment that we have for incursions on land at the present time', is expected to be finalised in 2018.¹¹⁷

5.100 However, the committee received evidence expressing concern about the attention given to biosecurity matters at present. IMAS argued that there are 'limited' research and development capabilities and investment in fish health in Australia, which it considers is surprising given the value of marine industries, the size of Australia's ocean territory, and the concentration of Australia's population in coastal areas. IMAS argued that these limited capabilities and investment are 'inadequate to support ever increasing aquaculture growth, which at the same time faces largely unpredictable threats from climate change'.¹¹⁸ IMAS suggested that long-term funding is required for 'comprehensive, coordinated biodiversity monitoring systems' to assist in improved understanding of the implications of climate change for natural systems.¹¹⁹

5.101 It was also argued that biosecurity efforts focus on individual industries and suffer from a lack on overall coordination. Mr Martin Exel from Austral Fisheries observed:

As to biosecurity, you have got a huge problem with white spot virus at the moment in prawns in Queensland; you have got the problems with the algal blooms...you have got the issues with moving of lobster or abalone or toothfish or whatever. But it is not coming into a cohesive place; each area has their own expertise and they are all dealing with it separately.¹²⁰

5.102 Mr Exel agreed that a government taskforce on improving coordination in biosecurity matters 'would be a damned good start'.¹²¹

117 Mr Ian Thompson, DAWR, *Committee Hansard*, 20 October 2017, p. 13.

118 IMAS, *Submission 1*, p. 38.

119 IMAS, *Submission 1*, p. 40.

120 Mr Martin Exel, General Manager Environment and Policy, Austral Fisheries, *Committee Hansard*, 21 February 2017, p. 24.

121 Mr Martin Exel, Austral Fisheries, *Committee Hansard*, 21 February 2017, p. 24.