
The Parliament of the Commonwealth of Australia

Netting the benefits

Inquiry into the Role of Science for the Future of Fisheries and Aquaculture

House of Representatives
Standing Committee on Agriculture, Resources, Fisheries and Forestry

November 2012
Canberra

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Foreword

'When The Boat Comes In' (or 'Dance Ti Thy Daddy')

Dance to your Daddy, my little laddy

Dance to your Daddy, my little man

Thou shalt have a fish and thou shalt have a fin

Thou shalt have a codlin when the boat comes in

Thou shalt have haddock baked in a pan

A traditional English folk song, originating in Northumberland, where mothers sang to their little ones as they waited for their fishermen to come back from the treacherous North Sea.

Fishing is the activity of catching fish. It is an ancient practice dating back at least 40,000 years. Many species have come and gone depending on climate and fishing habits, but fish have remained part of our diet through the ages.

Since the 16th century, fishing vessels have been able to cross oceans in pursuit of fish and since the 19th century it has been possible to use larger vessels and, in some cases, process the fish on board. Fish are normally caught in the wild. Techniques for catching fish include hand gathering, spearing, netting, angling and trapping.

The term fishing may be applied to catching other aquatic animals such as shellfish, cephalopods, crustaceans, and echinoderms. The term is not usually applied to catching aquatic mammals, such as whales, where the term whaling is more appropriate, or to farmed fish. In addition to providing food, modern fishing is also a recreational sport.

FAO statistics tell us that the total number of fishermen and fish farmers across the world is estimated to be 38 million. Fisheries and aquaculture provide direct and

indirect employment to over 500 million people. In 2005, the worldwide per capita consumption of fish captured from wild fisheries was 14.4 kilograms, with an additional 7.4 kilograms harvested from fish farms.

Australia is a small player globally, but fishing is still a vital part of our economy. However, there are many opinions about how to run the industry and how much involvement should come from Government.

This inquiry was due to the fact that little attention had been paid the fishing industry in recent times and yet there have been many changes in both the wild fisheries and aquaculture that has attracted some fairly contradictory legislation. AFMA had played a good solid role in developing a hands-off approach to managing our commercial fisheries. But it was time to take a look at this industry and review its capabilities.

As it happened, towards the end of our inquiry a controversy arrived in the shape of a super trawler that quickly became a 'bogey man'. Although there was sufficient legislation to control its activities, the community was mobilised to oppose it through fear, despite the fact that scientists working in the field explained that it would have no greater impact than others using similar methods of fishing.


Thus it exposed weaknesses in our legislative processes and caused rifts not only in the fishing community, but also among elected members of Parliament. Emergency measures were taken, not necessarily in the interests of the industry.

The Committee took a large amount of evidence across the country which gave us a good insight into the industry but also pointed to many inconsistencies in dealing with the various fishing levels and aquaculture changes.

This led me to believe that there should be some way of developing a national regional fishing policy statement for fisheries, aquaculture and recreational fishing that would allow the industry to start setting its goals through regional fishing agreements that run for up to twenty years, but with reviews every five years. This way all processes can be reviewed regularly, while allowing some certainty in the industry to encourage investment.

Lastly, I wish to thank members of the Committee, the Secretariat and all the individuals and organisations who contributed to the inquiry.

Hon Dick Adams MP
Chair



Membership of the Committee

Chair Hon Dick Adams MP

Deputy Chair Mr Alby Schultz MP

Members Mr Darren Cheeseman MP

Mr Geoff Lyons MP

Mr George Christensen MP

Mr Rob Mitchell MP

Mr Tony Crook MP (Supplementary)

Mr Dan Tehan MP

Committee Secretariat

Secretary	Mr David Brunoro
Inquiry Secretary	Mr Thomas Gregory
Research Officer	Mr Nathan Fewkes
Administrative Officers	Ms Dorota Cooley
	Ms Louise Goss



Terms of reference

The Committee will inquire into and report upon the role of science for the future of fisheries and aquaculture, and in particular:

- a) the relationship between scientific knowledge of fish species, ecosystems, biodiversity and fish stock sustainability;
- b) fishery management and biosecurity, including but not limited to:
 - the calculation and monitoring of stock size, sustainable yield and bycatch, as well as related data collection
 - the effects of climate change, especially relating to species dispersion, stock levels and impacts on fishing communities
 - pest and disease management and mitigation
 - minimising risks to the natural environment and human health
 - cooperation among Australian governments on the above
- c) research, development and applied science of aquaculture, including:
 - transitioning from wild fisheries to aquaculture in individual species
 - improving sustainability and lifecycle management practices and outcomes
 - pest and disease management and mitigation
- d) governance arrangements relating to fisheries and aquaculture, including the implications for sustainability and industry development;
- e) current initiatives and responses to the above matters by state, territory and Australian governments;
- f) any other related matter.



List of abbreviations

ABARES	Australian Bureau of Agricultural Research and Economics
AFMA	Australian Fisheries Management Authority
AFZ	Australian fishing zone
AIMS	Australian Institute for Marine Science
AMA	Australian Marine Alliance
AMCS	Australian Marine Conservation Society
AMSA	Australian Marine Sciences Association
APFA	Australian Prawn Farmers Association
CFA	Commonwealth Fisheries Association
CRCs	Cooperative Research Centres
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Department of Agriculture, Fisheries and Forestry
DCCEE	Department of Climate Change and Energy Efficiency
DPI	Department of Primary Industries (NSW)
DPIPWE	Department of Primary Industries, Parks, Water and Environment (Tas)
EBFM	Ecosystems-based fisheries management

EEZ	Exclusive Economic Zone
<i>EPBC Act</i>	<i>Environment Protection and Biodiversity Act 1999</i>
ERM	Ecological risk management
ESD	Ecologically sustainable development
<i>FA Act</i>	<i>Fisheries Administration Act 1991</i>
FAO	Food and Agriculture Organisation
<i>FM Act</i>	<i>Fisheries Management Act 1991</i>
FRDC	Fisheries Research and Development Corporation
FSANZ	Food Standards Australia and New Zealand
HSP	Harvest Strategy Policy
IMAS	Institute for Marine and Antarctic Studies
ISA	Infectious salmon anaemia
JCU	James Cook University
MEY	Maximum economic yield
MSC	Marine Stewardship Council
MSY	Maximum sustainable yield
MPA	Marine protected area
NAC	National Aquaculture Council
OCS	Offshore Constitutional Settlement
RD&E	Research, development and extension
SBT	Southern bluefin tuna
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
TSGA	Tasmanian Salmonid Growers Association

TSIC	Tasmanian Seafood Industry Council
UWA	University of Western Australia
WAFIC	Western Australian Fishing Industry Council
WWF	World Wildlife Fund



List of recommendations

2 Background

Recommendation 1

The Committee recommends that the Fisheries Research and Development Corporation conduct and publish an annual audit of total national investment in fisheries and aquaculture research, development and extension.

3 Fisheries

Recommendation 2

The Committee recommends that the Australian Government continue to publish a consolidated stock report for all Australian fisheries on a regular basis, after the initial publication of such a report in 2012, in consultation with State and Territory governments.

Recommendation 3

The Committee believes that precaution is about managing risk; and therefore recommends that a new guideline on precaution be developed with agreement and support of stakeholders, for inclusion in a new national regional policy statement for fisheries, aquaculture and recreational fishing.

Recommendation 4

The Committee recommends that the Australian Government expedite the creation and implementation of the monitoring and evaluation strategy for the national Commonwealth marine reserves network – to ensure that they are well managed and thoroughly evaluated, before

consideration of any new MPAs domestically and globally. A timeline should be announced to show:

- when a complete monitoring strategy will be in place;
- when a full evaluation will be completed; and
- when the findings of the evaluation will be implemented.

Recommendation 5

The Committee recommends that the Minister for Agriculture, Fisheries and Forestry work with State and Territory counterparts to commission a regular estimate of recreational fishing activity and impacts in Australia, with data and results published in a yearly consolidated report, using a nationally agreed data collection model.

Recommendation 6

The Committee recommends that COAG seek to harmonise, where there is agreement, recreational fishing licensing, rules and data collection.

Recommendation 7

The Committee recommends that the current review of Commonwealth fisheries management consider whether revisions to the *Fisheries Management Act 1991* are necessary to allow the Australian Government to more readily manage recreational fishing activity in Commonwealth waters.

Recommendation 8

The Committee recommends that the 2008 preliminary assessment of the 'Implications of Climate Change for Australian Fisheries and Aquaculture' be developed by the Department of Climate Change and Energy Efficiency into a more comprehensive study, to include broad strategic issues and localised impacts.

Recommendation 9

The Committee recommends that the Australian Government ensure there is a continued strong effort to monitor and analyse the effects of climate change on Australia's oceans and communities.

Recommendation 10

The Committee recommends that the Australian Primary Industries Ministerial Council commission a review of the 'National Fishing and Aquaculture RD&E Strategy 2010', to assess progress in achieving the Strategy's aims, in particular in regard to the co-ordination of Australia's scientific effort. The review should consider whether additional

mechanisms are necessary to complement the strategy, such as a regular national fisheries research, development and extension forum or registry of research projects.

4 Aquaculture

Recommendation 11

The Committee recommends that the Australian Government work with state and territory governments to develop further conservation agreements to streamline assessments under the *EPBC Act*, to facilitate the growth of aquaculture.

Recommendation 12

The Committee recommends the Australian Government, through the Council of Australian Governments, lead the development and agreement of a detailed and comprehensive national aquaculture policy, including the roles and responsibilities of all governments, to address (amongst others) the issues contained in paragraph 4.89, at least in the areas of:

- National ambition;
- Governance;
- Regional planning;
- Community agreement;
- Technology; and
- International competitiveness

5 Biosecurity, certification and international aid and cooperation

Recommendation 13

The Committee recommends that the Australian Government update AquaPlan as soon as possible.

Recommendation 14

The Committee recommends that the Department of Agriculture, Fisheries and Forestry develop a model for funding and enhancing aquatic disease control and aquatic veterinary training, possibly including an industry levy, as a matter of urgency.

Recommendation 15

The Committee recommends the Legislative and Governance Forum on Food Regulation formulate an independent mechanism for conducting a performance audit or review of the entire food standards system.

Recommendation 16

The Committee recommends that, while protecting Australian intellectual property, the Australian Government make available technology and expertise through aid programs dedicated to fisheries management and aquaculture production.

Recommendation 17

From within the existing aid budget, the Committee recommends that the Australian Government increase aid to Pacific Island countries for projects and programs relating to fisheries management and aquaculture production.

6 Governance, environmental policy and the way forward**Recommendation 18**

The Committee recommends that the Treasurer refer to the Productivity Commission an inquiry into the efficiency of the fisheries industry across Australia and the efficiency and effectiveness of the inter-jurisdictional governance arrangements for Australian fisheries.

Recommendation 19

The Committee recommends that the fisheries management and environment protection responsibilities of the Australian Government continue to be administered by separate agencies, but that these agencies work towards a single application process (and potentially a single point of contact) for fisheries approvals, with the aim of providing a 'one-stop-shop' from the applicant's perspective.

Recommendation 20

The Committee recommends that commercial fishing organisations in Australia form a national peak body. This process could be initially assisted by the Department of Agriculture, Fisheries and Forestry through facilitating contact and coordination.

Recommendation 21

The Committee recommends that fisheries management should not be subject to political direction, except as explicitly provided for in legislation.

Recommendation 22

The Committee recommends that the Australian Government, through the Council of Australian Governments, lead the development of a comprehensive national regional policy statement for fisheries, aquaculture and recreational fishing, which includes:

- an overall statement of strategic intent to drive future direction;
- a new guideline on precaution; and
- a research, development and extension work program.

Introduction

The inquiry

- 1.1 During the summer of 2011 and 2012, the Committee developed options for an inquiry into fisheries, aquaculture and science. Having considered the Committee's proposal, on 21 March 2012 the Minister for Agriculture, Fisheries and Forestry, Senator the Hon. Joe Ludwig, asked the Committee to inquire into and report on the role of science for fisheries and aquaculture.
- 1.2 The Committee called for submissions through a newspaper advertisement on 4 April 2012 and by directly contacting stakeholders. The Committee also wrote to relevant State, Territory and Federal Ministers, notifying them of the inquiry and inviting submissions.
- 1.3 The Committee received 50 submissions (and 8 supplementary submissions) over the course of the inquiry, which are available on the Committee's website.¹ A full list of submissions is contained in Appendix A of this report. The Committee also received 8 exhibits to the inquiry, which are listed in Appendix B of this report.
- 1.4 The Committee held 11 public hearings, in Canberra, Perth, Hobart and Townsville. Details of the hearings and witnesses who gave evidence to the Committee are available in Appendix C of this report.
- 1.5 The Committee would like to sincerely thank all individuals and organisations that participated in the inquiry. The Committee has been

1 www.aph.gov.au/arff

privileged to receive evidence from scientists around Australia who are passionate, dedicated experts in their fields and who are keen to share their knowledge and understanding with the Parliament and the broader community. The Committee has also had the opportunity to visit scientists in their laboratories to view first-hand the efforts and results of their research.

Rationale for the inquiry

- 1.6 The world is expected to have a population of nine billion people by 2050; there is growing and urgent need for fish protein, the most traded protein in the world, and the highest deliverer of omega 3 oils.
- 1.7 There is a growing middle class in many Asia-Pacific countries and we are recognising the Asian century. Where does Australia fit in this picture?
- 1.8 Australia has a reputation of good science, especially for the top end of aquaculture market, which has helped to close the cycle of advances in fish production on land and the plate.
- 1.9 Wild fisheries in Australia is only small in catch and value and does not make a great impact on the huge area of oceans under Australia's exclusive economic zone.
- 1.10 Although there may be some growth from new species that could become commercially fishable and increases because of fish stock recoveries or increase in their numbers, overall there may not be growth from the wild fisheries.
- 1.11 Significant growth must come from aquaculture. The need to focus on aquaculture using world class science is critical for the growth of this industry and to find its way to take advantage of the new Asian opportunities.
- 1.12 Capital drives both fisheries and aquaculture. For wild fisheries, this means having a boat, a quota and the effort to fish. For aquaculture, this means research science and responding to a burgeoning market.
- 1.13 Underlying aquaculture is a need to find or develop new sources of feed stock, by replacing wild caught fish feed with either cereals or growing other fish to feed a higher species of more marketable fish.
- 1.14 This is where the health aspects of fish products and omega oils is an important aspect of our fisheries development, including the introduction

of fish oils into fish feed to ensure the omega oils are retained in the farmed fish.

- 1.15 The Committee began with the question of why Australia wasn't doing more to develop the fishery, to improve the position in the world. We are recognised for advances in aquaculture science and fisheries management, but there seems to be a number of barriers, including conflicting legislation, differences of emphasis between state and federal legislation, and a confused understanding of the sciences.
- 1.16 Added to this, the Federal Minister sought to look at the role of science for fisheries and aquaculture. Towards the end of the receipt of submissions, the case of the *MV Magiris* (or *Abel Tasman*) arose, which led to further questioning of the science. Further, although many fish are taken by recreational fishers, there is no real record of the recreational fishing take.
- 1.17 The aim of the report is to assess the current state of fisheries science and its application while also addressing the future of fishing in Australia. A desirable outcome would be to arrive at a new national regional policy statement that will allow the development of regional fisheries agreements that can be negotiated with the stakeholders, the states and environmental groups.



Background

Australian fisheries, aquaculture and recreational fishing industries

- 2.1 Production from Australian commercial fisheries and aquaculture is small by comparison with other countries. The economic value of each sector is approximately \$1.3 billion and \$0.9 billion per year respectively.¹
- 2.2 Separately, the economic value of the recreational fishing sector is exceedingly difficult to quantify, with some estimates placing it between \$4 billion and \$5 billion annually.² The Australian Fishing Trade Association's submission suggested that the figure 'could be as high as \$10 billion a year through direct expenditure associated with the activity of going fishing.'³
- 2.3 According to the Australian Bureau of Agricultural Research and Economics (ABARES), in 2010-11 the total national employment in commercial fishing and aquaculture was 12,000 people.⁴ The last detailed survey was conducted as part of the 2006 census, which estimated a total fishing and aquaculture workforce of 15,939 people (9,736 in fishing and aquaculture production and 6,203 in processing and wholesaling).⁵

1 Fisheries Research and Development Corporation, Submission 19, p.9.

2 Fisheries Research and Development Corporation, Submission 19, p.9.

3 Australian Fishing Trade Association, Submission 39, p.1.

4 Australian Bureau of Agricultural Research and Economics, *Agricultural Commodities, June Quarter 2012*, 2012, Canberra, p.121.

5 ABARES, 'Australian Fisheries Statistics 2010', August 2011, p.33.

- 2.4 Despite the geographic size of its waters, Australian wild fishery production is particularly low. The Fisheries Research and Development Corporation (FRDC) summarised the situation:

Australia's exclusive economic zone is the third-largest in the world, covering one-and-a third times the area of Australia's land mass. However, the quantum of Australia's commercial wild catch ranks 60th in the world, representing only 0.2 per cent of world tonnage but 2 per cent by value. The size of catch of one species in some countries exceeds that of Australia's total production.⁶

- 2.5 Australia's aquaculture sector has grown significantly in the past three decades, corresponding with the world-wide trend. As noted by the CSIRO:

Seafood is a major contributor to global food security with the aquaculture sector continuing to be the fastest-growing animal food producing sector in the world. Aquaculture currently accounts for nearly half (46%) of the world's food fish consumption, compared with 33.8% in 2000.⁷

- 2.6 Tasmanian salmon aquaculture, for example, is now the 'most valuable of all of Australia's seafood sectors with a farm gate value of \$370 million. The industry is based on a genetically healthy population of founder breeding stocks introduced from Canada in the mid-1960's.'⁸ Further detail about the aquaculture industry is in Chapter 4.

- 2.7 The future direction of commercial fisheries and aquaculture are linked to the broader challenges, such as ensuring sustainable economic growth, dealing with climate change and supporting development in regional Australia. Dr Patrick Hone (FRDC) said:

There is a real opportunity, as the mining boom expands in regional Australia and gives a greater focus on regional Australia, to look at how that industry, in terms of its needs, can complement the renewable industries – whether they are tourism, fisheries, food, fibre or whatever. In other words, how we build the future beyond the mining boom to the next boom, which we hope would be the food boom. So the question then is: to what degree can we build synergies in these regional areas? Can we build offset values? Can we look at other ways of doing things? Everyone talks about soil carbon, but very few people know about blue carbon,

6 Fisheries Research and Development Corporation, Submission 19, p.13.

7 CSIRO, Submission 23, p.3.

8 CSIRO, Submission 23, p.9.

and yet the oceans contribute significantly more to the sequestration of carbon than the land does.⁹

Fisheries and aquaculture governance in Australia

2.8 Australian fisheries governance is shared between the States, Territories and Australian Government. Governance issues are dealt with in more detail in Chapter 6, though a brief background is provided below:

Generally, State/Territory laws apply to coastal waters (up to 3nm) and Commonwealth laws apply from those waters out to the limit of the Australian fishing zone (200nm).

...

The Commonwealth has generally limited its jurisdiction to commercial fishing with the State/Territory fisheries departments assuming responsibility for recreational fishing.¹⁰

2.9 Fisheries that cross jurisdictional borders – between multiple state governments, or between a state government and the Australian Government – are subject to management from both levels of governments involved. Some of these fisheries are managed through ‘joint fisheries authorities’. Additionally, Australia has responsibility for a vast area of ocean surrounding the coast of the Australian Antarctic Territory.

2.10 Professor Steve Kennelly (NSW Department of Primary Industries) pointed out the artificiality of these borders:

Given the fact that these fish do not recognise borders, that they do not know that there is any difference between one side of a river and the other or that there is a boundary between Queensland and New South Wales, they just do what they have been doing for hundreds of thousands and sometimes millions of years. We have this artifice put over the top of it that involves these boundaries. We need to recognise that.¹¹

2.11 At a Commonwealth level, primary responsibility for commercial fisheries policies and programs rests with the Department of Agriculture, Fisheries and Forestry (DAFF). Management of fisheries resources in Commonwealth waters is the responsibility of the Australian Fisheries Management Authority (AFMA). AFMA’s role, as stated in its

9 Dr Patrick Hone, *Committee Hansard*, 20 June 2012, p.2.

10 DAFF, ‘Fisheries’ at <http://www.daff.gov.au/fisheries>

11 Prof Steve Kennelly, *Committee Hansard*, 15 August 2012, p.4.

submission, is 'to manage the resources of Australia's Commonwealth fisheries on behalf of the Australian community using the provisions of the *Fisheries Management Act 1991*.'¹²

- 2.12 The *Fisheries Management Act 1991* (the *FM Act*) and the *Fisheries Administration Act 1991* (the *FA Act*) are the main legislative instruments governing fishing. The objectives of the *Environment Protection and Biodiversity Act 1999* (the *EPBC Act*), however, also have an important bearing on fisheries management, policy and decision-making, which is overseen by the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC). The Committee believes that the tension between the environmental objectives of *EPBC Act* and the economic and social objectives of the *FM Act* should be resolved.
- 2.13 Recreational fishing – inland and ocean – is principally the responsibility of the States and Territories. Each jurisdiction has its own arrangements regarding licensing, catch and possession limits, permitted equipment and methods and fisheries management. Licensing arrangements in Australia vary, though rules and restrictions usually apply in terms of bag limits, possession limits, size limits, fishing methods and closed areas. Recreational fishing is discussed further in Chapter 3.
- 2.14 Aquaculture regulation rests almost exclusively with the States and Territories. However, the Australian Government is currently working with State and Territory governments to develop a regulatory framework for aquaculture in Commonwealth waters.¹³

Science priorities for fisheries and aquaculture

- 2.15 The knowledge gained through the scientific method is crucial to the future of fisheries and aquaculture. It informs breeding, management, environmental protection, food security, product development and export, biosecurity and economic sustainability. A National Research, Development and Extension (RD&E) Strategy was finalised in 2010, under the auspices of the Fisheries Research and Development Corporation (FRDC).¹⁴

12 AFMA, Submission 29, p.2.

13 DAFF, 'The Aquaculture Industry in Australia', at http://www.daff.gov.au/fisheries/aquaculture/the_aquaculture_industry_in_australia

14 Primary Industries Research Ministerial Council, 'National Fishing and Aquaculture RD&E Strategy 2010', April 2010.

2.16 According to the FRDC, 'the gap between global seafood demand and supply represents a challenge for the entire world... science will be at the forefront of progress.'¹⁵ The FRDC identified the following 'five categories of drivers' for new research in fisheries and aquaculture:

- global demographic factors;
- consumers and markets;
- climate change and variability;
- ecologically sustainable development, improved governance and resource access; and
- biosecurity and aquatic animal health.¹⁶

2.17 To meet these demands, action around the world will be necessary, and Australia will need to play its part. In its region, Australia will be able to make a big contribution, according to the CSIRO's submission:

Australia is adjacent to one of the world's largest fishing nations (Indonesia) and to the world's two largest tuna fisheries, in which it has shared interests - politically as well as through access to migrating seafood resources. Indonesia overtook the USA in 2007 as the third ranked country for fisheries production ... The Indonesian annual capture fishery catch is five million tonnes and 3.3 million people rely directly on fishing activities for part or all of their income ... Fish is a mainstay for food security for Pacific island countries and territories ... Fish provides 50-90 per cent of animal protein in rural areas and 40-80 per cent animal protein in many urban areas of the Pacific ... These fisheries share species and ecosystems with Australia.¹⁷

2.18 Australia's capacity in this field will be important beyond its role for fisheries directly. The CSIRO submitted: 'There are important opportunities for science to inform Australia's broader policy objectives regionally given the importance of fisheries in our region.'¹⁸

2.19 Science has contributed not only to the reputation of Australian fisheries management, but the quality of the science itself has been recognised internationally:

15 Fisheries Research and Development Corporation, Submission 19, p.14.

16 Fisheries Research and Development Corporation, Submission 19, p.14.

17 CSIRO, Submission 23, p.3.

18 CSIRO, Submission 23, p.1.

In a recent major international assessment of the management effectiveness of the world's marine fisheries, Australia was highly rated [...] In particular, scientific robustness, policy-making transparency and probability of sustainability of fisheries were rated in the best category¹⁹

- 2.20 Progress in Australian fisheries management can be shared to contribute to international progress and, in this sense, contribute to global outcomes.
- 2.21 The 'next-generation' of fisheries management is at an eco-system level. Governments throughout Australia are moving to adopt this level of management. The role of science, the Australian Marine Sciences Association (AMSA) submitted, 'will be even more important' as coastal ecosystems are sensitive to human-induced disturbances and changes to climates.²⁰
- 2.22 The establishment of marine protected areas (MPAs) in Australian waters will be another demand for scientific knowledge. As pointed out by the Australian Marine Sciences Association, there will be various needs for research relating to MPAs, and government decisions will need to take this research into account for the environmental, social and economic values affected by the creation of MPAs.²¹ However, funding dedicated to assessing MPAs should be proportionate, given the resources already diverted towards meeting obligations within environmental legislation (discussed further in chapter 6).
- 2.23 For aquaculture, the research demands generally differ from those of fisheries management: 'the drivers for science in aquaculture are usually focused on production (genetics, nutrition, disease management, chain management); on efficiency; and on consumers' seafood preferences.'²²
- 2.24 For an example of possible areas for future research, CSIRO has identified 'key areas' of aquaculture research:
- integrating climate change and resource use research into... aquaculture spatial planning frameworks that encompasses environmental and social values;
 - species selection;
 - production systems;
 - market demand and other uses of adjacent environments;

19 Australian Marine Sciences Association, Submission 14, p.1.

20 Australian Marine Sciences Association, Submission 14, p.3.

21 Australian Marine Sciences Association, Submission 14, p.3.

22 FRDC, Submission 19, p.15.

- increasing the speed of transition from reliance on wild broodstock to the use of domesticated selectively bred stocks, including the application of genetic tools developed for livestock breeding and human health; and
- developing cost effective aquaculture feeds that minimise or eliminate the use of wild harvest fishmeal and fish oil.²³

2.25 The 'fish-in, fish out' ratio and cost effective feed options was also identified as a challenge for aquaculture.²⁴

Structures for fisheries and aquaculture science in Australia

2.26 The Australian Government provides funding for research into fisheries and aquaculture through the FRDC. As the FRDC submission outlines, its role is to:

...plan, invest in and manage fisheries and aquaculture research, development and extension (RD&E) activities in Australia. This includes providing leadership and coordination of the monitoring, evaluating and reporting on RD&E activities, facilitating dissemination, extension and commercialisation. The FRDC achieves this through coordinating government and industry investment, including stakeholders to establish and address RD&E priorities. In addition the FRDC monitors and evaluates the adoption of RD&E to inform future decisions.²⁵

2.27 Research may also be funded through bodies such as the Australian Research Council, or in the establishment of Cooperative Research Centres (CRCs), such as the Seafood CRC (based in South Australia). The Australian Government also has conducts research directly, through organisations such as the CSIRO and the Australian Institute of Marine Science.

2.28 Many Australian universities have ongoing fisheries and aquaculture research programmes, such as the University of Tasmania's Institute for Marine and Antarctic Studies²⁶ or James Cook University's Centre for Sustainable Tropical Fisheries and Aquaculture²⁷. Universities, being state-based, tend to concentrate their research on local or regional issues.

23 CSIRO, Submission 23, p.4.

24 Prof Michael Harte, *Committee Hansard*, 29 June 2012, p.27.

25 Fisheries Research and Development Corporation, Submission 19, p.10.

26 See Institute for Marine and Antarctic Studies, Submission 27.

27 See James Cook University, Submission 28.

- 2.29 As part of the development of the National Fishing and Aquaculture RD&E Strategy 2010, the FRDC commissioned an audit of the RD&E capability supporting Australia's fisheries and aquaculture industries. Relying on data up to 2009, the audit found that the investment in RD&E grew from \$117 million in 2004-05 to \$142 million in 2008-09.²⁸ The audit found that most of this growth in investment related to the areas of environment and ecosystems research and research supporting legislative requirements.
- 2.30 However, the Committee was informed during the inquiry that funding for research is flat or reducing (see Chapter 3).²⁹

A national reporting framework

- 2.31 Stakeholders suggested that reporting of facts and figures should be improved, and that there are areas where reporting could be enhanced.
- 2.32 During the inquiry the Committee identified four national reporting areas where adequate data is needed to inform good policy decisions:
1. The level of investment in fisheries and aquaculture RD&E. This information was collated for the 'National RD&E Strategy' in 2010, but is not routinely published;
 2. The status of wild fisheries stocks and ecosystems. This information is currently published by each State and Territory individually as well as for Commonwealth waters.³⁰
 3. Data on recreational fishing impacts, catch and other statistics. The last national recreational fishing survey was conducted in the early 2000s. The States and Territories separately publish recreational fishing surveys of varying detail and regularity; and
 4. Fisheries and aquaculture industry activity statistics, as well as information relating to infrastructure, equipment and technology. ABARES produces the 'Australian Fisheries Statistics' on an annual basis, though its focus relates to industry performance and trade.

28 FRDC, *RD&E capability audit and assessment for the Australian Fishing and Aquaculture Industry*, FRDC Project 2009/217, April 2010, p.20.

29 CSIRO, Submission 23, p.4 and p.11; JCU, Submission 28, p.3.

30 Dr Ilona Stobutski, ABARES, *Committee Hansard*, 30 May 2012, p.5.

2.33 The Australian Government is expected to release a new publication by the end of 2012, entitled 'the State of Australian Fish Stocks Report', which will attempt to bring together State, Territory and national data. Dr Ilona Stobutski (ABARES) said:

It will be the equivalent of Australia's State of the Forests report. It is intended to be something that goes longer term and that develops over the longer term as well.³¹

Committee Comment

2.34 Science is central to fisheries management and aquaculture in Australia, and the role of science will only increase in importance in the future. Throughout the course of the inquiry, the Committee met with scientists conducting research fundamental to the long-term sustainability of fisheries and aquaculture, and their passion and commitment was always evident. Beyond the occasional contested issue, a broad message of strong science and a sustainable industry was consistently communicated by evidence to the inquiry. The Committee believes that the industry has a bright future, and that the role of scientists will continue to be central to that future.

2.35 However, in general, the Committee found that it was a challenge to understand the relationships and hierarchies between government, research institutes, industry and the strategic direction of scientific research priorities relating to fisheries management and aquaculture. The Committee was referred to a vast array of legislative objectives, strategic documents and policy guidelines during the inquiry. These issues are expanded upon throughout this report, but in particular in Chapter 6.

2.36 In order to assess arguments that the investment in fisheries and aquaculture research is declining, it is important to have regular national reporting on total investment. This will enable all interested stakeholders to assess the ongoing commitment to fisheries and aquaculture science across Australia. The Committee believes that the FRDC should conduct a regular audit of investment in RD&E in order to address this area of need.

2.37 In addition to RD&E investment data, the Committee believes that information on the status of wild fisheries stocks and ecosystems, recreational fishing statistics, and industry statistics – must all be improved to support good decisions about fisheries management,

31 Dr Ilona Stobutski, ABARES, *Committee Hansard*, 12 September 2012, p.9.

aquaculture development and consumer product choice. These areas of reporting are the topics of other recommendations within this report.

- 2.38 Furthermore, it is essential that these areas of reporting are coordinated so that they provide a comprehensive suite of information that can be relied upon by the industry, the general public, and governments.

Recommendation 1

- 2.39 **The Committee recommends that the Fisheries Research and Development Corporation conduct and publish an annual audit of total national investment in fisheries and aquaculture research, development and extension.**

Fisheries

- 3.1 Our understanding of fisheries management and the surrounding marine environment has evolved over time. Although our scientific knowledge of fisheries and the ocean has vastly improved over the last few decades there are still data gaps. There are also challenges in how the data is used to inform management and policy decisions, including in how we manage the environmental impacts of fishing. How scientific research priorities are determined and how to gather the skills necessary to complete this work is an additional challenge faced by the sector.
- 3.2 This chapter focuses on the relationship between science and key fisheries management challenges, including:
- gathering information on fish species;
 - measuring fish stocks;
 - measuring the sustainability of the marine environment;
 - managing uncertainty and the precautionary principle;
 - marine protected areas;
 - recreational fishing;
 - the effects of climate change and scientific responses; and
 - research and public education relating to fisheries science, including the demand for research, maximising capacity and developing priorities.
- 3.3 The legislative framework and governance arrangements behind these areas are dealt with in Chapter 6. International cooperation and aid in fisheries science and management is discussed separately in Chapter 5.

Science and fisheries management

Gathering information on fish species

- 3.4 Science in fisheries begins with acquiring basic taxonomic information about fish and their habitats. This includes accurate species identification; understanding variables affecting the distribution and abundance of fish and their larvae; knowledge of life histories; knowing prey and predator dynamics and understanding phylogenetics (evolutionary relationships among groups of organisms).¹
- 3.5 ‘Accurate species identification is fundamentally important to effective fisheries management and aquaculture,’ the Australian Museum submitted.²
- 3.6 A submission from the Western Australian Museum observed that what can appear to be one species of fish may actually be several species and ‘each of these species might require different management practices or habitat protection, which would be overlooked without accurate taxonomy.’³ Mr Neil Stump (Tasmanian Seafood Industry Council) said:
- There needs to be recognition that there should be ongoing investment in base level science. ... We have to know life history characteristics and population dynamics of different fish species.⁴
- 3.7 Dr Jeffrey Leis (Australian Museum) said that understanding the spatial distribution of larvae needs similar attention; otherwise there is no certainty species can properly replenish:
- The young may recruit into seagrass beds in estuaries and then move as juveniles out onto reefs, where the adults complete their lifecycle and spawn again. So each one of those habitats has to be in good condition, otherwise the species cannot complete their lifecycle and we will not have sustainable fisheries.⁵
- 3.8 Dr Leis added that without adequate knowledge, there is a risk of ‘lumping’ separate species together as one, which in turns risks ‘not

1 Australian Museum, Submission 5, pp.3-4; see also Australian Marine Sciences Association, Submission 14, p.2.

2 Australian Museum, Submission 5, p.2; see also AMSA, Submission 5, p.2.

3 Western Australian Museum, Submission 3, p.1.

4 Mr Neil Stump, *Committee Hansard*, 12 July 2012, p.55.

5 Dr Jeffrey Leis, *Committee Hansard*, 20 August 2012, p.13.

getting the fisheries management plans right' and of falling short on the responsibility to have 'carriage for biodiversity'.⁶

Measuring fish stocks

- 3.9 For the fishing industry, fisheries managers and government regulators reliable fish stock information is vital.
- 3.10 The importance of good quality information was captured well by Mr Neil Stump (Tasmanian Seafood Industry Council), who said:
- We always require more knowledge and better tools that allow us to make more accurate, informed, decisions in relation to the stock assessment process.⁷
- 3.11 The CSIRO submitted that Australia 'has a strong and proven capability in modelling and assessment of fisheries that is being replicated around the world.'⁸ However, the CSIRO also stated that scientific knowledge and investment 'varies considerably across species and fisheries'⁹ depending on economic value or conservation status.¹⁰
- 3.12 The Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) currently produces an annual fishery status report for fisheries in Commonwealth waters. This report provides a measure of sustainability and, in a general sense, performance against the objectives of the *FM Act*.¹¹ However, this report does not include data on State and Territory fisheries. ABARES informed the Committee that there will be a consolidated stock report for all Australian fisheries released for the first time in 2012.¹²
- 3.13 The States and Territories produce separate stock or status reports for fisheries within their own waters. The type and frequency of these reports vary, and the large data gathering task means that the quality of information is sometimes poor. For example, NSW reports performance information every two years for individual fish species targeted by recreational and commercial fishers in NSW-managed waters. The latest report, for 2008-09, found that of 108 species assessed, around one third of

6 Dr Jeffrey Leis, *Committee Hansard*, 20 August 2012, p.13.

7 Mr Neil Stump, *Committee Hansard*, 12 July 2012, p.55.

8 CSIRO, Submission 23, p.6.

9 CSIRO, Submission 23, p.6.

10 CSIRO, Submission 23, p.6.

11 ABARES, 'Fishery Status Reports 2010: Status of Fish Stocks Managed by the Australian Government', October 2011, p.1 and p.28.

12 Dr Ilona Stobutzki, *Committee Hansard*, 12 September 2012, p.9.

species are fully fished (or less) and 11 species were classified as being overfished.¹³ Half were 'undefined or uncertain', which was attributed to:

...the large number of species required to be assessed (greater than 100), the limited resources available to do assessments, difficulties with the proper identification and correct reporting of many closely related and little studied species, and the ongoing need for detailed biological studies for many species.¹⁴

- 3.14 Western Australia, by contrast, annually reports performance for individual fisheries as well as assessments of ecological assets within bioregions, to demonstrate performance against an EBFM framework. Greater than 90 per cent of its commercial fisheries met performance targets in the 2010-11 period.¹⁵ The information in the report also satisfies reporting requirements for *EPBC Act* assessments in accordance with SEWPaC's 'Guidelines for the Ecologically Sustainable Management of Fisheries'.¹⁶
- 3.15 Dr James Findlay (AFMA) said Australia's fisheries management system is 'the envy of much of the world'¹⁷, in part, due to fish stock data being used in complex modelling. He outlined the general modelling process for the Committee:

We rely on fisheries-dependent information – that is, information we get from the fishers themselves – as well as fisheries-independent information, so surveys and other data. Increasingly these days there is a reliance on remotely sensed data. That information is put into reasonably complex risk models to give us scenario-based planning exercises that say how much fish will deliver how much return at how much risk to the future productivity of the stock. We follow that very closely.¹⁸

13 NSW Department of Industry and Innovation, 'Status of Fisheries Resources in NSW 2008-09', February 2011, pp.v-vi.

14 NSW Department of Industry and Innovation, 'Status of Fisheries Resources in NSW 2008-09', February 2011, pp.vi. The report cautioned that while a species' status may be uncertain, this should not be presumed to mean overfishing, 'as many of the species are landed in very small quantities', though nor to mean lightly fished, 'until sufficient information is available'.

15 'WA Department of Fisheries, 'State of the Fisheries and Aquatic Resources Report 2010/11', August 2011, p.6.

16 SEWPaC, 'Guidelines for the Ecologically Sustainable Management of Fisheries', (Edition 2), p.4.

17 Dr James Findlay, *Committee Hansard*, 30 May 2012, p.11.

18 Dr James Findlay, *Committee Hansard*, 30 May 2012, p.13.

- 3.16 Dr Patrick Hone (Fisheries Research and Development Corporation - FRDC) argued that the strength of the science is closely related to high standards of fisheries management:

The science platform that Australia has is very good. It supports a very sustainable industry. There is no doubt that the science and the sustainability are in step – it is a very close partnership. We live in a very different industry from a lot of industries. We work in a public resource. We are under scrutiny every day of our lives. The science plays a very important part of that scrutiny. You cannot have fisheries management without science.¹⁹

- 3.17 Despite Australia being generally recognised as a world leader in fisheries science, Professor Euan Harvey (UWA Oceans Institute) told the Committee that in some areas of fisheries science there are gaps and in other areas there is almost zero knowledge. He said:

We are still at a point of discovery even with things like fish. We are still trying to figure out the distribution of some of those species and there are huge gaps in fundamental biology such as age and growth and having an understanding of diet. That is just for the target species.²⁰

- 3.18 He said that for many non-target species of fish, 'we have virtually zero knowledge, except people know they occur'.²¹ Professor Harvey said knowledge of habitats was also limited:

We are also at the point where we do not understand what the habitat requirements are of those different species at different life stages. ... Even for many of the key target species, we still do not know where they are recruiting.²²

- 3.19 The CSIRO's submission noted that one predominant gap of knowledge is the recreational fishing catch, which 'remains highly uncertain for many species, though in some cases it is known to be significant.'²³ (Recreational Fishing is discussed in more detail later in this chapter).

- 3.20 The Institute of Marine and Antarctic Studies (IMAS) submitted that at the level of individual species, 'scientific knowledge tends to be limited to biological information used for setting regulations that protect

19 Dr Patrick Hone, *Committee Hansard*, 20 June 2012, p.9.

20 Prof Euan Harvey, *Committee Hansard*, 9 July 2012, p.22.

21 Prof Euan Harvey, *Committee Hansard*, 9 July 2012, p.22.

22 Prof Euan Harvey, *Committee Hansard*, 9 July 2012, p.22.

23 CSIRO, Submission 23, p.5; see also JCU, Submission 28, p.2.

reproduction.’²⁴ IMAS also commented that ‘many stocks of fish aren’t included in Australian fisheries statistics because they are not targeted.’²⁵

- 3.21 IMAS also argued that reliance on catch data, though widely used to infer the abundance of fish is a ‘mistake’, because environmental changes can have a ‘profound effect on abundance’.²⁶ Further, IMAS submitted that catch rates are more likely linked to market conditions rather than necessarily the status of fish stocks:

Stability of wild total catch is widely interpreted to mean that the opportunity for producing food from wild harvests has reached its peak. This ignores the economic drivers of catch and the fact that many Australian fisheries have reduced catch over the last few decades in response to declining prices.²⁷

- 3.22 However, Dr Mike Hall (Australian Institute of Marine Science – AIMS) commented that fisheries management is always based around models and estimates because, essentially, ‘you are trying to predict population size for an organism you cannot really see at all or count very easily.’²⁸
- 3.23 Professor Michael Harte (World Wildlife Fund – WWF) said that ideally, there would eventually be ‘a real-time indication of what has been caught’. This would support active fisheries management; however, ‘we do not have that kind of sophisticated data collection at the moment’, he said.²⁹

Measuring the sustainability of the marine environment

- 3.24 In addition to considering the quantity of fish available for sustainable harvest, fisheries managers consider the broader state of the environment when setting catch limits.
- 3.25 The Committee heard of the importance of collecting broader environmental data, but also of challenges faced in collecting this data and then using it to implement ecosystems based management approaches.

24 IMAS, Submission 27, p.5.

25 IMAS, Submission 27, p.13.

26 IMAS, Submission 27, p.4.

27 IMAS, Submission 27, p.3.

28 Dr Mike Hall, *Committee Hansard*, 31 July 2012, p.6.

29 Prof Michael Harte, *Committee Hansard*, 29 June 2012, p.28.

- 3.26 DAFF's submission stated that 'the systematic collection of data is fundamental to understating and managing Australia's fisheries and their interactions with the environment'³⁰.
- 3.27 However, DAFF's submission also states that 'routine monitoring of marine ecosystems, particularly the biological components, is not undertaken in Australia'³¹. DAFF explained that indirect 'ecosystems effects' of fishing are often difficult to assess because marine ecosystems are highly complex and there is relatively sparse data, combined with limited understanding of the structure and function of these ecosystems'.³²
- 3.28 According to the WWF, 'the questions addressed by fisheries science now relate to whole regional ecosystems rather than single species'.³³ Consequently:
- This involves understanding and responding to both the ecosystem conditions that may affect fish stocks and their productivity and the effects of fishing activities on marine ecosystems.³⁴
- 3.29 The CSIRO concurred, submitting that the movement to ecosystem approaches to fisheries management has:
- ...shifted the science focus towards, on the one hand, understanding the broader ecological impacts of fishing, and on the other to improving of the role that biodiversity and ecosystem function might play in supporting fisheries production.³⁵
- 3.30 Dr Anthony Smith (CSIRO) referred to 'the so-called shifting baselines' within the state of the environment. He explained:
- Over periods of decades and even centuries, we know that our ecosystems are changing. Species mixes are changing. ... It is a dynamic environment. Our assessment methods are trying to take that into account. ... For good fisheries management it is going to need to be more flexible to be able to take account of those shifts that are happening spatially.³⁶

30 DAFF, Submission 24, p.3.

31 DAFF, Submission 24, p.3.

32 DAFF, Submission 24, p.1.

33 WWF, Submission 11, p.1.

34 WWF, Submission 11, p.3.

35 CSIRO, Submission 23, p.5.

36 Dr Anthony Smith, *Committee Hansard*, 12 July 2012, pp.13-14.

- 3.31 Tracing these baselines inserts a new layer of difficulty into fisheries management. 'In terms of understanding the shifts, we are at an early stage of that,' Dr Smith said.
- 3.32 Some witnesses were of the view that even though more knowledge would ideally be useful, scientific effort will need to be prioritised because available resources are not limitless.
- 3.33 Neil Loneragan and Alan Lymbery, from the Murdoch University Centre for Fish, Fisheries and Aquatic Ecosystem Research, submitted:
- The commercial sector faces declining returns... This reduces the funds available from the commercial industry to contribute to research and this places a priority on the science being targeted and cost-effective.³⁷
- 3.34 Mr Richard Stevens (WA Fishing Industry Council – WAFIC) stated: 'The industry's capacity to fund research and science is declining.'³⁸ The WWF similarly agreed that industry's capacity to fund research is 'limited'.³⁹
- 3.35 Mr Brian Jeffriess (Commonwealth Fisheries Association – CFA) went further in stating that the requirements of the *EPBC Act* are 'taking money away from straight scientific research' related to improving productivity.⁴⁰
- 3.36 The costs involved in measuring fish stocks and ecosystem impacts have been known for some time. As early as 1998-99 AFMA stated in its Annual Report that:
- Neither the Government nor the fishing industry has the capacity to fund the amount of research required to gain a full understanding of fish stocks and the marine ecosystem, if indeed that is possible.⁴¹

Managing uncertainty and the precautionary principle

- 3.37 During the inquiry, there was debate surrounding the costs and benefits of the precautionary principle and its effects on the fishing industry. Questions surrounding whether the appropriate level of precaution is being factored into management decisions has also been the subject of extensive public scrutiny and media attention.

37 Centre for Fish, Fisheries and Aquatic Ecosystem Research, Submission 8, p.1.

38 Mr Richard Stevens, *Committee Hansard*, 9 July 2012, p.7.

39 WWF, Submission 11, p.3.

40 Mr Brian Jeffriess, *Committee Hansard*, 20 August 2012, p.18.

41 AFMA, 'Annual Report 1998-99', p.9.

3.38 In 2005, the United Nations Educational, Scientific and Cultural Organisation (UNESCO) commissioned a group of experts to draft a new form of precautionary principle.⁴² A new form of words for a 'working definition' was proposed, as follows:

When human activities may lead to morally unacceptable harm that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm.

Morally unacceptable harm refers to harm to humans or the environment that is:

- threatening to human life or health, or
- serious and effectively irreversible, or
- inequitable to present or future generations, or
- imposed without adequate consideration of the human rights of those affected.

The judgement of plausibility should be grounded in scientific analysis. Analysis should be ongoing so that chosen actions are subject to review. Uncertainty may apply to, but need not be limited to, causality or the bounds of the possible harm. Actions are interventions that are undertaken before harm occurs that seek to avoid or diminish the harm. Actions should be chosen that are proportional to the seriousness of the potential harm, with consideration of their positive and negative consequences, and with an assessment of the moral implications of both action and inaction. The choice of action should be the result of a participatory process.⁴³

3.39 Within Australia the precautionary principle was defined within the *Intergovernmental Agreement on the Environment*, which was agreed on 1 May 1992 by the Australian Local Government Association, the States, Territories and the Australian Government.⁴⁴

3.40 The same definition was included in the *FM Act* and *EPBC Act*, as:

'If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a

42 UNESCO Commission on the Ethics of Scientific Knowledge and Technology, *The Precautionary Principle* (UNESCO, Paris, 2005).

43 UNESCO Commission on the Ethics of Scientific Knowledge and Technology, *The Precautionary Principle* (UNESCO, Paris, 2005), p.14.

44 *National Environment Council Protection Act 1994*, schedule, clause 3.5.1.

reason for postponing measures to prevent environmental degradation.⁴⁵

- 3.41 Other related Australian policy documents have elaborated on the definition and application of the precautionary principle, including: the 1998 Oceans Policy, the 2007 Harvest Strategy Policy; and the 2007 Guidelines for the Ecologically Sustainable Management of Fisheries.
- 3.42 The 1998 Oceans Policy added the following caveats to the application of the precautionary principle. Firstly:
- If the potential impact of an action is uncertain, priority should be given to maintaining ecosystem health and productivity.
- 3.43 Secondly:
- If there is a risk of serious and irreversible environmental damage resulting from an ocean use, that use should be permitted only if the damage can be mitigated, or it is limited in its extent, and there is an overriding net community benefit from the use.
- 3.44 And lastly:
- Ocean users carry a responsibility to assure the ecological sustainability of their operations and an obligation to identify and implement precautionary measures.⁴⁶
- 3.45 When released, the 2007 Harvest Strategy Policy was prefaced with the following statement:
- By its nature, fisheries management is an activity involving substantial elements of risk and uncertainty. ...it is necessary to develop a consistent framework which will deliver an evidence-based, precautionary approach to achieving long-term sustainability and profitability drawing on available information.⁴⁷
- 3.46 The 2007 Guidelines for the Ecologically Sustainable Management of Fisheries appeared to express less latitude when uncertainty arises:
- Sources of uncertainty within the data should be identified and where possible quantified. Until research on the specific stock provides information, a precautionary approach should set

45 *Fisheries Management Act 1991*, s.3A; *Environment Protection and Biodiversity Conservation Act 1999*, s.3A.

46 Australian Government, 'Australia's Oceans Policy: Vol. 1', 1998, pp.38-39.

47 DAFF, 'Commonwealth Fisheries Harvest Strategy: Policy and Guidelines', September 2007, p.2.

conservative limits to account for the unknown level of uncertainty.⁴⁸

- 3.47 The precautionary principle is either replicated or referred to in all state and territory legislation (although there are differences within the exact text used). In two cases, the precautionary principle has been expressly modified from its original form: WA's *Fish Resources Management Act 1994* confines the principle to 'cost effective measures to ensure the sustainability of fish stocks or the aquatic environment'⁴⁹ and Queensland's *Fisheries Act 1994* expanded the principle to cover the risk of 'possible environmental degradation'.⁵⁰ Other areas of common ground were the objectives of achieving optimum resource benefits or utilisation, ensuring equity of access or allocations (with consideration of relevant interests) and protecting biodiversity and or ecosystems. Some jurisdictions⁵¹ included an objective regarding safeguarding the wellbeing of future generations. The Tasmanian *Living Marine Resources Act 1995* was to some extent an exception; although having regard for various objectives; the only mandatory aim is the furtherance of 'the objective of resource management.'⁵²
- 3.48 Despite the long history and documentation of the precautionary principle in Australia, some witnesses argued that the concept was subjective or that governments have been applying excessive restrictions and limits on fishing activity. There was concern that the level of evidence required to prove minimal impact is unattainable and too costly, even though Australia's fisheries are acknowledged as having the highest management standards.
- 3.49 Dr Warwick Fletcher (WA Department of Fisheries) said the precautionary principle could be a subjective concept:

You can set precautionary levels of consequence within your risk analysis and then actually undertake it under that rate. For many things you do not have to have absolute, full certainty to do all these things. ...I think that in many respects that precautionary approach or precautionary principle has been somewhat changed through time to mean whatever someone wants it to mean.⁵³

48 SEWPaC, 'Guidelines for the Ecologically Sustainable Management of Fisheries', (Edition 2), p.2.

49 *Fish Resources Management Act 1994* (WA), s.4A.

50 *Fisheries Act 1994* (Qld), s.3.

51 Queensland, Western Australia, New South Wales and Victoria.

52 *Living Marine Resources Act 1995* (Tas) s.7.

53 Dr Warwick Fletcher, *Committee Hansard*, 9 July 2012, p.55.

- 3.50 The Australian Marine Science Association's submission that good science was necessary to avoid 'overly conservative and risk-averse management decisions' or 'poorly informed management decisions'.⁵⁴ Its submission also predicted that future fisheries management would encompass an even higher level of risk management, due to 'cumulative anthropogenic disturbances in coastal ecosystems' and 'impacts related to climate change.'⁵⁵
- 3.51 Dr Walter Starck (private capacity) said that the precautionary principle 'has sort of morphed into the idea that if there is any hypothetical objection then you cannot do anything until you can prove that there is no problem.'⁵⁶ He said that management processes should be 'empirically based', and include direct industry involvement, 'not just consultation'.⁵⁷
- 3.52 Mr Richard Stevens (WAFIC) said:
- If it is over-precautionary then business just cannot invest. They cannot keep doing these endless surveys and studies, when your regulators say, 'Well, do it, and then we'll have a look,' and then, five years later, 'Do it again and we'll have another look.'⁵⁸
- 3.53 Mr Dean Logan (Australian Marine Alliance) agreed and went further by stating:
- Fisheries management is, in our view, somewhat sidelined. I think the process has been controlled – and I do not say this lightly – by environmental ideologues in departments here in Canberra who are so far removed from the notion of primary production that it is scary.⁵⁹
- 3.54 Dr Starck concluded that Australia is effectively saving fish 'for the Asians to catch and sell back to us.'⁶⁰ Professor Bob Kearney said overfishing in Australian waters is a perception:
- There are very, very few fisheries that are seriously overfished. ... We have not had one that has been fished to a level where it has not recovered. And the government is responsible for making

54 AMSA, Submission 14, p.8.

55 AMSA, Submission 14, p.3.

56 Dr Walter Starck, *Committee Hansard*, 31 July 2012, p.29.

57 Dr Walter Starck, *Committee Hansard*, 31 July 2012, p.30.

58 Mr Richard Stevens, *Committee Hansard*, 9 July 2012, p.13.

59 Mr Dean Logan, *Committee Hansard*, 29 June 2012, p.16.

60 Dr Walter Starck, *Committee Hansard*, 31 July 2012, p.31.

them recover. We already have all of those steps in place and all of that legislation there.⁶¹

3.55 And, he argued, fisheries is subject to far tighter laws than land-based agriculture:

Wild caught fisheries do not start like agriculture does by clearing the land, introducing foreign species... There is not a single agriculture industry in Australia that would be allowed to operate if it had to operate under the conditions of the *FM Act*.⁶²

3.56 WWF submitted that there is 'considerable uncertainty attached too much of the scientific advice provided to stakeholders and managers.' WWF was concerned that 'management responses are delayed pending the delivery of scientific advice or the resolution of some of the uncertainty in that advice.'⁶³

3.57 Professor Michael Harte (WWF) explained that without active management, the industry could be unprepared for changing conditions:

It does not matter where the source of those changes comes from – whether they are human induced, fishing induced or whether they are environmentally induced in the broader sense, beyond our control, perhaps – we really have to understand the role of uncertainty and ensure that our systems are robust and resilient in the face of that uncertainty, otherwise we will be caught out by surprise.⁶⁴

3.58 He said that in practice, 'the largest impacts on the reef may not be fishing' and fishing and aquaculture operations need to respond accordingly.⁶⁵ He said these could be 'pollutants from agriculture just being washed off the land'. In one case:

When I chaired the aquaculture council in New Zealand, there was a very rich oyster-growing area near Whangarei that unfortunately was closed down because of effluent run-off from septic tanks. It was nothing to do with fishing but the response had to be to close that sector down because it no longer met the health requirements

61 Prof Bob Kearney, *Committee Hansard*, 29 June 2012, p.19.

62 Prof Bob Kearney, *Committee Hansard*, 29 June 2012, p.21.

63 WWF, Submission 11, pp.4-5.

64 Prof Michael Harte, *Committee Hansard*, 29 June 2012, p.26.

65 Prof Michael Harte, *Committee Hansard*, 29 June 2012, p.26.

for safe seafood. That was not the fault of the fishermen. They had done nothing wrong. They actually had excellent practices.⁶⁶

3.59 Ms Tooni Mahto (Australian Marine Conservation Society) said:

I understand that funding is limited, and I understand that it is very limited in state fisheries, but we do not believe it is not an acceptable situation to effectively say, 'Because there's no funding and it's a low-value fishery, we'll just keep on going with our fingers crossed.' We absolutely believe that good science is the foundation of good fisheries management.⁶⁷

3.60 In the view of her organisation, Ms Mahto said that in cases, at a state level, there had been undue 'influence' on fisheries managers that have raised a 'barrier to effective management of the resource'. There should be 'valuable stakeholder engagement in fisheries management, rather than fisheries management being led predominantly by vested interests of certain groups,' she said.⁶⁸

Marine protected areas

3.61 Issues around Marine Protected Areas (MPAs) were raised by many submissions and witnesses. The Committee heard that despite their long history internationally and in Australia much controversy remains about the rationale and value of MPAs.

3.62 The definition of an MPA is:

an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources, and managed through legal or other effective means.⁶⁹

3.63 This definition was originally developed by the 1994 World Conservation Union's (IUCN) and has since been adopted by Australia.

3.64 The concept of MPAs was endorsed in Australia's 1998 Oceans Policy and the legal framework was established in 1999 through the *EPBC Act*.

66 Prof Michael Harte, *Committee Hansard*, 29 June 2012, p.26.

67 Ms Tooni Mahto, *Committee Hansard*, 15 August 2012, p.11.

68 Ms Tooni Mahto, *Committee Hansard*, 15 August 2012, p.11.

69 SEWPaC, 'Marine Protected Areas', at <http://www.environment.gov.au/coasts/mpa/about/index.html>

3.65 Australia's target date for a fully representative system of MPAs is 2012.⁷⁰

3.66 The relationship between productivity from the oceans and bioregional planning was highlighted in the 1998 Oceans Policy:

The collapse of a number of major marine ecosystems and fisheries resources in the northern hemisphere, with the associated economic damage and social dislocation, is a stark warning of the vulnerability of marine systems. ...we are not immune from such threats. ... The Commonwealth's commitment to integrated and ecosystem-based planning and management will be implemented through the introduction of a major Regional Marine Planning process.⁷¹

3.67 Mr Stephen Oxley (SEWPaC) outlined the background of MPAs (or marine reserves) for the Committee:

...bioregionalisation, which essentially divides our marine environment into areas that essentially have the same ecological processes or ecosystems, is the foundation on which the marine reserves network is being established. Then we have worked the lessons we learned from the creation of the south-east marine reserves network in the mid-2000s to develop and then publish in 2007 the goals and principles for the establishment of the National Representative System of Marine Protected Areas in Commonwealth waters.⁷²

3.68 SEWPaC's website states that bioregional plans have a threefold purpose:

- support strategic, consistent and informed decision-making under Commonwealth environment legislation in relation to Commonwealth marine areas;
- support efficient administration of the *EPBC Act* to promote the ecologically sustainable use of the marine environment and its resources; and
- provide a framework for strategic intervention and investment by government to meet policy objectives and statutory responsibilities.⁷³

70 SEWPaC, 'National Representative System of Marine Protected Areas', at <http://www.environment.gov.au/coasts/mpa/nrsmpa/index.html>

71 Australian Government, 'Australia's Oceans Policy: Vol. 1', 1998, p.11.

72 Mr Stephen Oxley, *Committee Hansard*, 19 September 2012, p.1.

73 SEWPaC, 'Marine Bioregional Planning', at <http://www.environment.gov.au/coasts/marineplans/index.html>

3.69 MPAs should also yield information and data for researchers in the future. A supplementary submission from SEWPaC explained:

A monitoring strategy is being developed for the management of the national Commonwealth marine reserves network. This monitoring strategy will enable the review of effectiveness of management in reserves over time. Monitoring of the marine environment is a challenging task, both scientifically and logistically.⁷⁴

3.70 This information and datasets will be made publicly available, which will allow open access to the science informing marine management.⁷⁵ Professor Euan Harvey (UWA Oceans Institute) commented that MPAs have a secondary benefit for scientific research by eliminating fishing pressure as a variable from areas under study.⁷⁶

3.71 Throughout the inquiry a number of witnesses made claims that the restraints imposed due to MPAs have been excessively precautionous, even when risks of fishing-related impacts appear exceedingly remote.

3.72 Mr Brian Jeffriess (CFA) said areas have been closed to fishing without basis and in ignorance of available information. He said:

Green parks are desirable in many ways, but where a fishery is absolutely no threat of any type to the ecosystem, why would it be excluded from that area?⁷⁷

3.73 Mr Jeffriess added: 'It is an ad hoc process... You try and explain that to a fisherman. They lose confidence and faith in the whole system.'⁷⁸

3.74 IMAS submitted that in practice, 'scientific knowledge is not commonly used to develop ecosystem and biodiversity indicators.' According to IMAS, 'there has been a long history of marine protected area monitoring in Tasmania,' yet 'the results of this monitoring have not been used in setting performance measures for protecting ecosystems or biodiversity.'⁷⁹

3.75 Professor Colin Buxton (IMAS) said MPAs are unnecessary:

If you have good fisheries management, which we argue is predominantly the case in Australia, then fisheries management is

74 SEWPaC, Submission 49.

75 SEWPaC, Submission 49.

76 Prof Euan Harvey, *Committee Hansard*, 9 July 2012, p.24.

77 Mr Brian Jeffriess, *Committee Hansard*, 20 August 2012, p.25.

78 Mr Brian Jeffriess, *Committee Hansard*, 20 August 2012, p.27.

79 IMAS, Submission 27, p.5.

usually based on ensuring that your spawning stock biomass is not below a certain level. If your spawning stock biomass is not below a certain level then there cannot possibly be any limitation on recruitment. That is the fundamental basis of all fisheries management. That is widely accepted through all of the scientific literature. So if you have that good fisheries management in place then you do not have a constraint of inadequate recruitment and therefore you do not expect the reserve to make any difference.⁸⁰

- 3.76 Mr Dean Logan (AMA) said the closing areas to fishing causes an effect that reverses the intended benefits:

If you look at the maps that have been proposed you will see that a lot of the best fishing grounds have been taken, which means that those who wish to stay in the industry will aggressively fish areas that they can fish a lot harder to get to the quotas that they need to put food on the table.⁸¹

- 3.77 Mr Richard Stevens (WAFIC) said: 'The problem is if you invest and then somebody dumps a giant marine park over it. Then all your investment is wasted.'⁸²

- 3.78 Mrs Judith Lynne (Sunfish Queensland) said that during consultation processes, people were asked where they catch fish. She said that subsequently, the best fishing areas were closed, 'which created a history of mistrust.'⁸³ She added that closing areas of value to fishers had led to apathy for the health of oceans:

Once upon a time there were fish habitat areas and reserves and everybody in the community knew the value that they had and the reason they were there. They were very conscious of it and looked after them extremely well. We now have areas that appear to have just been painted on a map only to make percentages and they have lost their value. People are not as concerned about looking after them.⁸⁴

- 3.79 Professor Bob Kearney (private capacity) said that MPAs are merely 'lines on the water' based on 'terrestrial' management models.⁸⁵ He said:

80 Prof Colin Buxton, *Committee Hansard*, 12 July 2012, p.48.

81 Mr Dean Logan, *Committee Hansard*, 29 June 2012, p.16.

82 Mr Richard Stevens, *Committee Hansard*, 9 July 2012, p.8.

83 Mrs Judith Lynne, *Committee Hansard*, 31 July 2012, p.15.

84 Mrs Judith Lynne, *Committee Hansard*, 31 July 2012, p.16.

85 Prof Bob Kearney, *Committee Hansard*, 29 June 2012, p.23.

The concept of area management of that sort came from forestry, where you are dealing with sedentary, non-mobile stress in an area that you can draw a line around and control. ... But it has no relevance, really, to the marine environment.⁸⁶

- 3.80 However, Mr Stephen Oxley (SEWPaC) told the Committee that science has been central to the creation of MPAs:

That scientific foundation has its genesis in the 1990s and a national endeavour involving major research institutions such as the CSIRO, Geoscience Australia and a number of universities and museums around Australia to create, over several iterations, what has become known as the integrated marine and coastal bioregionalisation of Australia.⁸⁷

- 3.81 Professor Kingsford (James Cook University) gave evidence in support of the science behind marine reserves, in particular the 'spill over' effects they generated, stating that:

'there was is demonstrable proof which has been refereed by scientists in different parts of the world, so it is not, as was said, pretty much a bunch of hippies coming up with an eco-argument on this. It is based on really good science. It is quite clear that you can see that the blue zones are doing better as a result of having green zones nearby.'⁸⁸

- 3.82 However, Mr Oxley recognised that MPAs are not necessarily a 'panacea', with other fisheries management tools also being utilised to enhance conservation.

- 3.83 Mr Oxley also acknowledged that MPAs have 'impacts on people, communities, businesses and families', making the subject 'a highly contested space'. However, consultation has been extensive, he said, involving 245 meetings, 1,953 people and a large quantity of submissions over a three-year period.⁸⁹

- 3.84 He pointed out that not all MPAs will necessarily result in total closure:

They allow for a range of different activities. The extent to which those activities are allowed is determined firstly in terms of the risk they pose to the biodiversity values within them. We have

86 Prof Bob Kearney, *Committee Hansard*, 29 June 2012, p.23.

87 Mr Stephen Oxley, *Committee Hansard*, 19 September 2012, p.1.

88 Professor Kingsford, *Committee Hansard*, 31 July 2012, pp 24.

89 Mr Stephen Oxley, *Committee Hansard*, 19 September 2012, pp.4-5; SEWPaC, Submission 49.

done some risk assessment work in that regard, but there is also a socioeconomic consideration that is taken into account.⁹⁰

3.85 Mr Oxley added that management plans within MPAs are subject to a ten-year statutory lifespan and there would be a new opportunity to review arrangements.⁹¹ The Australian Government is also offering 'case-by-case decisions on adjustment assistance' to people affected by the creation of MPAs, an update of the same policy used in 2004 when the first tranche of MPAs were established in the south-east bioregion.⁹²

3.86 The Committee informed Mr Oxley that other witnesses had described MPAs as flawed for being akin to terrestrial approaches of management. Mr Oxley responded:

As for this transposition of terrestrial models into the marine environment, my observation is that the spatial management of the marine environment is something that demonstrably works.⁹³

3.87 Within the Great Barrier Reef Marine Park, he said, there has been a biomass increase, although he emphasised that benefits in other cases can vary depending on the circumstances. He commented that 'fisheries management extensively uses spatial management as a way of effectively managing fisheries'.⁹⁴

3.88 SEWPaC has advised the Committee that a national monitoring strategy is currently under development to evaluate marine ecosystem health and the marine reserves network. The monitoring strategy is being developed over several years from 2011 to 2014, and the following three outcomes are anticipated:

- A considered understanding of the data requirements for managing a network of Commonwealth Marine Reserves including how to mobilise national capacity to provide the required data;
- A considered understanding of the data requirements to evaluate and report on national marine ecosystem health including how to mobilise national capacity to provide the required data (especially with the Integrated Marine Observing System and National Plan for Environmental Information); and

90 Mr Stephen Oxley, *Committee Hansard*, 19 September 2012, p.5.

91 Mr Stephen Oxley, *Committee Hansard*, 19 September 2012, p.6.

92 Australian Government, 'Fisheries Adjustment Policy: Supporting the Creation of Commonwealth Marine Reserves' [undated], p.1 and p.3.

93 Mr Stephen Oxley, *Committee Hansard*, 19 September 2012, p.5.

94 Mr Stephen Oxley, *Committee Hansard*, 19 September 2012, p.5.

- Access to the relevant data analyses (within limits of existing data) to report on national-scale marine ecosystem health for input to the 2016 State of Environment report.⁹⁵

Committee comment

- 3.89 The Committee heard evidence that there has been a concerted effort in recent decades to improve fisheries science and management around Australia. Australia's fisheries science and management is now held in very high esteem around the world due to the efforts to move to more sustainable yields; development of a more sophisticated industry; and working towards ecosystems-based management. These changes have been significant, and not without controversy, but they have also improved the long term viability of our fisheries industry and the environment on which the industry depends.
- 3.90 Despite the relatively high standard of fisheries science and management in Australia, more still needs to be done.
- 3.91 This section provides the Committee's views in the areas of:
- The adequacy of measuring and reporting of fish stocks and environmental sustainability;
 - how uncertainty is managed and the precautionary principle applied; and
 - ensuring our marine park system contributes to world leading science.

Measuring and reporting of fish stocks and environmental sustainability

- 3.92 The Committee heard that good fish stock data is important for better fisheries management and better policy decisions. However, the first nationwide fish stock report will only be released later this year, and may still show a range of areas where data is lacking.
- 3.93 The Committee also heard that fish stock data is only part of the picture, and that assessing the environmental impacts of fishing and the sustainability of marine ecosystems is also necessary.
- 3.94 In the past, the fishing industry focused on financial returns and management of a resource; but today environmental objectives require management of ecosystems and habitats. Managing environmental impacts are integral to industry's financial returns both in terms of meeting regulatory requirements and satisfying consumers' demand for
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more information about the sources of their food, how it is harvested, and its overall sustainability.

- 3.95 The ecosystems based management approach has been a central part of Australian fisheries management for more than a decade, and is included in foundational documents such as the 1998 Oceans Policy.
- 3.96 However, the impetus to achieve higher levels of sustainability has placed increasing pressure upon fisheries managers and the industry. Substantial amounts of time and money are being invested in data collection and analysis to minimise impacts on surrounding ecosystems and to demonstrate sustainability.
- 3.97 During the inquiry witnesses commented on the additional data, analysis and reporting costs involved in collecting stock information and measuring sustainability. They also commented that the funding for this work is limited. The Committee heard that priorities need to be set and that pragmatism is needed to place limits on the desire to gain a 'perfect' understanding of the marine environment.
- 3.98 The Committee agrees that tough decisions need to be made on research priorities to fit within constrained budgets, but which also still support good decision making.
- 3.99 However, by taking a 'whole of system' approach to fisheries management this will ultimately support the ongoing viability of the industry and also improve sustainability outcomes and hopefully help to grow the future fishing industry.
- 3.100 The work towards a better understanding of the environment in which we fish will continue, and the Committee encourages all stakeholders to contribute.
- 3.101 However, a critical step is to gain a reliable consolidated national picture of fish stocks. The Committee therefore looks forward to the ABARES consolidated stock report expected later this year. This report needs to be made a regular publication, and supported with adequate funding to ensure it is comprehensive and can be relied upon by all stakeholders. It could then be expanded over time to include more detail on ecosystem sustainability and other issues as relevant.
- 3.102 Publication of a consolidated stock report for all Australian fisheries will complement existing publications and other publications recommended for production by the Committee in other chapters of this report. Together the reports will provide a full suite of national reporting on fisheries and aquaculture.

Recommendation 2

- 3.103 **The Committee recommends that the Australian Government continue to publish a consolidated stock report for all Australian fisheries on a regular basis, after the initial publication of such a report in 2012, in consultation with State and Territory governments.**

Uncertainty and the precautionary principle

- 3.104 During the inquiry, there was debate surrounding the costs and benefits of the precautionary principle and its effects on the fishing industry. Questions surrounding whether the appropriate level of precaution has been factored into management decisions have also been the subject of extensive public scrutiny and media attention.
- 3.105 Despite the fact that the precautionary principle (as defined in the 'Rio Declaration' agreed at the 1992 United Nations Conference on Environment and Development) has been enshrined in Australian fisheries management policy and legislation for some two decades, there has been no universal agreement as to its definition.
- 3.106 It has been used to decide how we manage uncertainty and risk. Yet when a risk or uncertainty becomes clearer and is no longer a risk or uncertainty, this principle becomes redundant.
- 3.107 In the Committee's view, the precautionary principle should not be interpreted as requiring zero impact, as some evidence has suggested is occurring. If this were the case, the precautionary principle would be excessive, prohibitive and unworkable.
- 3.108 The Committee feels that the precautionary principle should only be used as a guideline that can balance the interests of all stakeholders and recognise that decisions under its name are larger than just environmental decisions, but are also about jobs and communities.
- 3.109 The Committee therefore encourages the Australian Government to develop a guideline, rather than new principle, to assist with the development of a new national regional policy statement for fisheries, aquaculture and recreational fishing.
- 3.110 Once this guideline is developed the Australian Government should take action to ensure the community understands the new approach and explain how it is applied.

Recommendation 3

- 3.111 **The Committee believes that precaution is about managing risk; and therefore recommends that a new guideline on precaution be developed with agreement and support of stakeholders, for inclusion in a new national regional policy statement for fisheries, aquaculture and recreational fishing.**

The science of MPAs

- 3.112 The Committee heard a diverse range of arguments during the inquiry regarding MPAs.
- 3.113 Despite the fact that the establishment of a system of protected areas has been supported by successive governments since 1992, and several consultation processes have been run, some stakeholders remain unsatisfied about the rationale for MPAs. Particular questions and debate remain on the linkages between restricting activity, fisheries management and scientific research benefits.
- 3.114 The Committee heard that whilst there might be benefits of MPAs for fisheries management, they are primarily tools of conservation. MPAs may also contribute to scientific research and improving our understanding of the oceans, but only if good quality science is prioritised.
- 3.115 If Australia is going to create one of the world's largest systems of marine parks, we need to make the most of the scientific opportunity this offers. Extracting good data as to the effectiveness or otherwise of MPAs is crucial to justifying their establishment and also ensuring they are robustly evaluated. Furthermore, this data will inform the establishment of MPAs around the world.
- 3.116 The Committee recognises that getting the science right takes time, effort and money. The Committee was informed that there is a multi-year work plan in place under the National Environmental Research Program which will culminate in data being published in a 2016 State of Environment report⁹⁶.
- 3.117 However, given the years that have passed in the development of marine reserve networks in Australia, and the stakeholder concern heard during

96 SEWPaC, Supplementary submission 49.1.

the inquiry, the Committee feels that additional efforts are needed to finalise the monitoring and evaluation strategy as soon as possible.

- 3.118 The monitoring and evaluation strategy needs to ensure that the value of MPAs is critically assessed. Once the value or otherwise of MPAs has been determined, the Australian community can then be fully informed when making decisions about whether to establish additional MPAs or potentially whether some environmental controls should be relaxed.

Recommendation 4

- 3.119 **The Committee recommends that the Australian Government expedite the creation and implementation of the monitoring and evaluation strategy for the national Commonwealth marine reserves network – to ensure that they are well managed and thoroughly evaluated, before consideration of any new MPAs domestically and globally. A timeline should be announced to show:**

- when a complete monitoring strategy will be in place;
- when a full evaluation will be completed; and
- when the findings of the evaluation will be implemented.

Recreational fishing

- 3.120 Recreational fishing is a popular activity in Australia. Despite the significance of the sector, the level of policy attention given to recreational fishing issues is comparatively less than for commercial activities. Information relating to recreational fishing activity is limited. Facts and figures that are available tend to be out of date.

- 3.121 The CSIRO's submission stated that the recreational catch 'remains highly uncertain for many species, though in some cases it is known to be significant.'⁹⁷ Dr Andrew Rowland (RecFish West) explained that unlike the commercial fishing industry, recreational fishers 'are not bound by statute to record our catches'.⁹⁸

97 CSIRO, Submission 23, p.5; see also JCU, Submission 28, p.2.

98 Dr Andrew Rowland, *Committee Hansard*, 9 July 2012, pp.30-31.

- 3.122 The last major survey of recreational fishing, the 'National Recreational and Indigenous Fishing Survey', published in 2003, used a mixture of telephone surveys, face-to-face interviews and self-reporting through diaries to estimate effort, catch and expenditure.⁹⁹
- 3.123 The Survey also alluded to the fact that for some species, recreational fishers may match or exceed the impact of commercial fishing.¹⁰⁰ Many recreational fishers use boats with electronic aids, allowing them to range further out to sea and more effectively locate fish.¹⁰¹ Boat sizes and technology continue to advance and evolve.
- 3.124 Recreational fishing is primarily managed by the States and Territories, including where recreational fishing occurs in Commonwealth waters. The Australian Government has scope to intervene through general powers of the *EPBC Act* and s.17(6)(h) of the *FM Act* (relating to fisheries management plans), though in practice refrains from directly managing recreational fishing. Mr Ian Thompson (DAFF) said:

The data about how much fish are taken in recreational fishing is limited. It is from surveys of people coming in and those sorts of things, so it is a bit patchy from time to time. Recreational fishing is almost exclusively managed by the states, and there is not a consistent national picture of recreational fishing take.¹⁰²

- 3.125 Dr Rowland suggested that to compliment surveys, recreational fishers could keep diaries - 'where they might record the length of the fish, where it was caught, the day, the tide and all those sorts of things.'¹⁰³
- 3.126 Mrs Judith Lynne (Sunfish Queensland) said that licensing and reporting for the recreational sector should be enhanced through licensing and standardised data collection:

We rely heavily on the limited data collection that government provides. The issue nationally is that there are some state based licensing systems. They are not all the same. ... Some do it species-wise; some do it as total fish; some do not collect any data at all. To be honest, this is one case where we believe that the

99 TAFI/DAFF, 'National Recreational and Indigenous Fishing Survey', July 2003, FRDC Project 99/158.

100 TAFI/DAFF, 'National Recreational and Indigenous Fishing Survey', July 2003, FRDC Project 99/158, p.23.

101 TAFI/DAFF, 'National Recreational and Indigenous Fishing Survey', July 2003, FRDC Project 99/158, pp.52-53.

102 Mr Ian Thompson, *Committee Hansard*, 12 September 2012, p.9.

103 Dr Andrew Rowland, *Committee Hansard*, 9 July 2012, pp.30-31.

Commonwealth should have an overarching guideline that says we require data collection and therefore require the states to have some form of licensing system to provide that level of data collection. We know it is an issue. We cannot see any way around it other than some form of reporting.¹⁰⁴

- 3.127 A further advantage of licensing recreational fishers would be the ability to generate revenue to fund scientific research relevant to the recreational sector. Mrs Judith Lynne (Sunfish Queensland) said that DAFF, FRDC and Fisheries Queensland prioritise science for commercial fishing, leaving development of recreational fishing a challenge when 'the science dollar is being spent elsewhere.'¹⁰⁵
- 3.128 These themes have been recognised, discussed and reviewed prior to this inquiry. In 2002, recreational fishing stakeholders issued the 'Coolangatta Communique' on recreational fishing in Commonwealth waters. The Communique identified the following key issues:
- recreational fishing resource allocation;
 - agreement on resource management arrangements;
 - a cost recovery mechanism to fund improved management; and
 - the need for research to estimate the recreational catch.¹⁰⁶
- 3.129 In 2011, an advisory committee on recreational fishing (formed in 2008 by the then-Minister for Fisheries, Forestry and Agriculture) completed a review of national recreational fishing policy entitled *Recreational fishing in Australia – 2011 and beyond: a national industry development strategy*. It highlighted two key issues:
- The first and most critical is the need for a nationally-coordinated approach to the funding of recreational fisheries programs and of the representation of recreational fishers. The second is the need for strong leadership and an effective well-resourced national recreational fisher representation and advocacy body.¹⁰⁷

104 Mrs Judith Lynne, *Committee Hansard*, 31 July 2012, p.15.

105 Mrs Judith Lynne, *Committee Hansard*, 31 July 2012, pp.14-15.

106 'The Coolangatta Workshop Communique', October 2002, at <http://www.daff.gov.au/fisheries/domestic/resource-sharing/framework/coolangatta>

107 Recreational Fishing Advisory Committee, 'Recreational Fishing in Australia – 2011 and Beyond: A National Industry Development Strategy', June 2011, p. 25.

- 3.130 The review also observed that there is not a consistent national approach to licensing or funding for research and development.¹⁰⁸

Committee comment

- 3.131 Recreational fishing is a very popular pastime in Australia and is a significant economic activity, with potential impacts in terms of environmental outcomes.
- 3.132 The Committee learnt that recreational fishers were becoming increasingly sophisticated in their approach, using modern technology to locate fish and increase their vessel range. This poses a challenge for how recreational fishing is governed, but technology could also be an opportunity to gather additional information on recreational fishing impacts. For example, fishing groups could encourage individual members to report information using phone applications or website-based interfaces to capture data in 'real time'.
- 3.133 Recreational fishing is governed by a combination of State, Territory and national environmental legislation. The powers within the *FM Act* have not been used to actively manage recreational fishing in Commonwealth waters.
- 3.134 There are also different standards and rules for licensing and data collection arrangements between Australian jurisdictions. This creates resource management challenges when information relating to the numbers of fishers and their catch is limited or out-dated.
- 3.135 The Committee believes that recreational fishing impacts and catches should be better understood, and its contribution to the economy more accurately estimated. The last comprehensive national survey of recreational fishing was in the early 2000s. The Committee has therefore recommended regular reporting on recreational fishing statistics. This is one among a number of areas of national reporting the Committee believes should be addressed, with several related recommendations made throughout this report.
- 3.136 Separately, COAG should discuss standardising recreational fishing licensing and rules and agreeing to a framework for data collection on recreational fishing activity, to assist with national reporting.

108 Recreational Fishing Advisory Committee, 'Recreational Fishing in Australia – 2011 and Beyond: A National Industry Development Strategy', June 2011, p. 25.

- 3.137 In addition, the current review of Commonwealth fisheries management legislation should consider whether the *FM Act* needs to be revised to facilitate the Australian Government engaging more readily in regulation and data collection of recreational fishing in Commonwealth waters.

Recommendation 5

- 3.138 **The Committee recommends that the Minister for Agriculture, Fisheries and Forestry work with State and Territory counterparts to commission a regular estimate of recreational fishing activity and impacts in Australia, with data and results published in a yearly consolidated report, using a nationally agreed data collection model.**

Recommendation 6

- 3.139 **The Committee recommends that COAG seek to harmonise, where there is agreement, recreational fishing licensing, rules and data collection.**

Recommendation 7

- 3.140 **The Committee recommends that the current review of Commonwealth fisheries management consider whether revisions to the *Fisheries Management Act 1991* are necessary to allow the Australian Government to more readily manage recreational fishing activity in Commonwealth waters.**

Climate change

- 3.141 Climate change was recognised by a range of stakeholders during this inquiry as a known variable that will present a host of effects and challenges for the fishing industry. The appearance of tropical fish species as far south as Tasmania was given as a tangible example.¹⁰⁹ The Committee has sought, through this inquiry, to test the ability of science to provide answers and forecasts in relation to fisheries and aquaculture.

109 Mr Ian Thompson, *Committee Hansard*, 30 May 2012, p.6.

3.142 The CSIRO's submission made the observation that:

The majority of Australia's fishery species are considered sustainably managed but future climate change may impact industry profitability.¹¹⁰

3.143 This view was also shared by James Cook University, which in its submission described climate change as a 'one of the top emerging threats facing fisheries resources worldwide.'¹¹¹

3.144 The Department of Climate Change and Energy Efficiency (DCCEE)'s submission contained a bleak assessment:

Changes to ocean temperature, currents, winds, rainfall, extreme weather, ocean chemistry and nutrients supply are likely to have significant impacts on marine ecosystems. This will lead to changes in species dispersion and stock levels and impact on fishing communities. While climate change may present some opportunities, it is likely that overall, climate change will pose significant challenges to the fisheries and aquaculture sector.¹¹²

3.145 Mr Ian Thompson (DAFF) said:

...we expect direct impacts that could range from changes in fish populations, fish physiology, breeding habits, new diseases, changes in immunity and then indirect impacts like changes in algae and micro-organisms and the food chains.¹¹³

3.146 A recent CSIRO publication, entitled 'Marine Climate Change in Australia', reiterated that 'climate change is already happening' and outlined three general responses currently underway:

- designing adaptation strategies to 'reduce the vulnerability of marine species, systems and industries to climate change';
- observing key physical and biological variables in the ocean, which will be 'critical to evaluating effective adaptation strategies'; and
- preparing for climate change through 'changes in management or policy arrangements', a point also emphasised separately in the

110 CSIRO, Submission 23, p.7.

111 JCU, Submission 28, p.4.

112 DCCEE, Submission 36, p.1.

113 Mr Ian Thompson, *Committee Hansard*, 30 May 2012, p.2.

CSIRO's submission,¹¹⁴ particularly where these 'currently limit adaptation responses.'¹¹⁵

3.147 The WWF agreed that adaptation strategies will be required; however its submission anticipated:

Within already stretched budgets, it is difficult to see how these research needs can be met without compromising existing programs.¹¹⁶

3.148 However, notwithstanding the expected predictions surrounding climate change, according to DCCEE, 'there is little consolidated knowledge of the potential impacts of climate change' and 'much of the evidence... on marine fisheries has been inferred'.¹¹⁷

3.149 During this inquiry, there was noticeable diversity in opinions espoused by witnesses and submissions in terms of the specific impacts climate change might produce for fisheries or how other factors could be contributing to variability. Issues included:

- localised social and economic impacts if species move to new habitats. The Australian Marine Sciences Association (AMSA)'s submission stated:

In Australia, fisheries in some regions may benefit from climate change but other regions are likely to experience significant reduction of catches (particularly in southern temperate waters).¹¹⁸

Mr Brian Jeffriess (CFA) flagged the financial implication of climate change for the fishing industry:

Most importantly, it frightens the banks, and they are still the foundation, unfortunately, of the industry.¹¹⁹

He commented that there could be 'some positives' arising from climate change. 'Sardines in the Great Australian Bight, for example, will blossom to be better than they are now,' he said.¹²⁰

114 CSIRO, Submission 23, p.7.

115 CSIRO, 'Marine Climate Change in Australia: Impacts and Adaptation Responses: 2012 Report Card', p.1.

116 WWF, Submission 11, p.5.

117 DCCEE, Submission 36, p.2.

118 AMSA, Submission 14, p.4.

119 Mr Brian Jeffriess, *Committee Hansard*, 20 August 2012, p.20.

120 Mr Brian Jeffriess, *Committee Hansard*, 20 August 2012, p.20.

- whether other changes to the oceans, such as acidification, may deserve greater or equal status. According to Dr Anthony Smith (CSIRO):

In some ways, acidification is perhaps an even more important issue than temperature. We are still a long way from understanding what the consequences of those changes might be. That is right at the base of the ecosystem, so there is potentially a very large impact from that.¹²¹

Professor Michael Harte said that ‘cumulative impacts’ including sedimentation and agricultural run-off could greatly affect the state of the ocean.¹²²

- whether climate change should be regarded as part of broader environmental changes, which are ongoing rather than isolated events. Mr Neil Stump (TSIC) said:

...I would hope to see this fleeting focus on climate change turned into a longer-term view, and recognition that there is ongoing environmental change in the world’s oceans, estuaries and whatever, and that we do need to invest money to understand what those changes are and what the possible ramifications are.¹²³

- overcoming a shortage of knowledge about impacts on individual species of fish, which may vary. DCCEE submitted:

For most fisheries little is known about how climate change will affect:

- ⇒ population dynamics, for example, the timing of spawning or the tolerance to increased water temperatures;
- ⇒ composition and interaction within communities; [and]
- ⇒ structure and dynamics of communities, including changes to productivity due to physical changes in the environment such and wind-driven upwelling.¹²⁴

During a site visit to JCU, the Committee observed first-hand experiments underway in controlled conditions to test for the tolerance of individual species to temperature changes.

121 Dr Anthony Smith, *Committee Hansard*, 12 July 2012, p.15.

122 Prof Michael Harte, *Committee Hansard*, 29 June 2012, p.26.

123 Mr Neil Stump, *Committee Hansard*, 12 July 2012, p.57.

124 DCCEE, Submission 36, p.2.

3.150 The Committee notes that there has been active interest in answering the types of questions raised above. DCCEE cited three reports and strategies within its submission:

- ‘Implications of Climate Change for Australian Fisheries and Aquaculture: A Preliminary Assessment’, released in 2008;
- the ‘National Climate Change Adaptation Research Plan for Marine Biodiversity and Resources’, released in 2010; and
- ‘Australian Climate Change Science: A National Framework’, released in 2009.

3.151 Ms Jo Mummery (Assistant Secretary, Science and International Adaptation Branch, DCCEE) said:

At this stage, there is quite a lot that is not known. There is a level of confidence in the science community that many marine species operate within particular temperature ranges or have a preference to be within temperature ranges... it may lead to some unexpected predator-prey relationships that are not currently what we are managing around.¹²⁵

3.152 She continued:

It may lead to species moving further offshore or, in the case, for example, of species off the southern coastline of Australia, there may not be the nutrient support if the temperatures become too uncomfortable for their current distribution. There really is still too significant a gap in our understanding to fully respond to that question.¹²⁶

3.153 Nonetheless, Ms Mummery was confident that the necessary research priorities have been identified:

We have tried through our establishment and work through the adaptation research planning to make sure that there is a good engagement with other researchers and with stakeholders and industry in defining the research that is important. That has certainly been a core part of the way forward with the adaptation planning.

125 Ms Jo Mummery, *Committee Hansard*, 27 June 2012, p.2.

126 Ms Jo Mummery, *Committee Hansard*, 27 June 2012, p.2.

- 3.154 She also said that DCCEE is bringing together a coordination group for climate change science to enhance collaboration.¹²⁷

Committee Comment

- 3.155 Climate change was often raised as a significant source of concern and uncertainty by witnesses during the inquiry. Irrespective of the causes of climate change, change is occurring that will have large effects on the ocean environment and Australia's coastal communities.
- 3.156 The level of understanding surrounding climate change, oceans and fisheries is limited and the long-term outlook uncertain.
- 3.157 However, there was general consensus that further research is needed into how climate change may affect the oceans and how to best adapt to these changes.
- 3.158 The Committee supports the need for this additional research.
- 3.159 There is one central document prepared by the Department of Climate Change and Energy Efficiency - 'Implications of Climate Change for Australian Fisheries and Aquaculture' - that provides a foundation for further work. Whilst this is a short and specialised publication, it should be further developed into a comprehensive document that acts as a national reference document for the impacts of climate change on fisheries and aquaculture.

Recommendation 8

- 3.160 **The Committee recommends that the 2008 preliminary assessment of the 'Implications of Climate Change for Australian Fisheries and Aquaculture' be developed by the Department of Climate Change and Energy Efficiency into a more comprehensive study, to include broad strategic issues and localised impacts.**

Recommendation 9

- 3.161 **The Committee recommends that the Australian Government ensure there is a continued strong effort to monitor and analyse the effects of climate change on Australia's oceans and communities.**

¹²⁷ Ms Jo Mummery, *Committee Hansard*, 27 June 2012, p.3.

Research and public education

- 3.162 World leading science is critical to Australia's high standard of fisheries management. Continuously building on this science will support the future viability and competitiveness of Australian fisheries and will lead to even better environmental outcomes. Harnessing Australia's scientific skills will also allow Australia to play our global role in helping to provide food to surrounding developing nations.
- 3.163 In order to have good research outcomes we must foster our research capacity, including through skills development and targeted investment.
- 3.164 In order to use this research to achieve better fisheries management and environmental outcomes the research needs to be communicated to all stakeholders and the general public.
- 3.165 Breaking these issues down, there were four main themes raised during the inquiry, which are dealt with in turn within this chapter:
1. the demand for research generally;
 2. maximising research capacity, in terms of people, infrastructure and investment;
 3. setting research priorities and coordinating research efforts; and
 4. communicating fisheries research through public education.
- 3.166 The Committee recognises that there are many different terms used to describe scientific efforts and that there is also a spectrum from initial research to development, commercialisation and extension. For simplicity, the remainder of this chapter collectively refers to these issues as 'research'.

Demand for research

- 3.167 The 'National Fishing and Aquaculture RD&E Strategy 2010', commissioned by the Australian Primary Industries Ministerial Council, is a key source of information, facts, figures and discussion of fisheries research in Australia. It identified several 'strategic research themes' (separately, the FRDC has its own RD&E plan¹²⁸ based on these themes):
- biosecurity and aquaculture health;

128 FRDC, 'Investing for Tomorrow's Fish: The FRDC's Research, Development and Extension Plan 2010-2015', 2010.

- habitat and ecosystem protection;
- climate change;
- ecologically sustainable development;
- governance and regulatory systems;
- resource access and allocation;
- growth and profitability;
- maximising value from aquatic resources;
- consumers and markets;
- community support;
- community resilience and development;
- develop the capabilities of the people to whom the industry entrusts its future; and
- to create positive practice and attitudinal change through information transfer (addressing public perceptions).¹²⁹

3.168 Demand for fisheries research is growing. Consequently, having a plan for fisheries research priorities is essential. Dr James Findlay (AFMA) said:

The uncertainty about our marine stocks puts a lot of pressure on science. We are very science hungry organisation. We are making evidence-based decisions. It is highly contestable environment. Every decision we make about the level of catch, where people should fish or what method they should use or about managing things such as by-catch... is heavily contested. Because of that, we are heavily dependent on science and it is a large part of our investment.¹³⁰

3.169 As AMSA explained in its submission, less science would translate into 'overly conservative and risk-averse management decisions' or 'poorly informed management decisions'.¹³¹

3.170 Markets and the desires of consumers are key determinants of research investment. Dr Patrick Hone (FRDC) said:

129 Primary Industries Research Ministerial Council, 'National Fishing and Aquaculture RD&E Strategy 2010', April 2010, pp.31-36.

130 Dr James Findlay, Committee Hansard, 30 May 2012, p.10.

131 AMSA, Submission 14, p.8.

For the commercial sector, whether it is wild catch or aquaculture, it is about linking to markets. It is about getting market signals back into the research, back into the production base and to make sure that we have informed decisions about where they put their investment. If you build a fishing boat, that is a 15 to 20 year investment so you want to make sure if you are putting that sort of money in that you know what the market is going to do for white fish or what it is going to do for the sorts of products that you are producing.¹³²

- 3.171 Mr Brian Jeffriess (Commonwealth Fisheries Association) said that Australia's science is a source of competitive advantage, which would 'suffer' without an investment in training.¹³³

Maximising fisheries research capacity

- 3.172 The 'National Fishing and Aquaculture RD&E Strategy 2010' defined capacity as having three elements: 'human, infrastructure and investment.'

- 3.173 The RD&E Strategy estimated that there are '531 FTE research and extension professionals employed by major institutions', most in government agencies and the remainder in universities. The report estimated expenditure by research providers in 2008-09 to have been \$142million and capital investment in fisheries research infrastructure (for example, aquariums, laboratories and ships) was estimated to be around \$323million.¹³⁴

- 3.174 Fisheries research relies on mixed funding sources. The effort is partly funded by the fishing industry and funded partly from the government sector. Contributing stakeholders, therefore, expect spending to accord with their respective interests and contributions.

- 3.175 The Committee was informed that marine research has a relatively high cost and degree of difficulty. According to DAFF's submission:

Marine environments are generally far less accessible than their terrestrial equivalents and present a much more challenging environment in which to conduct research. As a result marine

132 Dr Patrick Hone, Committee Hansard, 20 June 2012, p.3.

133 Mr Brian Jeffriess, *Committee Hansard*, 20 August 2012, p.18.

134 Primary Industries Research Ministerial Council, 'National Fishing and Aquaculture RD&E Strategy 2010', April 2010, pp.23-27.

ecosystems are generally more difficult and expensive to study than terrestrial ecosystems.¹³⁵

- 3.176 Professor Neil Loneragan (Centre for Fish, Fisheries and Aquatic Ecosystem Research) said:

The size of the pie is being reduced in the wild harvest fisheries and more research is expected because of the requirements to demonstrate ecological sustainability and the requirements of ecosystem based fisheries management. There are two issues: how do we grow the funding pie and how do we do research more efficiently within the current model?¹³⁶

- 3.177 The CSIRO's submission mirrored this view, adding that public sector funding for research is 'flat', notwithstanding the 'ongoing needs for monitoring and research to reduce uncertainty about future resource dynamics... and demand for scientific proof to meet society's high environmental standards.'¹³⁷ JCU's submission warned that diminishing resources has 'meant management agencies can struggle to base decisions on high quality science.'¹³⁸ Another consequence of this situation may be that organisations have to devote a greater amount of time to bidding for funds in an environment of scarce funding.

- 3.178 However, Mr Richard Stevens (WAFIC) said cuts to research funding may be having the effect of driving cooperation and dismantling silos. 'I am seeing a greater amount of public cooperation now as the capacity to fund research declines. People are really starting to cooperate,' he said.¹³⁹ Mr Stevens added:

If you are looking at areas to fund, you should concentrate on those people who are working together rather than those people who are working apart. That would be a good strategy.¹⁴⁰

- 3.179 Associate Professor Robert Day (University of Melbourne Department of Zoology) said that funding for fisheries and aquaculture research has been concentrated into a few institutions only. A secondary issue arising, he said, is 'real or perceived conflicts of interest in allocating funds,' which he

135 DAFF, Submission 24, p.1; CSIRO, Submission, p.4.

136 Prof Neil Loneragan, *Committee Hansard*, 9 July 2012, p.42

137 CSIRO, Submission 23, p.4 and p.11.

138 JCU, Submission 28, p.3.

139 Mr Richard Stevens, *Committee Hansard*, 9 July 2012, p.8.

140 Mr Richard Stevens, *Committee Hansard*, 9 July 2012, p.10.

believed is reinforcing the concentration.¹⁴¹ He said this concentration is undesirable:

Expertise for projects depends on the project and it is very difficult to predict what kind of expertise you are going to need, so you need to be able to draw on expertise from institutions right across Australia when they are required for a particular project. It is very unlikely that the few institutions which are specifically targeted for fisheries and agriculture are going to have that sort of expertise in every case.¹⁴²

3.180 AMSA's submission described the intensive process from experts across a range of disciplines and fields to conduct stock assessments:

Obtaining such information (which may be fishery dependent or fishery independent) relies on fisheries biologists and mathematical modellers, regular sampling by fisheries observers, compilation and analysis of the catch data by scientists and computation of various scenarios with respect to yield.¹⁴³

3.181 Associate Professor Robert Day said that 'usually you need a combination of mathematics and biology and there are very few students anywhere who have those qualifications.'¹⁴⁴ Professor Neil Loneragan said that attracting enrolments was largely dependent on the research interests of individuals. The long-term direction of the university is something 'you cannot control', he said, adding: 'That depends on the success of the research area and the demand for teaching in the area.'¹⁴⁵ Mr Greg Jenkins (Challenger Institute) said that in his view there is 'a lot of competition' among universities, at least in his home State of Western Australia, and consequently 'the entry standards have lowered.'¹⁴⁶

3.182 Dr Michael Hughes (Office of the Chief Scientist) said that based on figures from the Department of Education, Employment and Workplace Relations, the numbers of students in specialised agricultural science or fisheries science degrees has 'steadily declined'. He said fisheries science has now become encompassed part of physical and natural sciences degrees, although this will expand the cohort of graduates.¹⁴⁷ He added

141 Assoc Prof Robert Day, *Committee Hansard*, 29 June 2012, p.5.

142 Assoc Prof Robert Day, *Committee Hansard*, 29 June 2012, pp.5-6.

143 AMSA, Submission 14, p.4.

144 Associate Professor Robert Day, *Committee Hansard*, 29 June 2012, p.6.

145 Prof Neil Loneragan, *Committee Hansard*, 9 July 2012, p.45.

146 Mr Greg Jenkins, *Committee Hansard*, 9 July 2012, p.39.

147 Dr Michael Hughes, *Committee Hansard*, 29 June 2012, p.1.

that cadetships and scholarships should be available to add 'some attractiveness and career path that is laid out and clear in the fisheries and aquaculture sector.'¹⁴⁸ Dr Hughes (Office of the Chief Scientist) said that although he believed 'potential' existed through cooperative research centres (CRCs):

...to be quite frank, the way this situation is at the moment is not ideal. There is a disconnect between people at the coalface and recognition of the problems they are having and the science that they need to innovate and deal with those problems.¹⁴⁹

3.183 Dr Patrick Hone (FRDC) agreed that the number of fisheries science courses are 'in decline', though he said this has been offset by an enlarged pool of employable graduates:

It is fair to say, though, that in our industry the sorts of graduates that come in from science are multidisciplinary – they will come from information technology, computational science or nutrition backgrounds. There are plenty of good graduates still coming through the system in that regard.¹⁵⁰

3.184 He said that in some areas, however, there is a shortage of graduates:

The veterinary area is an area where we still have some gaps. We still struggle to get aquatic animal health vets coming through the system and we are trying to address that. We still do have some gaps around computational science – mathematical modellers – not because there are not mathematical modellers; it is just that the competition for those sorts of people is very intense, like in a lot of industries.¹⁵¹

3.185 Dr Hone added that regarding courses aimed at the technical and trade level, 'there are definitely requirements to do more work in TAFE-type colleges'.¹⁵²

3.186 Associate Professor Robert Day (University of Melbourne Department of Zoology) said the FRDC should offer small grants to doctoral students to fund the operational costs of their projects, which should be framed to:

drive greater collaboration between industry, universities and state based fishery agencies and create a pathway to attract

148 Dr Michael Hughes, *Committee Hansard*, 29 June 2012, p.2.

149 Dr Michael Hughes, *Committee Hansard*, 29 June 2012, p.3.

150 Dr Patrick Hone, *Committee Hansard*, 20 June 2012, p.7.

151 Dr Patrick Hone, *Committee Hansard*, 20 June 2012, p.7.

152 Dr Patrick Hone, *Committee Hansard*, 20 June 2012, p.7.

students who are interested in this from anywhere in Australia and train them in the fisheries and aquaculture fields.¹⁵³

3.187 Dr Elizabeth Smith (private capacity) said:

The difficulty that I saw as a working scientist and which I still see in scientific research is that research tends to get narrower and narrower and narrower. It has to because only in that way can you fully understand a system, but there are fewer people who are doing the broad-range research and it tends not to be the younger people.¹⁵⁴

3.188 Dr Smith suggested there could be fellowships offered that are designed to provide students with broader views.¹⁵⁵

3.189 Dr Len Stephens (Seafood CRC) said that CRCs are obliged to fund graduate students and that the Seafood CRC is funding around 55 students.¹⁵⁶

Setting priorities and coordinating efforts

3.190 The *National Fishing and Aquaculture RD&E Strategy 2010* (RD&E Strategy), developed by the Primary Industries Ministerial Council, aims to establish:

‘the future direction to improve the focus, efficiency and effectiveness of RD&E to support Australia’s fishing and aquaculture industry’¹⁵⁷

3.191 The RD&E Strategy’s ‘research themes’ included ecosystems, climate change, governance, marine resources and social and economic issues.

3.192 Despite the aim of the RD&E Strategy, a number of witnesses claimed that the organisation of fisheries science in Australia is devolved, dispersed and not well coordinated.

3.193 The RD&E Strategy itself recognises that in 2010 there was ‘no common forum for stakeholders to work together on RD&E’ and characterised Australia’s fisheries research effort as being one of ‘confusion, competition, inefficient investment and suboptimal adoption rates.’ Once

153 Assoc Prof Robert Day, *Committee Hansard*, 29 June 2012, p.5.

154 Dr Elizabeth Smith, *Committee Hansard*, 12 July 2012, p.10.

155 Dr Elizabeth Smith, *Committee Hansard*, 12 July 2012, p.10.

156 Dr Len Stephens, *Proof Committee Hansard*, 22 August 2012, p.3.

157 FRDC, ‘National RD&E Framework’, at http://www.frdc.com.au/research/RDEPlanningandPriorities/Pages/nat_framework.aspx

implemented, it was claimed the RD&E Strategy would result in 'higher returns on the substantial resources invested by government and industry'.¹⁵⁸

3.194 A key issue for achieving coordination is that the range of fisheries research stakeholders is diverse, potentially emanating from the following types of organisations:

- state and Federal government departments with responsibility for the primary industries and environment portfolios;
- independent institutes, relying on a mixture of government and non-government funding, which deliver relevant projects in accordance with the wishes of their stakeholders and financiers (but unlike universities, most do not have teaching programs, though they may fund graduate studies) (e.g. CSIRO, AIMS, FRDC, CRCs);
- universities, with expertise in areas including marine resources, habitats, ecosystems, climatic studies, oceanography, oceans policy and aquaculture. Universities are also training the future generations of fisheries scientists;
- technical skills institutes, which concentrate on practical aspects of harvesting fish, workforce training and improving production; and
- museums and aquariums, which collect and catalogue taxonomic information about fish species.

3.195 According to the WWF's submission, coordination is still generally lacking:

There are significant differences across the jurisdictions' arrangements for delivery of scientific advice, engagement of stakeholders, the identification of research priorities and the conduct of peer review and evaluation of scientific research.¹⁵⁹

3.196 The WWF submitted that although some research programs been developed to address issues at a national or regional level, many institutions continue to operate in 'silos' based around jurisdictions or sectors, 'and this restricts their access to funding and prevents them achieving the "critical mass" required to address and increasingly complex set of questions.' The tight and uncertain funding situation

158 Primary Industries Research Ministerial Council, 'National Fishing and Aquaculture RD&E Strategy 2010', April 2010, pp.1-2.

159 WWF, Submission 11, p.4.

(except for the CSIRO, which has core funding), according to WWF, 'does not engender good strategic planning of either research or expertise.'¹⁶⁰

3.197 Professor Michael Kingsford (James Cook University) said:

Essentially, you have a limited number of scientists and managers in Australia. You want to maximise the interaction between them and maximise the opportunities for collaborative research.¹⁶¹

3.198 Mr Jon Bryan (TCT) said there is 'no coordinating body' and 'there tends to be silos'.¹⁶² Mr Bryan also that the FRDC was essentially 'an industry research group' with 'fairly narrow, industry-directed research goals which look at industry problems in the short-term'.¹⁶³

3.199 Dr Elizabeth Smith (private capacity) said:

I do believe that publicly funded science should be for the benefit of the public and the environment, not so much for the benefit of private companies or publicly listed companies.¹⁶⁴

3.200 The NSW Department of Primary Industries submitted that there are a number of structures and processes in place which are designed to ensure collaboration and minimise duplication of effort.¹⁶⁵ NSW DPI suggested:

To build upon this success and formalise these processes, NSW recommends the development of a national centralised database or notification register for fisheries and aquaculture-related projects.¹⁶⁶

3.201 Professor Steve Kennelly (Director Fisheries Research, NSW DPI) said that a web-based format would be preferable; he commented that past attempts had led to incomprehensible 'reams of paper' being produced.

3.202 The Committee heard a variety of views regarding priority accorded to research fields or sectors, with witnesses concerned that important areas are not being accorded appropriate priority.

3.203 Associate Professor Tim Day and Dr Rob Dempster submitted that 'almost all' funding for fisheries and aquaculture research is 'focused on tactical research for management' and 'strategic research with obvious direct

160 WWF, Submission 11, p.2.

161 Prof Michael Kingsford, *Committee Hansard*, 31 July 2012, p.20.

162 Mr Jon Bryan, *Committee Hansard*, 12 July 2012, p.32.

163 Mr Jon Bryan, *Committee Hansard*, 12 July 2012, p.31.

164 Dr Elizabeth Smith, *Committee Hansard*, 12 July 2012, p.6.

165 NSW DPI, Submission 32, p.2.

166 NSW DPI, Submission 32, p.2.

benefit for the industries.’¹⁶⁷ However, Mr Warwick Nash (Queensland DAFF) explained that research involving information-gathering, such as for ongoing stock assessments, is not of particular interest to universities because it is not publishable. He said:

Universities to a large extent get funded by the quality of the research that they do and the number of papers they have in those high-level journals. So, to some extent, the type of research that is needed for the states to be able to have their fisheries going into the future is not the sort of work that is attractive to universities.¹⁶⁸

3.204 Mr Richard Stevens (WAFIC) said that most science is about counting fish and oceanography and felt that contrary to claims of other witnesses, industry is ‘neglected’.¹⁶⁹

3.205 Mr Gregory Jenkins (Challenger Institute of Technology) said:

We only use the science when we have a problem that prevents our industry partner getting to a particular goal. Scientists love their science, they love their areas. Quite often perhaps... some of their science may not be completely necessary for the industry to move forward but it may be important for their career progression. Our career progression depends on us having an industry result. It has certainly got nothing to do with a number of papers we publish.¹⁷⁰

3.206 The recreational fishing sector also expressed concerns about having its interests perceived as being unimportant. Mrs Judith Lynne (Sunfish Queensland) said that the sector cannot make its case when ‘it is the commercial sector that receives all the interest’ and ‘the science dollar is being spent elsewhere.’¹⁷¹

3.207 The Australian Marine Science Association expressed a similar view, noting that whilst historically commercial interests have set priorities, there has been a realisation of the need to include recreational fishers, indigenous fishers and other community groups.¹⁷²

3.208 DAFF assured the Committee that while some duplication may exist, coordination is being achieved. Mr Ian Thompson (DAFF) said that

167 Day and Dempster, Submission 17, p.3.

168 Mr Warwick Nash, *Committee Hansard*, 20 August 2012, p.5.

169 Mr Richard Stevens, *Committee Hansard*, 9 July 2012, p.12.

170 Mr Greg Jenkins, *Committee Hansard*, 9 July 2012, p.38.

171 Mrs Judith Lynne, *Committee Hansard*, 31 July 2012, pp.14-15.

172 AMSA, Submission 14, p.8.

generally, research providers 'tend to specialise in different areas' and coordinate their work through the National Fishing and Aquaculture RD&E Strategy 2010 and forums to minimise duplication and overlap. However, he said:

The risk of it happening with so many providers is probably quite high but, with budget pressures and the existence of a coordination strategy, I am in no position to say how much overlap still exists or whether it ever did exist.¹⁷³

3.209 He said the potential for 'inefficiency and duplication' is addressed through the National Fishing and Aquaculture RD&E Strategy 2010:

It is brought to life through the cooperation between Commonwealth and states in the Australian Fisheries Management Forum, which is Commonwealth and state fisheries managers, and the FRDC plays a major role in coordination implementation. Under that strategy there tends to be some specialisation between states and the Commonwealth and institutes in what they should do so everyone does not need to be an expert in everything.¹⁷⁴

3.210 Mr Gordon Neil (DAFF) added that there is 'a big effort to avoid duplication' through the research and development strategy and forums convened by the FRDC.¹⁷⁵

Communicating fisheries research through public education

3.211 A number of witnesses expressed a degree of concern that at times, the standards of fisheries management and sustainability of species is subject to unfair or factually questionable public commentary, based upon mistaken perceptions and incomplete information.

3.212 Dr Anthony Smith (CSIRO Wealth from Oceans National Flagship) said that although Australian fisheries are 'well-managed', with few exceptions:

The difficulty is that globally there is quite a lot of mismanagement in fisheries and there is quite a lot of overfishing. I think the media tends to play up those issues, and that is a lot of what influences public perception. ...there is not a lot of

173 Mr Ian Thompson, *Committee Hansard*, 30 May 2012, p.9.

174 Mr Ian Thompson, *Committee Hansard*, 30 May 2012, p.2.

175 Mr Gordon Neil, *Committee Hansard*, 30 May 2012, p.9.

differentiation in the public's mind between the global situation and the situation in Australia.¹⁷⁶

- 3.213 Dr Smith said the CSIRO is considering ways to improve the public perception, 'or at least get it based on more realistic information and science.'¹⁷⁷ Professor Neil Loneragan (Murdoch University) commented that science is being used for 'political arguments' and has become 'lost'.¹⁷⁸ Mr Neil Stump (TSIC) said that there are people who are 'hell-bent on ignoring the science'.¹⁷⁹ Mr Robert Gott (DPIPWE) said:

There are some sections of the community that want a zero-risk approach. The amount of science that would need to be invested to get to that point would be significant and we will probably never achieve that outcome.¹⁸⁰

- 3.214 Dr Adam Main (TSGA) said:

I see that there is a tremendous amount of science being done for our industry by some very qualified and independent researchers. It is my role, our role – that of the company – to try and get the science translated across so it is understood, not just by the community but also by government. Failure to do that means that there could be a perception that we are not utilising science when we make decisions or plan.¹⁸¹

- 3.215 Dr Andrew Rowland (RecFish West) explained the need to adequately communicate decisions:

The essential role of science in underpinning the management is one thing, but it is actually the understanding of the science in the community which is needed, given the political nature of the way management decisions are made, particularly given the large size of the recreational fishing community.

- 3.216 He continued:

If the science is solid and it is communicated well and the rationale and reasons behind any management reforms are put forward in that manner, then generally we have found that the recreational fishing community will be accepting of any changes and, indeed,

176 Dr Anthony Smith, *Committee Hansard*, 12 July 2012, p.12.

177 Dr Anthony Smith, *Committee Hansard*, 12 July 2012, p.12.

178 Prof Neil Loneragan, *Committee Hansard*, 9 July 2012, p.44.

179 Mr Neil Stump, *Committee Hansard*, 12 July 2012, p.55.

180 Mr Robert Gott, *Committee Hansard*, 12 July 2012, p.50.

181 Dr Adam Main, *Committee Hansard*, 12 July 2012, p.59.

as I said earlier, will drive those changes because they care deeply about the resource.¹⁸²

- 3.217 Dr Len Stephens (Seafood CRC) emphasised the need for customer outreach to feature in production research and ‘marketing science’. He explained:

The CRC is doing a lot of work in the area of the three major activities... technical research in the whole area of seafood product, packaging and retailing; consumer research – consumers’ attitudes to seafood and seafood marketing and retailing; and provision of technical advice on issues such as trade negotiations...¹⁸³

- 3.218 Dr Stephens commented that he believed that ‘post-harvest research into seafood... is an area where Australia’s capability is quite deficient.’¹⁸⁴ However, he said there have been efforts to communicate the health benefits of seafood through schools, health professionals, industry and retailers.¹⁸⁵

- 3.219 Professor Colin Simpfendorfer (JCU) said that managing fish is about managing the people who catch fish, which means taking account of the social aspects of fishing within the research agenda, in particular attitudes and behaviours.¹⁸⁶

Committee Comment

- 3.220 Fisheries research makes a significant contribution to the fishing industry, communities and the environment. Fisheries science contributes to:
- maintaining the industry’s comparative advantages;
 - guaranteeing that marine resources will be available for future generations;
 - ensuring the health of ecosystems and the environment; and
 - informing and reassuring consumers and markets that Australian products are harvested sustainably from fisheries managed under best-practice conditions.

182 Dr Andrew Rowland, *Committee Hansard*, 9 July 2012, p.30.

183 Dr Len Stephens, *Committee Hansard*, 22 August 2012, p.2.

184 Dr Len Stephens, *Committee Hansard*, 22 August 2012, p.3.

185 Dr Len Stephens, *Committee Hansard*, 22 August 2012, p.3.

186 Prof Simpfendorfer, *Committee Hansard*, 31 July 2012, p.25.

- 3.221 The Committee found that Australian fisheries science is world leading, and that our fisheries are well managed - especially in comparison to international standards. However, the Committee also heard of the challenges of prioritising limited research funding in order to find the right balance between diverse stakeholder agendas and also between short and long term interests.
- 3.222 Despite the increasing demand for high quality research the Committee heard of the challenges in getting the right people with the right skills into the industry. In particular, the area of veterinary science for fisheries and aquaculture was highlighted to the Committee, and this area is discussed in more detail in Chapter 5.
- 3.223 While the aims of better coordination within the National Fishing and Aquaculture RD&E Strategy 2010 are commendable, the Committee nevertheless found that issues of poor coordination and disagreement surrounding research priorities still appear widespread. Industry, recreational fishers, environment groups and academics expressed concern that one aspect or another of fisheries science is not given high enough priority or attention. The Committee is not in a position to judge whether certain aspects of fisheries research are being neglected nor to specifically identify a source of coordination or leadership failure. However, unless these issues can be addressed there is a risk that the RD&E Strategy could become marginalised. The Strategy itself identifies a number of pre-existing shortcomings, to which the Strategy in part was expected to respond.
- 3.224 The Committee recognises that the RD&E Strategy is at the early stages of implementation, however, it also believes that a review should be undertaken to assess how the RD&E Strategy is improving coordination outcomes. As part of this review - and update of the strategy if necessary - there should be consideration of new coordination mechanisms, such as a regular national fisheries RD&E forum and registry of research projects.
- 3.225 In addition to the appropriate research being undertaken and published, there is a need to ensure that it is also communicated amongst the industry, and to the community at large. It is essential that scientists themselves be active in this communication effort. Numerous witnesses commented on the high esteem in which Australian fisheries management and aquaculture development is held around the world. However, it was also evident throughout the inquiry that this does not always find reflection in Australian community attitudes towards fisheries management and aquaculture. Problems with other countries fisheries management of environmental outcomes are too often falsely claimed to

also be occurring in Australia. Ongoing efforts by scientists, industry stakeholders, fisheries managers, and governments will be fundamental to overcoming these misconceptions; and achieving greater public awareness and acceptance of the strong management and environmental sustainability credentials of our fisheries.

- 3.226 The importance of seafood for health has been addressed during the inquiry, and the Committee believes that further work by the FRDC and Seafood CRC (amongst others) can ensure that this message is widely understood.

Recommendation 10

- 3.227 **The Committee recommends that the Australian Primary Industries Ministerial Council commission a review of the 'National Fishing and Aquaculture RD&E Strategy 2010', to assess progress in achieving the Strategy's aims, in particular in regard to the co-ordination of Australia's scientific effort. The review should consider whether additional mechanisms are necessary to complement the strategy, such as a regular national fisheries research, development and extension forum or registry of research projects.**



Every stage in the domestication of plant and animal life requires inventions, which begin as technical devices, and from which flow scientific principles. The basic devices of the nimble-fingered mind lie about, unregarded, in any village anywhere in the world. Their cornucopia of small and subtle artifices is as ingenious, and in a deep sense as important in the ascent of man, as any apparatus of nuclear physics: the needle, the awl, the pot, the brazier, the spade, the nail and the screw, the bellows, the string, the knot, the loom, the harness, the hook, the button, the shoe – one could name a hundred and not stop for breath. The richness comes from the interplay of inventions; a culture is a multiplier of ideas, in which each device quickens and enlarges the power of the rest. Settled agriculture creates a technology from which all physics, all science takes off.¹

Aquaculture

- 4.1 Aquaculture – whilst dating back at least four millennia in Egypt² – is the most recent human domestications of wild living things: agriculture, believed to have begun with wheat in the Middle East, is probably eleven or twelve thousand years old.³ Despite aquaculture’s ancient beginnings, most domestications of freshwater and marine animals and plants have taken place in the last century (see figure below).
- 4.2 Australian aquaculture has mostly developed in the last half-century. Australian aquaculture income is based on a fairly narrow range of

1 Jacob Bronowski, *The Ascent of Man*, BBC, London, 1973, pp.73-4.

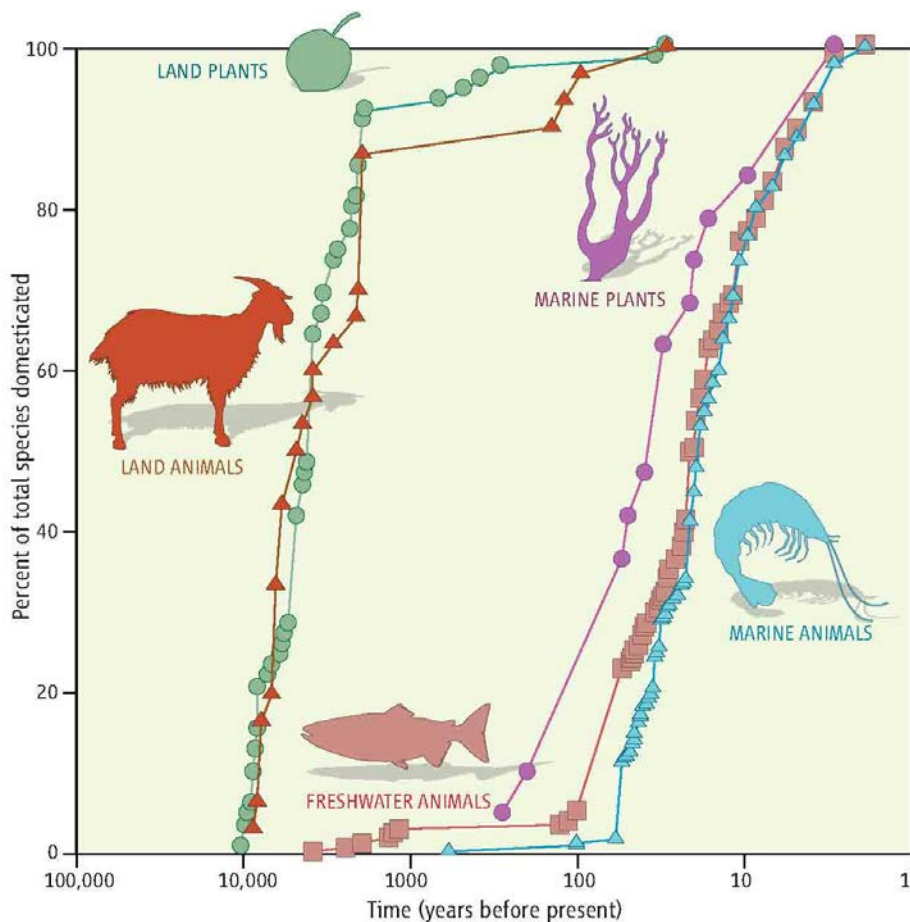
2 Carlos Duarte, ‘Beyond Malthusian pessimism: Aquaculture as a milestone in human history’, *The Conversation*, <https://theconversation.edu.au/beyond-malthusian-pessimism-aquaculture-as-a-milestone-in-human-history-6895>, 7/5/12.

3 Carlos M. Duarte, Nùria Marbà & Marianne Holmer, ‘Rapid Domestication of Marine Species’, *Science*, 316: 382-3.

species. Based on annual figures from 2009-10, the five most valuable aquaculture species were salmonids (\$370 million), pearl oysters (\$104 million), bluefin tuna (\$102 million), edible oysters (\$99 million) and prawns (\$77 million).⁴ Together, these five species comprised over eighty-five per cent of the value of Australia's aquaculture production in 2009-10.

- 4.3 Aquaculture in each species is often focussed in a particular region: over \$360 million of the salmonid value is produced in Tasmania; all farmed tuna is from South Australia; over \$75 million of prawn aquaculture is located in Queensland; and over \$85 million of pearl oysters are grown in Western Australia.⁵

Figure 1 Domestication of plants and animals: land versus water



Source *Science*, 316: 382-3.

4 ABARES, 'Australian Fisheries Statistics 2010', August 2011, p.72.

5 ABARES, 'Australian Fisheries Statistics 2010', August 2011, p.72.

- 4.4 The Committee notes that in 2004, the Productivity Commission released a research paper on environmental regulation and aquaculture.⁶ Key points included:
- aquaculture production is ‘subject to an unnecessarily complex array of legislation and agencies’ and there are ‘complex approval processes’ that can take ‘significant time’; and
 - there could be ‘greater use of innovative policy instruments’ such as ‘tradeable permits... to manage pollution discharges.’⁷
- 4.5 In the Committee’s view, many of the Productivity Commission’s 2004 observations remain relevant in 2012.
- 4.6 With the above comment in mind, this chapter will discuss the current state of aquaculture in Australia, as well as its long-term potential. It will consider:
- the roles and responsibilities of governments in Australia;
 - the potential growth of aquaculture;
 - the role of science for aquaculture;
 - national policy; and
 - committee comment and recommendations.
- 4.7 Governance issues, including those cross-cutting aquaculture and fisheries management, are dealt with in more detail in Chapter 6.

Potential growth of Aquaculture

- 4.8 Many submissions to the inquiry suggest that Australia’s aquaculture industry has a significant potential to grow:

There is the opportunity to develop and apply knowledge and technology to enable the Australian aquaculture industry to achieve its full potential for sustainable growth.⁸

6 Productivity Commission, ‘Assessing Environmental Regulatory Arrangements for Aquaculture’, February 2004.

7 Productivity Commission, ‘Assessing Environmental Regulatory Arrangements for Aquaculture’, February 2004, p.xx.

8 CSIRO, Submission 23, p.2.

Tropical aquaculture, including on-shore, near-shore and offshore industries, has significant untapped potential to contribute towards meeting the future food production needs of Australia. Australia's northern coastline has 1.2 million hectares that are potentially suitable for aquaculture.⁹

Unfortunately, it appears that Australia is not meeting the potential for sustainable aquaculture that is suggested by our enormous coastline, variety of water temperatures, and vast marine biodiversity.¹⁰

- 4.9 However, the Committee has been unable to ascertain an estimate of growth – whether expressed in the potential value of products, volume of production or employment, for example. Much evidence about the potential growth of aquaculture was speculative: ‘The prawn industry in Australia is currently worth about \$75 million. There is no reason we cannot have a \$500 million prawn industry.’¹¹ Some evidence emphasised that there is no obvious limit to the growth potential:

The general view is that there is no obvious limit to growth in terms of areas where development is possible. We are aware of various groups exploring the possibilities of investing and expanding. There is no immediate physical limit to that.¹²

- 4.10 Quite apart from the potential size of aquaculture, two major themes regarding the expansion of aquaculture have emerged throughout the inquiry, and will be discussed below:

- Making strategic choices; and
- Balancing economic and environmental considerations.

Strategic choices

- 4.11 The Committee sought evidence about the best way for governments to support growth in aquaculture in Australia. Evidence frequently supported Australia making strategic decisions about where to direct future efforts in aquaculture.

9 Northern Territory Department of Resources, Submission 9, p.6.

10 Southern Cross University, Submission 13, p.1.

11 Dr Patrick Hone, *Committee Hansard*, 20 June 2012, p.4.

12 Mr Gordon Neil, *Committee Hansard*, 12 September 2012, p.3.

4.12 Evidence from the FRDC underlined the importance of making careful decisions and investments, so that Australian aquaculture can compete against foreign competitors:

Australian producers must achieve the operating scale, global technologies and human capacity to be internationally competitive, and these ventures must be based on new differentiated products. It is unlikely Australia will be able to compete on price alone.¹³

4.13 The following considerations are central to making strategic decisions that will enable Australian aquaculture to expand and continue to be internationally competitive:

- Australia's competitive and seasonal advantages;
- foreign competitors;
- regional zoning; and
- availability of capital and development of markets, particularly in Asia, to respond to rising demand.

Australia's competitive and seasonal advantages

4.14 There are numerous competitive advantages identified by witnesses throughout the inquiry; specifically, climate variety, product quality and safety, the quality of science and proximity to markets.

4.15 The FRDC highlighted Australia's great diversity of geography and climates, and the potential variety of species that could be farmed:

Australia would not be well served going down a one-species model, maybe because of geographic issues. We have a tropical climate; we have a very cold climate; we have a mid-temperate climate; and we also have an east and west which are very different. So the strategy would include more species for Australia's type of country.¹⁴

4.16 Associate Professor Rob Day said Australia's reputation as a producer of high-quality and safe food provides an advantage:

We have good regulation to try to ensure biosecurity of our aquaculture is maintained, and that gives us a good edge in the

13 FRDC, Submission 19, p.32.

14 Dr Patrick Hone, FRDC, *Committee Hansard*, 20 June 2012, p.4.

market because we can ensure that we always produce high quality.¹⁵

4.17 The quality of seafood products is a direct result of high quality science:

Australia has a very good history and world standing in the quality of the science that we throw at developing technology... The salmon industry is a good example of a very efficient industry, up at world class, competing against the big boys like those in Norway and Chile. The work that I came to Australia to do at the beginning was in domestication of the black tiger prawn, and that has been commented on in previous inquiries here. We are at world class for that species of prawn, and that was using the expertise and skills of Australian researchers.¹⁶

4.18 Evidence also pointed to Australia's strength in producing high-value, luxury foods for foreign markets, driven by investment in research:

The important thing is that we have nearly \$1.2 billion worth of production research, which is aimed at producing food which essentially will be a discretionary luxury purchase in Asia and in China these days.¹⁷

4.19 Australia also has a competitive advantage by its proximity to Asian markets, and the capacity of producers to transport fresh seafood into those markets. As noted by Dr Patrick Hone (FRDC), this could enable Australia to be a 'food bowl' for many regional economies, particularly given Australia's reputation for safe, high-quality food:

They do not have the processes around food safety and quality and all of the things that we can deliver which would give us that marginal cost above the competitive product – and we are next door. There is only one hour, two hours difference in time zones, and we are only an eight-hour flight or a relatively short shipping trip away. So there is lots of opportunity there in terms of Asia as a destination for food, let alone seafood.

[...]

For example, the Australian Atlantic salmon industry can put fresh salmon into Singapore, Hong Kong and China. It is very hard for our competitors in Europe or in North America to do that

15 Associate Professor Robert Day, *Committee Hansard*, 29 June 2012, p.8.

16 Dr Mike Hall, *Committee Hansard*, 31 July 2012, p.2.

17 Dr Len Stephens, *Committee Hansard*, 22 August 2012, p.2.

because they have just that much further to travel. So we do have some advantages.¹⁸

Foreign competitors

4.20 Witnesses underlined the importance of potential aquaculture species being assessed for their economic viability, considering the relevant cost of production in other countries:

With aquaculture, it depends a lot on the species you are talking about and our ability to grow it economically. You would not try to grow everything that occurs in the wild in an aquaculture sense. You need to pick the winner that is best for your particular piece of real estate and for the cost structures around that and also be mindful of the competition that is out there from South-East Asia and other countries that sometimes can outcompete us on price because of their lower wages and so on. Aquaculture is very much a species-by-species proposition.¹⁹

4.21 Some competitors also have weaker environmental protection, and hence can produce aquaculture products that are cheaper but more damaging to the environment.²⁰

4.22 Additionally, some countries have focussed on a single species, in order to develop an industry that enjoys economies of scale and returns big enough to invest in research and development. A particularly striking example is the Norwegian salmon industry:

Norway is essentially the inventor of salmon aquaculture and they now farm close to a million tonnes a year. I am not exactly sure how much it is worth, but it may be something like €10 billion a year...

The Norwegian government has invested in major research facilities. They have entire salmon farms that are simply for research...There are actually four of these facilities in Norway. Some of them are completely state run. Some of them are a consortium whereby the industry runs the facility as a for-profit farm and the researchers conduct research in a dedicated way around that facility.²¹

18 Dr Patrick Hone, *Committee Hansard*, 12 September 2012, p.19.

19 Professor Steven Kennelly, *Committee Hansard*, 15 August 2012, p.5.

20 Associate Professor Robert Day, *Committee Hansard*, 29 June 2012, p.8.

21 Dr Timothy Dempster, *Committee Hansard*, 29 June 2012, p.8.

- 4.23 Australia has competitors with considerable investments in research, and it is important that Australia assess the abilities of other countries to seize opportunities. As noted by Dr Patrick Hone:

Chile has some of the best partnerships in the world in terms of research. They have a fantastic partnership with Norway. They have a fantastic partnership with the Canadians and the Scots. They really do partner well in research. They also have a very good mechanism by which other companies can co-invest. There are a lot of Norwegian companies in Chile, for example. So there is a lot of transfer of technology. They are great adopters of technology. Their own science facilities are very good. They are some very good, well-trained Chilean scientists.²²

- 4.24 At the same time, existing foreign competition is not necessarily a bar to new developments in Australia. The most telling case is Salmon: despite the considerable Norwegian salmon aquaculture industry, as well as a mature industry in Chile, the Australian salmon industry is continuing to grow with expansions currently proposed.²³

Regional zoning

- 4.25 Australia has an enormous range of climatic and environmental conditions within its borders and many local endemic species. As pointed out by witnesses to the inquiry, choices must be made about the best locations for aquaculture development:

A very senior aquaculture scientist once said to me, 'You can grow tomatoes in the Antarctic, but if you want to make lots of money out of it you grow tomatoes where it is easiest to grow them.' That was in reference to trying to grow a tropical species like mud crabs down in the southern part of Australia. It is more economic to grow them in the northern part of Australia where the water is warmer and mud crabs are used to growing.²⁴

- 4.26 In 2011, the Western Australian Government announced funding to create two 'aquaculture development zones' within the state.²⁵ According to the Fisheries Minister, 'the objective of the investment-ready zones was to

22 Dr Patrick Hone, *Committee Hansard*, 12 September 2012, p.19.

23 Dr Patrick Hone, *Committee Hansard*, 20 June 2012, p.4.

24 Professor Steven Kennelly, *Committee Hansard*, 15 August 2012, p.4.

25 For further information, see the following website: <<http://www.fish.wa.gov.au/Fishing-and-Aquaculture/Aquaculture/Aquaculture%20Zones/Pages/default.aspx>>.

provide pre-approved areas for defined commercial aquaculture activities to be undertaken'. The funding would allow:

comprehensive information to be gathered to undertake strategic environmental assessments required for environmental approvals for the identified zones...[and would] also enable additional research for planning approvals, continuing environmental management and monitoring of the zones, which would provide investors greater certainty on locations than the current project-by-project model.²⁶

4.27 As described by Mr Timothy Nicholas, Western Australian Department of Fisheries:

The idea of those zones is to get the government to do a lot of the baseline studies and the initial scientific work that needs to be done to get over the line in terms of environmental approvals and, hopefully, to remove some of the burden from the companies that would ordinarily have to deal with that.²⁷

4.28 The Australian Government, in an agreement with the Queensland Government, has also agreed to a regional aquaculture zone, for the Great Sandy Marine Park (around Fraser Island). Under the 'Conservation Agreement', a certain class of actions – non-intensive aquaculture operations approved by the state government – may be conducted in the marine areas of the Park, without needing separate *EPBC Act* approval.²⁸

4.29 These two examples demonstrate how aquaculture can be encouraged at a regional level, but this approach needs careful planning, consultation and implementation. This regional planning approach will be discussed further below.

Balancing economic and environmental considerations

4.30 As will be discussed below, the regulation of aquaculture in each jurisdiction must find a balance between economic and environmental considerations.

26 Hon Norman Moore, Minister for Fisheries (Western Australia), *Zoning provides future security for aquaculture*, Media Release, 16/12/11.

27 Mr Timothy Nicholas, *Committee Hansard*, 9 July 2012, p.52.

28 Commonwealth of Australia and State of Queensland, *Conservation Agreement / Agreement in relation to aquaculture operations in the Great Sandy Marine Park*, 7/9/11, Paragraph 6 – Declaration.

- 4.31 Evidence to the inquiry stressed the need for governments to carefully consider both economic and environmental impacts of aquaculture when making decisions about new ventures. Science will be central to both developing new ventures, and understanding their environmental impacts:

...research has an important role in supporting this development through developing planning instruments for industry and government that permit rigorous, quantitative evaluation of the potential for aquaculture production systems to provide economic and social benefits whilst conserving ecosystem health and biodiversity.²⁹

Environmental impacts of aquaculture

- 4.32 CSIRO emphasised the role of Australian science in improving the environmental impact of aquaculture:

All Australian aquaculture industries operate within strict environmental regulations applied at national and state government levels. The industry, CSIRO, and other research providers have made globally significant advances over the past two decades in environmentally sustainable management of near-shore sea-cages ... and on-shore coastal ponds.³⁰

- 4.33 Aquaculture can be conducted either in marine waters or inland (usually in ponds). In both cases the types of environmental impacts are similar, although the impact on the local environment depends on a number of variables.

- 4.34 Evidence from Murdoch University outlined the major environmental management issues for the future of aquaculture:

the need to reduce the collection of wild fishes for breeding stock, reducing the reliance on fishmeal in aquaculture feeds, minimising the release of cultured stock into the wild and mitigating the impacts of aquaculture wastes, particularly nutrients, on receiving environments.³¹

- 4.35 As noted by the same submission:

The science behind many of these issues is well understood and the primary requirement is now the development of appropriate

29 CSIRO, Submission 23, p.12.

30 CSIRO, Submission 23, p.10.

31 Murdoch University, Submission 8, p.4.

regulatory or economic incentives for implementing environmental management systems.³²

- 4.36 The World Wildlife Fund pointed out that aquaculture is not without risks and that understanding its sustainability depends on scientific knowledge:

While WWF believes there is an important role for aquaculture in satisfying global demand for seafood products, we wish to emphasize that science-based and sustainable management is as important for aquaculture enterprises as it is for wild capture fisheries. The nature or the weighting of the risks involved in aquaculture may vary from that of wild capture fisheries but the need to understand and to mitigate those risks remains. Aquaculture does not represent a riskless solution to overfishing of wild fish stocks...³³

- 4.37 Dr Patrick Hone (FRDC) summed up the dynamic relationship between economic and environmental considerations very neatly:

Dr Hone: It is very hard to get a prawn farm up with zero impact.

CHAIR: Can't the science solve the issues? How do you make it sustainable?

Dr Hone: We can create a prawn farm with zero impact – it is just too expensive to run.³⁴

- 4.38 In the absence of technologies that can make 'zero impact' aquaculture a competitive proposition, aquaculture operations will continue to be assessed on the balance they strike between economics and environmental impact.

- 4.39 Technological solutions to the problem of aquaculture pollution continue to be developed across Australia. One example is the use of algae to clean water from aquaculture operations. At James Cook University, the Committee toured facilities where researchers are growing algae in water from aquaculture ponds, which produces a marketable product and cleans the water simultaneously. As discussed by Professor Michael Kingsford:

We are way ahead of the game now compared to 20 years ago...We now have things like different types of algae that we can use to sequester the nutrients, which are a major source of pollution. There is now the opportunity to harvest the algae as novel

32 Murdoch University, Submission 8, p.4.

33 World Wildlife Fund, Submission 11, p.8.

34 Dr Patrick Hone, *Committee Hansard*, 20 June 2012, p.4.

products for Australia. And there is now the opportunity to grow that type of algae in mixed polyculture, which addresses carbon sequestration. I would suggest to you there are a whole range of innovative new industries that are available through aquaculture as well as its addressing the increased demand for protein for Australia. Rather than buying Nile perch from South-East Asia, where there is very little environmental consideration for how they are raised – or, for that matter, the prawn industry over there – we could actually focus very carefully on developing that area in Australia.

[...]

The aquaculture problem has been a pollution one. Certainly [the Great Barrier Reef Marine Park Authority] has been very concerned about any suggestion of aquaculture around here, for the reason of its putting nutrients on the reef. The truth of the matter is that, if you look at local initiatives now – in collaboration with JCU, I have to say – they can actually get it down to zero. The water quality going out is sometimes better than that going in, to be honest, by the time they have actually treated it.³⁵

Regulatory arrangements to find the balance

4.40 The National Aquaculture Council (NAC) expressed its view that: ‘the science demonstrates that the risks to the environment from aquaculture are well managed.’³⁶ Nonetheless, the NAC outlined six areas of potential work to improve environmental regulation:

1. standardize environmental impact statement reporting;
2. establish national aquaculture environmental monitoring and management standards;
3. develop cost effective and real time environmental monitoring and reporting systems;
4. understand the structure of the ecosystems.
5. develop ecological carrying capacity models that will enable the carrying capacity to be undertaken on a regional, multi-user, coastal scale; and

35 Professor Michael Kingsford, *Committee Hansard*, 31 July 2012, p.22.

36 National Aquaculture Council, Submission 35, p.5.

6. develop validation tools for the carrying capacity models.³⁷
- 4.41 The NAC added that 'time, cost and complexity is the enemy of investment'. It further submitted that 'decision-making and regulatory conditions' are heterogeneous, particularly in respect of:
- certainty in the decision making process;
 - application of risk assessments; and
 - application of risk management tools, namely the application of licence conditions.³⁸
- 4.42 The NAC suggested added that this was symptomatic of 'the absence of contemporary understanding of the environmental risks that aquaculture poses, by environmental regulatory authorities.'³⁹ Further:
- The environmental risks of aquaculture are well understood, however, there should be investment in extending this information into the environmental regulatory authorities e.g. State Environmental Protection Authorities (EPA's). Furthermore, this science needs to be used to establish national aquaculture environmental monitoring, reporting and management standards to ensure equivalence between states.⁴⁰
- 4.43 The regulation of environmental protection at a state and territory level is a matter for those governments, but there is scope for coordination and standardisation, particularly through cooperation between governments. In addition, regional aquaculture planning under the *EPCB Act* – such as the approach taken in the Great Sandy Marine Park – is a promising way to ensure that environmental protection and aquaculture development are both promoted in a balanced way. This will be discussed further, below, in the section regarding national policy.

Roles and responsibilities of governments

- 4.44 The vast majority of aquaculture production (by value) occurs within four States – Tasmania, South Australia, Queensland and Western Australia. Under Australia's constitutional arrangements, the regulation of aquaculture is a matter for the States and Territories and would be a

37 National Aquaculture Council, Submission 35, p.5.

38 National Aquaculture Council, Submission 35, p.6.

39 National Aquaculture Council, Submission 35, p.6.

40 National Aquaculture Council, Submission 35, p.6.

matter for the Australian Government if conducted in Commonwealth waters in the future.

The Australian Government

4.45 As noted by DAFF's most recent Annual Report (2010-11), there is 'no current provision [for aquaculture in Commonwealth waters] in the Fisheries Management Act 1991.'⁴¹ However, the Department's website states that 'the Australian Government is working with state and territory governments to develop a regulatory framework for aquaculture in Commonwealth waters.'⁴²

4.46 As aquaculture is 'primarily managed by the states and the Northern Territory'⁴³, the Australian Government's role in aquaculture is limited to 'issues that require a national focus.'⁴⁴ Areas of activity include:

- research;
- quarantine;
- fish health;
- food safety;
- market access and trade;
- business development; and
- farm management assistance.⁴⁵

4.47 Under environmental law, the Australian Government also has a role relating to aquaculture, by virtue of the *Environment Protection and Biodiversity Conservation Act 1999*. If an aquaculture venture were to trigger the approvals process under that Act, it would be referred to the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) for assessment and, if necessary, decision by the Environment Minister.

41 Department of Agriculture, Fisheries and Forestry, 'Annual Report 2010-11', p.81.

42 Department of Agriculture, Fisheries and Forestry, http://www.daff.gov.au/fisheries/aquaculture/the_aquaculture_industry_in_australia, viewed 12/9/12.

43 Department of Agriculture, Fisheries and Forestry, Submission 24, p.2.

44 Department of Agriculture, Fisheries and Forestry, Submission 24, p.7.

45 Department of Agriculture, Fisheries and Forestry, <http://www.daff.gov.au/fisheries/aquaculture/supporting>, viewed 12/9/12.

4.48 SEWPaC told the Committee that the Australian Government has had some involvement in assessing aquaculture ventures. According to Mr Dean Knudson (SEWPaC):

since 2002 we have had eight referrals of projects under the Act, which have continued on to approval stage. Of those, seven have been approved. One is at the first stage of the assessment process, so it is awaiting a referral decision, which will then determine the level of assessment and whether it needs to continue with assessment under the Act. So zero projects have been denied under the Act.⁴⁶

4.49 The outstanding project noted by Mr Knudson relates to a proposed 'marine farming expansion', at Macquarie Harbour Tasmania. The proposal would expand the area for salmon farming from the current 564 hectares to 926 hectares.⁴⁷ The proposal was received by the Department on 30 May 2012. On 3 October 2012, the Environment Minister approved the proposal, subject to certain conditions. A media release from the Tasmanian Salmonid Growers Association indicated that the expansion will go ahead.⁴⁸

4.50 Understanding the conditions and workings of the *EPBC Act* and the interplay with State environment legislation can be a challenge. SEWPaC may wish to consider how applicants could be assisted, such as with more information about the approval process and whether proposal scrutiny could be streamlined.

The States & Territories

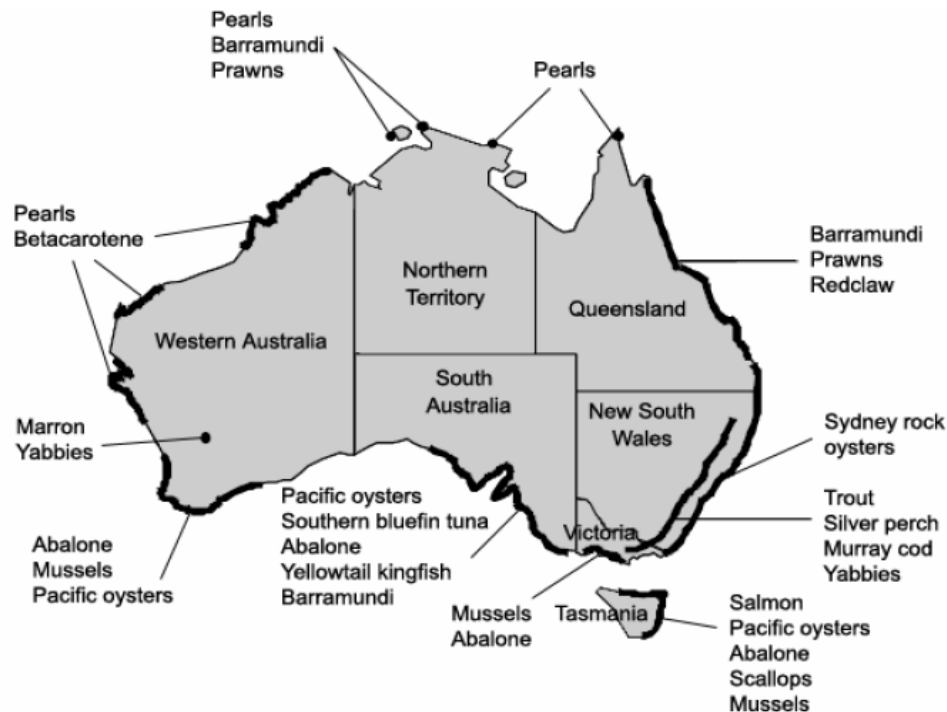
4.51 The four largest aquaculture products are almost exclusively grown within single jurisdictions. Of the fifth largest product – edible oysters – almost half of national production is grown in New South Wales, with most of the balance grown in South Australia and Tasmania. Species tend to be concentrated into distinguishable regions, illustrated by the map below.

46 Mr Dean Knudson, *Committee Hansard*, 19 September 2012, p.7.

47 Referral of proposed action, *Marine Farming Expansion - Macquarie Harbour Tasmania*, reference number 2012/6406, www.environment.gov.au, p.4.

48 Tasmanian Salmonid Growers Association, *Federal Government Approval for West Coast Expansion*, media release, 8 October 2012.

Figure 2 Aquaculture in Australia



Source Productivity Commission, 'Assessing Environmental Regulatory Arrangements for Aquaculture', February 2004, p.2.

4.52 Regulation differs in each state, depending on local conditions and species most commonly being produced. In South Australia, for example, aquaculture operations are organised by zones:

Approximately 6,000 hectares of water are currently allocated for aquaculture production and 11 aquaculture zone policies have been developed to secure access to the resource... An aquaculture zone policy stipulates the amount of area available for leasing, the types of aquaculture that can be undertaken and the biomass that can be farmed in the area.⁴⁹

4.53 The process for developing aquaculture zones in South Australia begins with:

a combination of desktop analysis and the collection of field data information from wide regions considered suitable for aquaculture development. Following consultation with the aquaculture industry, smaller areas are identified for possible aquaculture zone development. It is these areas that are targeted for a more detailed

49 Primary Industries and Regions South Australia, Submission 22, p.11.

technical investigation undertaken by [the South Australian Research and Development Institute] to determine the suitability of a zone for aquaculture activities.

When assessing individual aquaculture applications, [Primary Industries and Regions South Australia] Fisheries and Aquaculture uses a strict set of guidelines to assess potential environmental impacts associated with the proposed activities.⁵⁰

4.54 Tasmania has a similar 'zonal' approach to aquaculture:

Under [the *Marine Farming Planning Act 1995*]...marine farming development plans are prepared, designating areas in State waters where marine farming may occur.

All marine farming operations must be licensed under the *Living Marine Resources Management Act*. Licences include environmental conditions to ensure that marine farming operations are sustainable and do not have an unacceptable impact on the marine environment.

[...]

In addition, the Department of Health and Human Services manages the Tasmanian Shellfish Quality Assurance Program under the *Public Health Act 1997* and the *Food Act 1998*. This includes monitoring water quality in shellfish growing areas and the public health status of shellfish on marine farms, to ensure the safety of farmed shellfish for human consumption.⁵¹

4.55 However, in Tasmania, freshwater (on-shore) aquaculture is regulated separately from marine aquaculture. Regulation of the former is undertaken by the Inland Fisheries Service:

Any fish farming proposal that is put forward goes through a rigorous assessment procedure involving consultation and approvals from various Government authorities. There is a coordinated process for reviewing applications that ensures each application meets high and consistent standards in relation to land and water usage, environmental impacts, disease control etc.

In particular the IFS assesses the effects on recreational trout fisheries, including access to these fisheries, the effects on

50 Primary Industries and Regions South Australia, Submission 22, p.11.

51 Tasmanian Department of Primary Industries, Parks, Water and Environment, <http://www.dpiw.tas.gov.au/inter.nsf/WebPages/ALIR-4YS2XW?open>, viewed 12/9/12.

migratory fish and freshwater fauna, and the possibility of fish escaping.

The Service opposes any loss of existing trout fisheries and does not permit privatisation of public waters for this purpose. Similarly, grow-out of farmed fish in public access inland waters has not been permitted. The Service believes that a properly controlled fish farm does not pose a risk to Tasmania's fisheries.⁵²

- 4.56 New South Wales, with a smaller share of aquaculture than other states, has in place:

[A] whole of government approach to the development of the oyster and land based [aquaculture industry] in NSW to promote sustainable industry development. NSW Oyster and Land Based Sustainable Aquaculture Strategies detail a streamlined approval process and advice on best aquaculture practice for species and site selection, design and operation. Research undertaken on aquaculture production assists with industry development and supports the development of policy and management practices for future developments in NSW.⁵³

The role of science for aquaculture

- 4.57 Evidence throughout the inquiry repeatedly stressed the central importance of science for all aquaculture operations.

- 4.58 The Australian Prawn Farmers Association (APFA) submitted:

Everything prawn farmers do has been underpinned by millions of dollars worth of research and has covered topics in relation to key environmental issues, domestication, genetics, disease resistance, water quality, sustainable feed, spatial analysis, seasonal forecasting, energy auditing, value adding and better feed conversion ratios.⁵⁴

52 Tasmanian Inland Fisheries Service, <http://www.ifs.tas.gov.au/fishery-management/commercial-fisheries/fish-farms>, viewed 12/9/12.

53 New South Wales Department of Primary Industries, <http://www.dpi.nsw.gov.au/fisheries/aquaculture/about-aquaculture>, viewed 12/9/12.

54 Australian Prawn Farmers Association, Submission 45, p.1.

- 4.59 As noted by the Australian Shellfish Quality Assurance Advisory Committee, some aquaculture products are 'high risk' and their safety for consumers relies heavily on good science:

Bivalve shellfish are a high risk food group as they are filter feeders and therefore can concentrate contaminant particulates from their environment. Contaminants that potentially impact on human health include pathogenic bacteria and viruses, toxic algae, heavy metals and pesticides...Science plays a pivotal role in maintaining the currency of the Australian Shellfish Quality Assurance Program when facing the wide range of issues found in the diverse growing areas around the country.⁵⁵

- 4.60 The CSIRO has engaged in partnerships with industry to produce research that has a direct benefit for aquaculture productivity of species that are already commercially grown:

CSIRO and its industry partners have responded to this challenge by established long-term (decadal) R&D programs to optimise the cumulative benefits of domestication and selective breeding of Atlantic salmon, Pacific oysters, prawns and abalone. Other species, including barramundi, amenable to domestication are likely to be the next candidates for selective breeding. Recent achievements of these partnerships include: 60 per cent increase in the harvest yields of black tiger prawns; 15 per cent genetic response to selection for growth and disease resistance in farmed Atlantic salmon; 10 per cent genetic gains in growth rates of abalone; and 8.5 per cent improvement in the economic performance of Pacific oysters.⁵⁶

- 4.61 The Australian Institute of Marine Science documented numerous areas of aquaculture research needing further attention:

Key areas requiring science input include microbial management; the identification of nutritional requirements for the target species; development of specific feeds that are independent of wild harvested fishmeal and fish oils; and seawater processing engineering to ensure the highest quality seawater.

[...]

As the use of antibiotics in food production systems is being increasingly banned, the use of 'good' bacteria as probiotics to

55 Australian Shellfish Quality Assurance Advisory Committee, Submission 2, p.1.

56 CSIRO, Submission 23, p.16.

control the establishment and spread of 'bad', or pathogenic bacteria is becoming increasingly important. The development of technologies that minimize production loss due to pathogens is an important area for research.

[...]

As in agriculture, there is an ongoing requirement for research to allow the development of microbial and parasite management regimes that either minimise their impact or neutralise them.⁵⁷

- 4.62 As well as maintaining and improving the viability of existing aquaculture operations, research and development is vital for assisting the expansion of aquaculture. As noted above, there are a number of opportunities for new aquaculture production, but strategic choices must be made to direct effort in the most promising direction. Research is central to illuminating the costs and benefits of new aquaculture possibilities:

Aquaculture is dependent on scientific research. Knowledge about the life history and biology of candidate species enables informed decision-making regarding the most appropriate species to culture for return on investment and also to ensure the best growth rates and food conversion rates.⁵⁸

- 4.63 The role of science in particular elements of aquaculture will be discussed below, as follows:

- transition of species from wild to farmed;
- future development of aquaculture; and
- exporting science.

Transition from wild to farmed

- 4.64 As already discussed, there is considerable work involved in the domestication of wild fish stocks for aquaculture production. During the course of the inquiry, the Committee toured a number of research projects where this work is being done.

- 4.65 At the Western Australian Department of Fisheries in Perth, the Committee was able to see close hand the research being done to develop ranching techniques for octopus as well as attempting to 'close the life cycle' of *Octopus tetricus*, which would enable the production 'of octopus

57 AIMS, Submission 20, p.5.

58 AMSA, Submission 14, p.5.

juveniles in sufficient numbers and to a sufficient size to make it a commercially successful aquaculture operation.⁵⁹

4.66 At the Australian Institute of Marine Science in Townsville, the Committee was impressed with the ongoing work on Rock Lobster:

current research at AIMS is closing the life cycle of the Tropical Rock Lobster – a species of high interest to the Asian market – through expertise in seawater processing engineering, nutrition and disease mitigation for high health.⁶⁰

4.67 The CSIRO identified two examples where the domestication of species was a priority, and would likely assist the industry greatly if achieved. Firstly:

There has been a progressive decline in the value of the southern bluefin tuna (SBT) 'farming' industry over the past decade, in contrast to the growth of Atlantic salmon. The industry relies on the fattening of wild caught fish in sea cages. There are no domesticated SBT broodstock and the industry has yet to succeed in rearing any stocks to sexual maturation in captivity.⁶¹

And secondly:

Farmed production of Australian native barramundi is mainly from pond-based systems in Queensland and the Northern Territory, with one sea cage operation in North Western Australia. Some domesticated stocks have been produced but selective breeding of this species is still in early stages of development. Growth of the industry to its current farm gate value of \$27 million has been from progeny of wild broodstock.⁶²

4.68 As recently reported in the *Australian*, closing the southern bluefin tuna life cycle is 'the blue sky for aquaculture'. Following the efforts of the Clean Seas company, the paper described how it:

has 24 very large tuna in a 3.5 million litre tank which it uses as brood stock. Water temperature and light is manipulated to trick the fish into spawning. It is the first and only company to get captive southern bluefin tuna to spawn; the only problem is that for a species that migrates annually from the tropical waters of Indonesia to the Southern Ocean, the waters off Port Lincoln are

59 'Octopus aquaculture comes to the fore', *Intrafish*, March 2012, pp.20-21.

60 AIMS, Submission 20, p.2.

61 CSIRO, Submission 23, p.15.

62 CSIRO, Submission 23, p.15.

proving too cold for the juveniles to survive. For the third year running, the tuna fingerlings bred in captivity have failed to make it to summer.⁶³

- 4.69 The Australian Institute of Marine Science outlined the importance of conducting rigorous and comprehensive research into species before domestication can be attempted:

Scientific evaluation of wild species is essential to identify the select few species that meet the prerequisites for domestication. These species must have reasonable fast growth rate; the ability reproduce in captivity; the ability to be held in reasonably high densities; manageable nutritional requirements and future market prospects. Few species are suitable for domestication. As a comparison, only 0.08 per cent of land plant species and 0.0002 per cent of land animal species have been domesticated and it is expected that there will be similar limits on the suitability of species for aquaculture. In both cases timelines for domestication are in many years to decade.⁶⁴

- 4.70 So-called 'closing the life cycle' can involve research with many generations of animals:

In many instances the transition from wild fisheries to aquaculture is facilitated by selective breeding programs that give animals a growth and survival advantage over their wild counterparts. For example, the Sydney rock oyster industry, historically dependent on wild-caught spat, is increasingly transitioning to use of hatchery-produced spat due to the development of disease-resistant and fast growing lines⁶⁵.

- 4.71 The Committee sought an overview of the process used by the FRDC to decide whether to support research on species that hold potential for aquaculture production. Dr Patrick Hone (FRDC) said:

The FRDC has a long record of emerging species for aquaculture. We effectively have three types of aquaculture. We have what we call 'total market failure', where no-one owns it – we call them orphans – and there is no actual industry. Rock lobster was a classic. When it started there was no industry, no members, no nothing. We created a complete structure around the country to

63 The Australian, *Catch 22*, the Weekend Australian Magazine, 15/9/12, p.18.

64 AIMS, Submission 20, p.4.

65 AMSA, Submission 14, p.5.

create rock lobster aquaculture. We are now stepping back a bit because the commercial investors are coming in...

When it moves from orphaned it then goes to what we call 'in the shed'; in other words, it is that pioneer phase. People are tinkering. It is not quite commercial; it is not quite an orphan. There are identified people in it. We have had various industries go through that phase. Abalone was a classic. Abalone started with nothing. It then went through that shed phase where you have to do different types of research. Usually what we do is research when it is in the shed, which is in the public space. It is the health research, the nutrition research. We get away from the IP bit at that stage. That is where they think they have a competitive advantage. If they have it, go out and flog it. Good stuff.

Finally, you have the commercial industries: the salmons, the tunas, the pearls et cetera. That is another completely different thing.

[...]

To get into that orphan group – the ones to identify – we have a set of criteria. We only will farm species endemic to Australia. In other words, they have to occur in Australia. It is not going to be introduced. You have to demonstrate a market. You have to demonstrate a business plan – in other words, that your estimates of the cost of production will be less than the sale price that you think you will get for it. You think that might be trivial, but you would be surprised how few people do the business plan. So there are a range of things. Plus you have to show evidence that the state government has a plan in which it will allow the approval of the planning process.⁶⁶

- 4.72 Lastly, to produce carnivorous fish through aquaculture, these fish need to be fed other fish or a cost-effective substitute.
- 4.73 Professor Michael Harte (World Wildlife Fund) said that if three kilograms of wild fish are used as feed to produce one kilogram of farmed fish, 'you have to question that equation'.
- 4.74 Alternative sources of feed need to be developed to reduce the 'fish-in, fish out' ratio. A low ratio not only has environmental advantages, but also reduces costs and potentially makes more fish species viable within

66 Dr Patrick Hone, *Committee Hansard*, 12 September 2012, p.13.

an aquaculture business model. Agricultural by-product, for example, could re-processed into fish feed.

Future development of aquaculture

- 4.75 Evidence to the Committee highlighted an emerging aquaculture opportunity that would combine the production of food with the production of other valuable products, so-called 'Aquaculture 2.0':

links the mass production of food with the production of high-value molecules for sophisticated and emerging biotechnological applications...

In terms of the research impetus to develop this aquaculture 2.0 we need to revitalise marine biotechnology as a research strategy and link that to the development of aquaculture.⁶⁷

- 4.76 Professor Carlos Duarte (UWA) argued that Australia should redevelop a capacity in marine biotechnology, which he said had been neglected in recent years:

Australia used to be a big player in the field of marine biotechnology, but it made a strategic decision for some Commonwealth agencies that were playing the leadership role, like AIMS and, to a lesser extent, the CSIRO, to abandon this research line. Unfortunately, they did so just at the time that the major revolution of molecular biology and modern biotechnology was about to emerge. These opportunities would have been with us if we had maintained that research effort in marine biotechnology. Now we need to start from scratch but, again, it is imperative that we couple those research efforts in marine biotechnology with those in food production from the ocean.⁶⁸

- 4.77 Professor Euan Harvey (UWA) noted the opportunities to collocate marine aquaculture with energy production, both through renewable energy technology and by using infrastructure established to extract offshore oil and gas.⁶⁹

- 4.78 Witnesses expressed support for the possibility of this kind of integration, but averred that, to their knowledge, it remains mostly unexplored:

67 Professor Carlos Duarte, *Committee Hansard*, 12 September 2012, p.8.

68 Professor Carlos Duarte, *Committee Hansard*, 12 September 2012, pp.8-9.

69 Professor Euan Harvey, *Committee Hansard*, 9 July 2012, p.26.

In terms of energy, I am not sure where we sit, but the potential for tidal energy up there must be enormous.⁷⁰

Yes, there probably is a lot of opportunity. Marine based aquaculture in those areas is a very big specialised investment, so it is not something to be done on the side but there may be opportunities to bring those things together.⁷¹

- 4.79 In addition, research is being conducted to explore the viability of powering onshore aquaculture operations with renewable energy, particularly in the context of a changing climate:

[Australian Prawn Farmers Association] recently received a Farm Ready grant to better prepare farmers for the impacts of climate change. This confirmed that increasingly isolating Australia's sustainable prawn farms from the ocean makes them highly dependent on energy for aeration, and the project examined options for powering farms using renewable energy in line with future developments in the carbon economy. Following the project a study of seasonal weather forecasting was also begun to help farmer's manage production in the face of changing weather.⁷²

- 4.80 Opportunities for aquaculture engineering and technology are many and varied. Aquaculture methods could be used to produce seaweed and algae, amongst others. The CSIRO submitted:

There is a global need to develop cost effective alternatives to wild-harvest fishmeal and fish oil. CSIRO recently has achieved significant advances toward this goal. These include the bioconversion of low value agricultural plant waste to a high value bioactive feed that doubles the rate of farmed prawns...⁷³

- 4.81 These options should be explored to improve productivity and capitalise on the growth of Asian markets, a trend highlighted in the Australian Government's Asian Century White Paper.⁷⁴

70 Professor Neil Loneragan, Murdoch University, *Committee Hansard*, 9 July 2012, p.44.

71 Associate Professor Alan Lymbery, Murdoch University, *Committee Hansard*, 9 July 2012, p.44.

72 APFA, Submission 45, p.5.

73 CSIRO, Submission 23, p.10

74 Australian Government, 'Australia in the Asian Century: White Paper', October 2012, pp.44-45 and p.124.

National policy

4.82 In 2003, the Primary Industries Ministerial Council considered and endorsed the *National Aquaculture Policy Statement*, which provides that:

All Australian Governments commit to working in partnership with the aquaculture industry to achieve maximum sustainable growth, whilst also meeting national and international expectations for environmental, social and economic performance.⁷⁵

4.83 The statement recognises and acknowledges numerous benefits from aquaculture, as well as identifying the importance of research and development to the expansion of aquaculture in Australia. The statement commits the governments, together, to four main areas of work:

- The facilitation of effective, efficient, timely and transparent planning and approval processes [for domestication, growth, regulation, statutory approvals and the use of Commonwealth waters];
- Supporting and recognising continual improvement of ecologically sustainable aquaculture practices and to develop environmental performance standards for aquaculture;
- Provide and encourage investment for growth [especially in the areas of capital, branding and research and development]; and
- Ensuring participation of the Australian industry and broader community in aquaculture planning and management.⁷⁶

4.84 However, much evidence throughout the inquiry focussed on the absence of a comprehensive, detailed and widely agreed national policy to encourage the growth of aquaculture.

4.85 Some evidence drew parallels between the absence of a more comprehensive national policy and the relatively small size of aquaculture today. The National Aquaculture Council submitted:

The uneven rate of expansion of the aquaculture industry is symptomatic of the absence of a whole of government approach to enable aquaculture development. This can easily be remedied by promulgating a National Policy Statement on the importance and its commitment to aquaculture's ongoing development, especially

75 Primary Industries Ministerial Council, *National Aquaculture Policy Statement*, 2003, p.1.

76 Primary Industries Ministerial Council, *National Aquaculture Policy Statement*, 2003, pp.4-5.

given its importance to address Australia's trade imbalance of this critical protein source.⁷⁷

Policy areas

4.86 The FRDC has identified a number of areas of priority for the industry, that need reflection in or coordination by national policy:

- engage with local communities to increase awareness of aquaculture practices and demonstrate the sustainability, positive economic contribution and excellent products created by aquaculture, and in so doing secure endorsement to gain access to waters and natural resources;
- align legislation across jurisdictions to motivate and promote efficient, sustainable investments by industry based on competitive advantages of regions and ecosystems;
- continue to invest in innovation and closely monitor and adopt/adapt technologies available in advanced aquaculture operations worldwide;
- jointly plan development strategies for each species and identify the key research areas that drive the strategic competitive advantages of that species.⁷⁸

4.87 The CSIRO has argued that the expansion of aquaculture could be integrated into more broad planning regimes:

All Australian aquaculture industries operate within strict environmental regulations applied at national and state government levels...CSIRO suggests there is a need to integrate climate change and resource use research into spatial planning frameworks that include environmental and social values, species selection, production systems, market demand, and other uses of environments surrounding areas of aquaculture potential. Such integrated R&D will be important to enable industry and policy makers to realise the full potential for sustainable growth of Australian aquaculture.⁷⁹

4.88 The CSIRO has also noted the potential for indigenous economic development through aquaculture:

A preliminary spatial analysis of Australia's northern coastline identified 1.2 million hectares that are potentially suitable for pond based marine aquaculture ... Indigenous Australians own a large

77 NAC, Submission 35, p.3.

78 FRDC, Submission 19, p.32.

79 CSIRO, Submission 23, p.16.

percentage of the areas. Aquaculture could play a pivotal role in the future livelihoods in these coastal communities and research has an important role in supporting this development through developing planning instruments for industry and government that permit rigorous, quantitative evaluation of the potential for aquaculture production systems to provide economic and social benefits whilst conserving ecosystem health and biodiversity.⁸⁰

Committee Comment

4.89 A number of areas for national discussion and agreement have been identified throughout the inquiry. These areas for agreement fall under the general categories of national ambition, governance, regional planning and community agreement. A national policy framework would need to address all of these issues:

- National ambition:
 - a national aquaculture production goal;
 - a national process to identify strategic species;
 - a national strategy to promote the economic, social and environmental benefits of aquaculture, as well as promoting the quality of Australian aquaculture products;
 - a national plan to drive indigenous economic development through aquaculture;
 - a national plan to drive market-identification and marketing strategies for new species
- Governance:
 - identifying barriers to aquaculture expansion;
 - identifying ways to remove barriers to expansion, including through regulatory harmonisation and streamlining;
 - promoting a standardised and streamlined environmental assessment process across all jurisdictions;
- Regional planning:
 - a national process to identify regional aquaculture hotspots;

-
- a national process to develop pre-approval templates for aquaculture in these hotspots
 - regional infrastructure plans to facilitate aquaculture expansion;
 - Community agreement:
 - a process for achieving regional community agreement on aquaculture development, balancing economic, social and environmental considerations.⁸¹
 - Technology:
 - Supporting skills training in aquaculture engineering and infrastructure construction.
- 4.90 In general, the framework should consider factors influencing the competitiveness of Australian aquaculture. Australia may wish to lead on environmental standards; however, the challenge is to regulate the industry without making it wholly uncompetitive, which would increase reliance on imports and perpetuate low production standards offshore. State and Federal conservation agreements under the *EPBC Act* are one mechanism that could streamline and minimise regulation.
- 4.91 The Committee believes that aquaculture presents an enormous opportunity for Australia. It holds the potential for considerable economic growth in regional and rural areas, as well as for indigenous economic development. In addition, it represents a path for Australia to contribute even more to the global food supply, improving food security in Australia and overseas.
- 4.92 Aquaculture has been focussed on a fairly narrow range of species, in very particular geographic regions. This has certainly contributed to the success of Australian aquaculture to date: the Tasmanian Salmon industry is a good example of the benefits of focus.
- 4.93 Whilst there is a clear potential for significant growth in aquaculture, the Committee was unable to ascertain an estimate of growth. It is evident that more detailed work on this question is needed. Such an estimate – and a related production goal – would be an important part of a national policy on aquaculture, discussed further below.
- 4.94 The environmental regulation of aquaculture differs around Australia, and is minimal at the federal level. There exists scope for governments to
-

81 CSIRO, Submission 23, p.8.

coordinate and standardise their environmental assessment processes, and this should be the focus of intergovernmental discussion and cooperation.

- 4.95 There is a particular role for the Australian Government to play in developing regional aquaculture plans, as conservation agreements under the *EPBC Act*, as discussed above. The Committee believes that this is a particularly fruitful area for further work and cooperation between the Australian Government and state and territory governments.

Recommendation 11

- 4.96 **The Committee recommends that the Australian Government work with state and territory governments to develop further conservation agreements to streamline assessments under the *EPBC Act*, to facilitate the growth of aquaculture.**
- 4.97 Science has an important part to play in all areas of aquaculture, including improving the productivity and environmental performance of existing aquaculture species, the domestication of wild species, and the future integration of numerous activities in so-called 'Aquaculture 2.0'. The Committee commends researchers around Australia who are working in these fields, contributing to existing and future aquaculture operations in Australia and around the world.
- 4.98 The Committee is concerned about the lack of prominence for aquaculture science in Australia. Whilst the FRDC has a central role in coordinating and funding aquaculture research, its name does not reflect this. Whilst altering the name of the FRDC to include 'aquaculture' would be a formal reflection of its full mandate, this would entail considerable administrative costs. The Committee does not believe that such costs would be justified however, and looks forward to continuing efforts by FRDC to clearly state its involvement in aquaculture research.
- 4.99 Australia can make a contribution to food security overseas, through the export of Australian research, development and technology. The Committee believes that this should be an important priority of Australia's work to improve food security through its aid program. The Committee looks forward to seeing AusAID and the Australian Centre for International Agricultural Research continuing to export Australian aquaculture science to improve food security, particularly in the region.

- 4.100 The Committee believes that the current national policy statement on aquaculture is a valuable agreement on the need for a national approach to aquaculture. However, it falls well short of providing the kind of detailed policy necessary to promote the expansion of aquaculture. The Committee notes that, in the Government's Discussion Paper for a National Food Plan, aquaculture is not discussed in much detail. This may be symptomatic of the small size of the industry, but also due to the lack of a comprehensive national policy focus for aquaculture. Submissions on the discussion paper are available online, and some deal with aquaculture.⁸²
- 4.101 If aquaculture is to achieve its growth potential, Australia must have a comprehensive national policy, with the agreement of all state and territory governments, as well as the Australian Government. As noted above, there are a number of priority areas for national policy, and the Committee believes that a national policy should be developed that identifies the roles and responsibilities of all governments to make such a national policy work.

Recommendation 12

- 4.102 **The Committee recommends the Australian Government, through the Council of Australian Governments, lead the development and agreement of a detailed and comprehensive national aquaculture policy, including the roles and responsibilities of all governments, to address (amongst others) the issues contained in paragraph 4.89, at least in the areas of:**
- **National ambition;**
 - **Governance;**
 - **Regional planning;**
 - **Community agreement;**
 - **Technology; and**
 - **International competitiveness**

82 See, for example, Western Australian Aquaculture Council submission, available at <<http://www.daff.gov.au/nationalfoodplan/process-to-develop/issues-paper/submissions-received>>

Biosecurity, certification and international aid and cooperation

- 5.1 This chapter deals with three major issues that were considered during the inquiry, that are relevant to both wild fisheries and aquaculture: biosecurity, certification and international aid and cooperation.
- 5.2 The biosecurity section deals with animal health, screening of seafood imports, the link between seafood and public health, and the translocation of species within Australia.
- 5.3 The certification section discusses third party certification of seafood products, generally directed at consumers. Certification generally provides consumers with information about the environmental sustainability of seafood products, as well as a guarantee of the origin and custody of seafood products along the supply chain, also known as traceability. Products are accordingly labelled to signify compliance for sustainability or traceability.
- 5.4 The last section on international cooperation and aid considers Australia's involvement with international fisheries organisations and opportunities to assist other countries with fisheries management and aquaculture production through aid programs.

Biosecurity

- 5.5 This section will consider biosecurity generally as it relates to marine animals, as well as government biosecurity policy and food standards.

- 5.6 The setting of biosecurity policy and rules occurs mostly at a national level, through DAFF. Within national borders, the States and Territories have their own systems for enforcement and outbreak detection.

Biosecurity and marine animals

- 5.7 Overall, Mr Ian Thompson (DAFF) said that biosecurity science is closely linked to Australia's comparative trade advantage:

Biosecurity science underpins Australia's freedom from many major aquatic animal diseases and invasive marine species that are found elsewhere in the world. That freedom gives us an advantage in trade, productivity and sustainability.¹

- 5.8 The Australian Government, Mr Thompson said, is well-placed to carry out certain biosecurity and border protection functions in support of developing the aquaculture industry.²

- 5.9 Dr Patrick Hone (FRDC) said:

By and large, I think Australia is well served by its biosecurity processes. We have very conservative rules. Tasmania, for example, has some extremely conservative biosecurity rules which serve that industry well.³

- 5.10 Australia is free from most aquatic animal diseases present elsewhere in the world.⁴ Were an outbreak to occur, this could cause substantial economic losses. DAFF submitted:

Losses in productivity from diseases of aquatic animals can be massive. Diseases such as ostreid herpes virus resulted in losses of 38 per cent in French Pacific oyster farming in recent years, and an outbreak of a salmon virus in Chile in 2007 caused unemployment and losses of over half of Chile's salmon production. Research into the development of species resistant to disease, disease treatments, and improved management practices is crucial to minimising the impact of disease on production, and flow-on effects such as unemployment.⁵

1 Mr Ian Thompson, *Committee Hansard*, 30 May 2012, p.2.

2 Mr Ian Thompson, *Committee Hansard*, 30 May 2012, p.3.

3 Dr Patrick Hone, *Committee Hansard*, 20 June 2012, p.8.

4 DAFF, Submission 24, p.8.

5 DAFF, Submission 24, pp.8-9.

- 5.11 In addition, Mr Ian Thompson (DAFF) stated that animal aquatic health is 'relatively poorly understood in comparison to land animals',⁶ a point reiterated in other evidence.
- 5.12 Current capacity to prevent, confine or eradicate aquatic diseases is limited, according to the CSIRO. Dr Nicholas Elliott (CSIRO) said that although there have been recent improvements:
- ...generally, in the fisheries and aquaculture area, we have a very low capability in that area. We have very few scientists working in that area. It is an area that has been identified as one where we need more because there is no doubt about it: we will get more diseases.⁷
- 5.13 Other evidence to the inquiry also expressed concern about Australia's capacity to deal with a major disease outbreak in aquatic animals. As noted by Murdoch University, the approach taken to biosecurity is generally reactive, and in relation to wild fish stocks is constrained by limited scientific knowledge:
- Our ability to minimise and appropriately manage disease risks in natural fish populations is constrained by a relatively poor understanding (compared with terrestrial wildlife) of the diversity, life cycles and transmission capabilities of infectious agents. This means that we have a very limited capacity to develop proactive preventative measures and we rely almost invariably on reactive responses after the outbreak has occurred.⁸
- 5.14 The same submission noted that aquaculture shares some of the problems of wild fisheries, relating to limited scientific knowledge. However, because aquaculture utilises artificial environments, a disease outbreak could be 'on a scale rarely seen in natural populations.'⁹ CSIRO submitted that, whilst some Australian disease outbreaks are linked to foreign outbreaks, some have been specific to Australia. It further submitted that disease outbreaks would continue to occur, 'possibly more frequently with changing climate'.¹⁰
- 5.15 Imported fish is a major source of potential disease risk. Associate Professor Tim Day (University of Melbourne) said:

6 Mr Ian Thompson, *Committee Hansard*, 30 May 2012, p.1.

7 Dr Nicholas Elliott, *Committee Hansard*, 12 July 2012, p.16.

8 Murdoch University, Submission 8, p.3.

9 Murdoch University, Submission 8, p.4.

10 CSIRO, Submission 23, p.8.

Bringing species in from overseas is a recipe for bringing in new diseases. That can be done sometimes – it has been done successfully with salmon, obviously – but you have to be really careful. Salmon has been associated with some very severe diseases in aquaculture that have spread to wild stocks of salmon.¹¹

5.16 Dr Adam Main (Tasmanian Salmonid Growers Association) said:

Biosecurity and the import of other products is a threat from a supply point of view, but it is also a major threat from disease and pest point of view. If something was to come into Tasmania, like an ISA [infectious salmon anaemia] or any number of diseases that they have in the Northern Hemisphere or in Chile, it would be the end of our industry.¹²

5.17 According to evidence from Professor Euan Harvey, ballast water from ships is another potential source of marine pests.¹³

5.18 Managing aquatic animal health relies on suitable veterinary science and veterinarians with appropriate expertise. According to Murdoch University:

Globally, veterinarians with skills in aquatic animal health, to meet the disease challenges of capture fisheries and aquaculture, are in short supply. Very few veterinary courses in Australia, or overseas, provide even basic training in fish diseases. Exacerbating the shortage of fish health professionals is the very limited availability of advanced training courses in fish health within Australia. Although some courses are run by organisations such as the University of Tasmania, Murdoch University and CSIRO, these are typically limited in scope, often ad hoc and usually pitched at a relatively basic, entry-level audience.¹⁴

5.19 More generally, opportunities to develop new aquaculture species in Australia needs 'basic biological knowledge', Prof Day said, such as growth rates and immune systems.¹⁵

11 Assoc Prof Tim Day, *Committee Hansard*, 29 June 2012, p.9.

12 Dr Adam Main, *Committee Hansard*, 12 July 2012, p.61.

13 Prof Euan Harvey, *Committee Hansard*, 9 July 2012, p.24.

14 Murdoch University, Submission 8, pp.3-4.

15 Assoc Prof Tim Day, *Committee Hansard*, 29 June 2012, p.10.

Government biosecurity policy

5.20 Current national animal health policy is under review, following the lapsing of the most recent AquaPlan. DAFF's submission explains the origin of the AquaPlan policies:

AQUAPLAN 1998-2003, Australia's first national strategic plan for aquatic animal health, was developed after mass mortality events in pilchards in southern Australian waters in 1995 and 1998...These mortality events highlighted the need for a coordinated national approach to aquatic animal health management in Australia, and in 1997 the Australian Government committed \$2.7 million to develop a comprehensive aquatic animal health plan for Australia. A joint government/industry body was established in 1997 to develop AQUAPLAN 1998-2003.¹⁶

5.21 According to DAFF, a number of outcomes resulted, including:

- Establishing Australia's National List of Reportable Diseases of Aquatic Animals and mechanisms to update the list.
- Establishing emergency aquatic animal disease preparedness and response arrangements including AQUAVETPLAN and the Aquatic Consultative Committee for Aquatic Animal Diseases.
- Establishing the Aquatic Animal Health Subprogram (AHHS) of the Fisheries Research and Development Corporation (FRDC) to coordinate and lead aquatic animal health research and development ...[and]
- Raising awareness of aquatic animal health issues through a range of educational and awareness materials e.g. Aquatic Animal Diseases Significant to Australia: Identification Field Guide.¹⁷

5.22 A second AquaPlan was implemented from 2005 to 2010, which has now lapsed. According to evidence from DAFF, 'The feedback from industry and other stakeholders is supportive of a new plan and steps are being taken to progress a new plan for another five-year period.'¹⁸

5.23 AquaPlan 2005 to 2010 noted that for continued growth, the aquaculture industry requires access to the skills of aquatic health professionals.¹⁹ The Committee strongly agrees that education and training to ensure the

16 DAFF, Submission 24, pp.9-10.

17 DAFF, Submission 24, pp.9-10.

18 Dr Robert Biddle, *Committee Hansard*, 12 September 2012, p.2.

19 Primary Industries Ministerial Council, 'AquaPlan 2005-2010: Australia's National Plan for Aquatic Animal Health', July 2005, p.30.

relevant skills and services are available is critical to the future of the aquaculture industry.

- 5.24 Mr Reg Butler (DAFF) said with land-based diseases, the usual arrangement is for costs to be shared between government and industry, through a levy. Mr Butler pointed out, however, that even for some terrestrial species, there is not a cost sharing arrangement for disease response. Mr Ian Thompson (DAFF) added that the breadth of any levy applied across an industry may be complex, as a 'disease of oysters is not necessarily going to affect salmon'.²⁰

Food standards and consumers

- 5.25 Evidence during the inquiry highlighted the links between the health of aquatic animals, human health, consumer confidence and industry viability. Dr Nicholas Elliott (CSIRO) said:

Certainly I think with aquaculture, as with any primary production, you have got to look at the whole system because everything is dependent. So if you do not have a healthy environment you will not have a healthy animal, you will not have a healthy industry and you will not have healthy consumers.²¹

- 5.26 Dr Adam Main (TSGA) said:

One of the things that the salmon industry has done very well is to have a fish health surveillance program, and we can demonstrate freedom from diseases. From a social licence, sale point and biosecurity point of view we have the processes in place to demonstrate that freedom.²²

- 5.27 Food Standards Australia and New Zealand (FSANZ) has an important role in protecting human health through the development of food standards, which are then replicated by governments:

Standards developed by FSANZ do not have a direct legal effect. Rather, the *Food Regulation Agreement* provides that the States and Territories adopt or incorporate the Code into state or territory law.²³

20 Mr Reg Butler and Mr Ian Thompson, *Committee Hansard*, 30 May 2012, p.7.

21 Dr Nicholas Elliott, *Committee Hansard*, 12 July 2012, p.20.

22 Dr Adam Main, *Committee Hansard*, 12 July 2012, p.61.

23 FSANZ, Submission 46, p.1.

5.28 Under this arrangement, food standards are implemented by governments across Australia and New Zealand. A performance audit in 2010 by the Australian National Audit Office considered FSANZ's administration of its food standard functions. However, as the audit report noted:

The scope of this audit did not include the bodies primarily involved in food regulation policy or the bodies responsible for the implementation, compliance and enforcement of the standards.²⁴

5.29 A further performance audit of the collective implementation of the standards would not be possible under the *Auditor-General Act 1997*, as such an audit would need to include state and territory government agencies not subject to the above Act.

5.30 Evidence highlighted the important link between aquatic animal health and an industry with strong social licence.

Committee comment

5.31 The Committee is concerned that although the seafood industry and, in particular, aquaculture operations, are vulnerable to disease, there are questions over Australia's capacity to fully contain outbreaks. The Committee also notes that as some diseases affect certain species (and, therefore, are a risk to only a section of the industry) this could make charging an industry-wide levy for services challenging. It remains, however, an important priority deserving Australian Government action.

Recommendation 13

5.32 **The Committee recommends that the Australian Government update AquaPlan as soon as possible.**

24 Australian National Audit Office, *Audit Report No.15 2010-11*, p.17.

Recommendation 14

- 5.33 **The Committee recommends that the Department of Agriculture, Fisheries and Forestry develop a model for funding and enhancing aquatic disease control and aquatic veterinary training, possibly including an industry levy, as a matter of urgency.**
- 5.34 The Committee is concerned that the current arrangements by which food standards are implemented and enforced are not sufficiently reviewable. In particular, the inability of the Auditor-General – or the equivalent officers in Australian jurisdictions or New Zealand – to conduct a performance audit of the entire food standards system is a problem. In the absence of such an audit, it is difficult to establish whether the current food standards system as a whole is working properly.
- 5.35 Given the importance of maintaining disease-free status of Australian seafood, the Committee believes that the Legislative and Governance Forum on Food Regulation, which comprises the relevant Australian and New Zealand ministers, should address this gap in assessing food standards performance.

Recommendation 15

- 5.36 **The Committee recommends the Legislative and Governance Forum on Food Regulation formulate an independent mechanism for conducting a performance audit or review of the entire food standards system.**

Certification

- 5.37 Standards of fisheries management in Australia and internationally are coming under increasing scrutiny through certification schemes, which can provide consumers with information about where a seafood product has been sourced. As seafood companies compete to achieve higher rankings or ratings against criteria within certification schemes, this has the potential to influence the future direction of fisheries research as market forces demand higher standards of evidence-based science to demonstrate claims of sustainable fisheries management.
- 5.38 As examples, the Marine Stewardship Council (MSC) has developed global certification programs, for both traceability and sustainability:

- the ‘environmental standard for sustainable fishing’, which certifies the sustainability of fish stocks, environmental impacts and effective management systems;²⁵ and
- the ‘chain of custody standard for seafood traceability’, which certifies that a business has systems, records, proof that seafood has been sourced from an accredited supplier and an ability to ensure products are not substituted or mixed.²⁶

And the Australian Marine Conservation Society’s ‘sustainable seafood guide’ (not intended as a certification scheme) uses the tags ‘say no’, ‘think twice’ and ‘better choice’ against species commonly sold at fishmongers and at restaurants.²⁷ Ms Tooni Mahto (AMCS) said the Guide is ‘based on publicly available literature, from peer reviewed academic papers to government stock status reports and fisheries updates.’²⁸

5.39 Dr Patrick Hone (FRDC) explained the connection between markets and science:

There is public scrutiny, corporate social responsibility, social licence to operate – you might call it anything you want. There are a lot of things happening in the community where people want demonstrable evidence that you are doing things sustainably.²⁹

5.40 He continued:

Some countries like Canada are going through a trial of what is called the FAO based code of conduct for a sustainable fishing standard. ... our goal as scientists is to make sure that we harmonise, that we reduce the duplication and that all fisheries can afford it, if that is where we are going in the future, some demonstrable certification.³⁰

5.41 Both the aquaculture and fishing industries have recognised the rise of certification schemes. Dr Adam Main (Tasmanian Salmonid Growers Association) said:

25 MSC, ‘The MSC environmental standard for sustainable fishing’ at <http://www.msc.org/about-us/standards/standards/msc-environmental-standard>

26 MSC, ‘MSC chain of custody standard for seafood traceability’, at <http://www.msc.org/about-us/standards/standards/chain-of-custody>

27 AMCS, ‘About the Guide’, at http://www.sustainableseafood.org.au/Sustainable-Seafood-Guide-Australia.asp?active_page_id=696

28 Ms Tooni Mahto, *Committee Hansard*, 15 August 2012, p.8.

29 Dr Patrick Hone, *Committee Hansard*, 20 June 2012, p.3.

30 Dr Patrick Hone, *Committee Hansard*, 20 June 2012, p.3.

Certification and accreditation and standards have become vitally important for our industry to move forward. ... I do not know if the accreditation necessarily gives us social licence. It helps us demonstrate sustainability in one aspect and to an end user – possibly the purchasers of our seafood – but we do work on the social licence issue in quite a different way.³¹

5.42 Mr Neil Stump (Tasmanian Seafood Industry Council) said:

We do have to acknowledge that the community at large is placing increasing scrutiny over the need for sustainable fisheries, and there has been a lot of debate about the need for independent third party certification of sustainable fisheries and aquaculture practices.³²

5.43 The CSIRO's submission warned that reducing assessments and monitoring could put the industry at risk, because of the linkage between product marketability and management standards:

Reduction in such programs would place at risk the scientific basis of Australia's claim of good management and potentially threaten high-value markets that demand high environmental standards and demonstration of ecologically sustainable practices, such as through the Marine Stewardship Council certification.³³

5.44 Professor Michael Harte (WWF) said that certification for standards is important: 'it is about showing that you have the chain of custody and that you meet globally agreed standards for sustainable fisheries management,' he said, adding:

We see truly outstanding examples of companies and fisheries that are leading the way not just in Australia but globally, yet they are dragged down to the same level as the guy who takes his tinny out, throws his net over the side and turfs a couple of turtles overboard which the net brought up.³⁴

5.45 Mr Ian Thompson (DAFF) said:

We do not see there is a role for government to come in over the top and impose something but we encourage it as an advantage to Australian producers so that people know where their food is

31 Dr Adam Main, *Committee Hansard*, 12 July 2012, p.59.

32 Mr Neil Stump, *Committee Hansard*, 12 July 2012, p.54.

33 CSIRO, *Submission 23*, p.7.

34 Prof Michael Harte, *Committee Hansard*, 29 June 2012, p.28.

coming from. We encourage it in terms of truth in labelling so that people know what they have.³⁵

- 5.46 However, Professor Kearney said that third-party certification schemes were mostly about 'making money' for non-government organisations who sell their guidebooks. He said that certification is unnecessary because fisheries legislation already imposes the need for sustainability. If a problem arose, he said, 'the government should be held to account and made to fix it.' In any event, he said, 'our fisheries are extraordinarily sustainable, with very, very few exceptions.'³⁶
- 5.47 Professor Kearney emphasised, however, that certification for sustainability is distinct from certification for product traceability.³⁷
- 5.48 His submission observed that there are 'no essential qualifications or experience' required to conduct an assessment for third party guides or accreditation schemes, which he stated are then sold as independent scientific assessments by groups 'that have a self interest in misrepresenting the state of Australia's fisheries'.³⁸

Committee Comment

- 5.49 The Committee endorses the development of independent product certification. Although one witness argued that certification for sustainability is unnecessary, in general the industry, environmental groups and governments were supportive. Inherent in such certification are particular judgments about the relative importance of differing measures of sustainability: if consumers are sympathetic to the judgments of a particular certification scheme, they can make decisions about purchases accordingly.
- 5.50 At the same time, Australian governments have a legislated responsibility to ensure the sustainability of fisheries, whilst acknowledging that there are varying levels of confidence about the sustainability of individual fisheries and ecosystems. All governments compile data on fish stocks to inform decisions about fisheries management. This data should be placed in the public domain to support findings about fisheries and ecosystems sustainability. Consumers who share governmental judgments about sustainability can rely on government data to inform their purchases.

35 Mr Ian Thompson, *Committee Hansard*, 30 May 2012, p.8.

36 Prof Bob Kearney, *Committee Hansard*, 29 June 2012, p.19.

37 Prof Bob Kearney, *Committee Hansard*, 29 June 2012, p.20.

38 Prof Bob Kearney, Submission 6, p.5.

- 5.51 The Committee believes that the Australian Government should collect and publish national data about fish stocks and ecosystems, as is expected in late 2012 (discussed in Chapters 1 and 2). However, the Committee does not recommend that the Australian Government should move to the next stage of developing a certification scheme. Such schemes are maturing and the Australian Government should confine its role to reporting national data.
- 5.52 Without mimicking available consumer guides, government-published information should be readily accessible, easy to understand, and should give clear advice about the sustainability of a fish stock or its ecosystem. This could take the form of fact sheets, with clear and systematic indications of the sustainability of particular species from particular ecosystems. Where there is doubt about a particular measure of sustainability, an emerging trend, or specific remedial action being taken by governments, this should be communicated and updated as necessary.
- 5.53 As well as the expected high-level and technical publication in a national report, data should also be published for specific species and ecosystems.
- 5.54 In addition to direct use by members of the public, third parties can use this information as a foundation for independent research.

International cooperation and aid

- 5.55 According to the Food and Agriculture Organisation, wild fisheries production has reached a plateau that will not increase until the world's fish stocks are more effectively managed.³⁹ While Australian fisheries and aquaculture production is well-managed by global standards, other regions of the world may face food security issues in the future due to unaddressed management issues. Australia contributes to efforts internationally to overcome these problems through participation in international agreements, giving direct assistance through its aid programs and exporting technology.
- 5.56 Australia has involvement with international fisheries agreements that are both regional and global in scope. Australia participates in regional fisheries management organisations (RFMOs), which aim to protect species on the high seas or migratory species, such as tuna. Mr Ian Thompson (DAFF) said:

39 *The State of World Fisheries and Aquaculture 2010* (FAO, Rome, 2010), p.42.

In terms of governance, the institutional structures and relationships for science and fisheries are quite different to land based science. ...fish do not take notice of our boundaries and they swim internationally and between jurisdictions. It means we have to work internationally on our science and we have to work with our state colleagues on domestic matters.⁴⁰

5.57 He continued:

Internationally, the issues are around shared stocks – migratory species such as tunas and swordfish – and we have responsibilities under international treaties to cooperate in science and information to inform conservation and management.⁴¹

5.58 Australia's RFMO membership includes the following:

- Commission for the Conservation of Southern Bluefin Tuna (CCSBT);
- Indian Ocean Tuna Commission (IOTC);
- South Pacific Regional Management Organisation (SPRMO); and
- Western and Central Pacific Fisheries (WCPFC).

5.59 Australian participation in global organisations and agreements includes:

- United Nations Fish Stocks Agreement;
- Food and Agriculture Organisation Committee on Fisheries;
- United Nations Law of the Sea (UNCLOS); and
- Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR).

5.60 In addition, Australia has fisheries management agreements with its northern neighbours where maritime boundaries are shared, such as the Torres Strait Treaty between Australia and Papua New Guinea.

5.61 Australia can also make a significant contribution to improvements in food security for developing nations through its aid programs. According to Professor Carlos Duarte (UWA): 'The technologies for aquaculture are highly transferable.'⁴² He further suggested that 'we believe that there is

40 Mr Ian Thompson, *Committee Hansard*, 30 May 2012, p.1.

41 Mr Ian Thompson, *Committee Hansard*, 30 May 2012, p.1.

42 Professor Carlos Duarte, UWA, *Committee Hansard*, 12 September 2012, p.9.

enough potential to satisfy the food requirements of the nine billion people if we develop a more intelligent approach to aquaculture.’⁴³

- 5.62 The Pacific Islands manage a delicate food security situation and supply chains due to relative isolation and economies of scale. Some Pacific Island nations, reliant on fish as a source of food, are predicted to incur a supply shortfall by 2030.⁴⁴
- 5.63 The Australian Government is a member of the Network of Aquaculture Centres (NACA) in the Asia-Pacific, an organisation that:
- promotes rural development through sustainable aquaculture. NACA seeks to improve rural income, increase food production and foreign exchange earnings and to diversify farm production. The ultimate beneficiaries of NACA activities are farmers and rural communities.⁴⁵
- 5.64 In this regard, Australia is well-placed to offer assistance to countries in the Pacific region, using the expertise of its scientists. The Australian Centre for International Agriculture Research (ACIAR) has an extensive fisheries program, in particular sustainable aquaculture production and fisheries and aquatic resource management.⁴⁶
- 5.65 Additionally, export of intellectual property may present an avenue to make a financial return on investment in aquaculture and fisheries science. Dr Mike Hall (AIMS) said:
- ...a lot of our focus may not be so much on [aquaculture] production but on the technology associated with production. Potentially, via intellectual property or even our patents, we can protect that. So, if the production is not done in this country for various reasons such as labour costs and that production shifts overseas, at least Australia is in the game of aquaculture by developing technologies that are essential for that production, whether in Australia or overseas.⁴⁷
- 5.66 The recent National Food Plan green paper noted that Australia’s advanced expertise in agricultural and fisheries technology ‘will be sought
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43 Professor Carlos Duarte, UWA, *Committee Hansard*, 12 September 2012, p.9.

44 World Fish Centre, ‘Aquaculture, Fisheries, Poverty and Food Security’, working paper 2011-65, December 2011, p.32.

45 Network of Aquaculture Centres in the Asia-Pacific, <http://www.enaca.org/modules/about/index.php>

46 Australian Centre for International Agriculture Research, ‘ACIAR Fisheries Program Project Profiles 2011-2012’, August 2011.

47 Dr Mike Hall, *Committee Hansard*, 31 July 2012, p.2.

after by developing countries wanting to improve their own agricultural capacity and fisheries management.⁴⁸

Committee comment

- 5.67 Australia is a good global citizen in the area of international fisheries cooperation. With active participation in a number of intergovernmental organisations and contributions to United Nations programs, the Australian Government is assisting with the task of improving the sustainability of fish stocks in the region and around the world.
- 5.68 In addition to cooperation through intergovernmental organisations, Australia can contribute to fisheries management and aquaculture production in other countries through its aid program. The Committee notes that these programs are already underway, though recommends an expansion of aid in this area, especially for Pacific Island nations.
- 5.69 Australian fisheries management – and the science underpinning it – is held in high esteem around the world. Sharing Australian expertise in this area can contribute to global food security, particularly in the South Pacific. Through AusAID and the Australian Centre for International Agricultural Research, Australia can assist other countries improve their own fisheries management practices. The Committee believes that this should be pursued as a priority.

Recommendation 16

- 5.70 **The Committee recommends that, while protecting Australian intellectual property, the Australian Government make available technology and expertise through aid programs dedicated to fisheries management and aquaculture production.**

Recommendation 17

- 5.71 **From within the existing aid budget, the Committee recommends that the Australian Government increase aid to Pacific Island countries for projects and programs relating to fisheries management and aquaculture production.**

48 Australian Government, 'National Food Plan Green Paper', July 2012, p.34



Governance, environmental policy and the way forward

- 6.1 Australia's enormous coastline and the vast oceans in its exclusive economic zone create considerable governance challenges, above and beyond the challenges to fisheries management posed by our federal system. Australia's governance arrangements have various historical origins, including pre-federation responsibilities, constitutional reform over many decades, the elaboration of international law, and the progress of scientific discovery.
- 6.2 The preceding chapters discussed the role of science for fisheries management and aquaculture in considerable depth. The way that science is integrated into government policy and the administration of policy is complex, especially as sustainability concerns have grown in relative importance in recent decades. Although governance arrangements are chiefly a matter of legislation and policy, their structure and operation are profoundly influenced by our knowledge of the natural world. This chapter will consider how governance arrangements can best serve the appropriate integration of science into managing Australia's fisheries and aquaculture industry.
- 6.3 Numerous ongoing shortcomings in Australia's fisheries governance arrangements were identified throughout the inquiry. Whilst many of these shortcomings have neither easy nor obvious solutions, reform can be advanced in an evolutionary way.
- 6.4 This chapter will discuss issues highlighted to the Committee in the following order:
- multi-jurisdiction management of single fisheries;

- the interactions between fisheries management policy and environmental policy; and
 - the separate administration of fisheries management and environment protection, both within the federal bureaucracy and between jurisdictions.
- 6.5 Governance specific to the aquaculture sector is discussed in Chapter 4.
- 6.6 Additionally, towards the end of the inquiry, the Minister for Agriculture, Fisheries and Forestry, Senator the Hon Joe Ludwig, announced a review of the Australia's fisheries management system. This review will also be discussed.
- 6.7 Lastly the chapter contemplates a possible way forward for fisheries management, aquaculture and recreational fishing in Australia.

Multi-jurisdiction management

- 6.8 Whilst the Australian Government has effective jurisdiction over most of its waters, the majority of fisheries production value comes from State-managed fisheries. As pointed out the *Fishery status reports 2010*:

The gross value of production of Commonwealth fisheries has been stable over the last five years, estimated at \$316.7 million in 2009-10. This represents 15 per cent of the total value of Australian fishery production.¹

- 6.9 Within the Commonwealth fisheries, most of the value comes from four fisheries:

The Northern Prawn Fishery, Southern and Eastern Scalefish and Shark Fishery, Southern Bluefin Tuna Fishery and the Eastern Tuna and Billfish Fishery were the four most valuable fisheries, contributing 77.7 per cent of the value of Commonwealth fisheries production.²

- 6.10 Evidence to the inquiry frequently pointed out the artificiality of Australia's internal borders. Whilst Australia has a social need for jurisdictional boundaries, these lines are often irrelevant – or unrelated to – the natural world. Hence, Australia's constitutional arrangements give authority over a single 'natural' fishery to numerous governments. As
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1 ABARES, 'Fisheries Status Reports 2010', October 2011, p.v.

2 ABARES, 'Fisheries Status Reports 2010', October 2011, p.v.

noted by the Hon Harry Woods (FRDC), this arrangement is 'not always [a] good thing, because the fish do not know the borders.'³

6.11 In general, State, Territory and Commonwealth fisheries are managed through a mixture of input controls (such permits and licences) and output controls (such as size, catch and possession limits). Rules and regulations vary among jurisdictions and for particular species or locations, with fishing operators obliged to comply accordingly. Complexities can arise when a target species has a habitat crossing jurisdictional lines.

6.12 The Department of Agriculture, Fisheries and Forestry submitted that multi-jurisdiction fisheries are generally avoided by the use of Offshore Constitutional Settlement arrangements:

When a fishery falls within two or more jurisdictions, an Offshore Constitutional Settlement (OCS) arrangement is generally developed and responsibility is passed to one jurisdiction. OCS arrangements are usually defined in terms of species, fishing method and area and form the basis for ongoing cooperation between governments who share the management responsibilities. Alternatively, a Joint Authority may be formed whereby a fishery is co-managed through the legislation of one jurisdiction.

Currently there are 59 fisheries OCS arrangements in place between the Commonwealth, states and the Northern Territory. Under the terms of these arrangements, the states and Northern Territory generally manage coastal, slow moving or inshore species such as rock lobster and abalone, while the Australian Government manages deepwater or migratory species subject to international agreements such as orange roughy, tuna and billfish throughout their range.⁴

6.13 However, this is not always possible, particularly where a fishery is large and when numerous states are involved. A prominent example is the southern rock lobster fishery, which comes under the jurisdiction of three states (Victoria, South Australia and Tasmania).⁵

6.14 Evidence from Mr Richard Stevens, of the Western Australian Fishing Industry Council, highlighted the interconnectedness of fisheries even

3 Hon Harry Woods, *Committee Hansard*, 20 June 2012, p.6.

4 DAFF, Submission 24, p.8.

5 Victorian Government, *Rock Lobster Fishery Management Plan*, June 2003, p.5.

with Western Australia's considerable isolation from other parts of Australia:

Yes, across the Great Australian Bight there is a southern rock lobster fishery, a small one from Esperance to the bight. There are obviously the migratory species, which tend to be managed by the Commonwealth – the jack mackerel, the blue mackerel, the southern bluefin tuna, the other tuna. Between us and the Territory you have the Spanish mackerel. There is an argument that some of the deepwater snapper go right through the tropics and into Indonesia as well. There is the shark fishery in the north, which again crosses state and international boundaries.⁶

6.15 AFMA explicitly submitted that it 'is of the view that the current suite of OCS arrangements do not deliver efficient and cost effective management of fish stocks.'⁷ Further, AFMA noted, 'too often a commercial fisher has to hold a fishing concession from more than one jurisdiction to fish the same fish stock.'⁸

6.16 The World Wildlife Fund agreed that the current system of fisheries management is impacting on the fishing industry and also the sustainability of fisheries that cross borders:

Fisheries science and management in Australia is typically fishery or jurisdiction-centric. However, increasingly, science is being asked to answer questions on a regional or ecosystem basis that involve overlapping fisheries and jurisdictions. Existing science and management structures and legislation, which generally operate in 'silos', are not well-equipped to deal with this, and there is no efficient and effective mechanism for dispute resolution or negotiation among jurisdictions and stakeholders interacting in the same ecosystem.

[...]

To deliver more sustainable outcomes, the adoption of a cumulative approach to scientific research in fisheries would necessarily entail greater cooperation at all stages in the science and management frameworks.⁹

6 Mr Richard Stevens, *Committee Hansard*, 9 July 2012, p.11.

7 AFMA Submission 29, p.2.

8 AFMA, Submission 29, p.2.

9 WWF, Submission 11, pp.7-8.

- 6.17 The following section will detail the evidence collected about potential simplification and standardisation of fisheries management in Australia, including current efforts by various governments. Environmental policy interactions with fisheries management are then considered.

Simplification and standardisation of fisheries management

- 6.18 A number of witnesses drew attention to the amount of effort and expense required to meet legislative and other requirements demanded of fisheries management in Australia. By simplifying fisheries management some witnesses argued that this could make available more funds for scientific research to progress the industry.

- 6.19 The FRDC cited a report it commissioned in 2009 to assess the impact of current management arrangements on the economic performance of Australian fisheries. According to the FRDC submission:

The report concluded that Australia's commercial wild-catch fisheries across all jurisdictions were under-performing compared to their potential. The value of this under-performance gap across all fishery users was in the order of \$416 million per year, or more than \$1 million forgone per day.¹⁰

- 6.20 Mr Ian Thompson (DAFF) said that fisheries are recognised as having a 'high level' of regulation.¹¹

- 6.21 He said Council of Australian Government's Primary Industries Standing Committee:

...will look at deregulation, regulation streamlining, consistency or institutional frameworks which may make fisheries regulation more streamlined and more efficient.¹²

- 6.22 The Commonwealth Fisheries Association (CFA) expressed its displeasure with the contemporary tendency for AFMA's funding going towards 'overheads... rather than science.'¹³

- 6.23 Dr Nick Rayns (AFMA) explained arrangement's for the Authority's funding:

The fishing industry does pay levies to the government which the authority receives through its appropriation. They constitute

10 FRDC, Submission 9, p.29.

11 Mr Ian Thompson, *Committee Hansard*, 30 May 2012, p.9.

12 Mr Ian Thompson, *Committee Hansard*, 30 May 2012, p.9.

13 Mr Brian Jeffriess, *Committee Hansard*, 20 August 2012, p.21.

about half of the costs of managing domestic fisheries, and currently that is running at about \$13 million a year. In terms of research, though, they pay disproportionately. Probably 75 per cent of our research budget is industry funded.¹⁴

- 6.24 Emeritus Professor Bob Kearney (retired, private capacity) said that Australian fisheries are 'very close to the best managed' in terms of protecting biodiversity and sustainability. However, he was concerned that the industry had not been able to expand:

...unfortunately, they are not well managed at all when it comes to the economics of ensuring the viability of the industries themselves. In fact, the problem there is that most of our fisheries are overcapitalised and Australia does not have a strategic approach to the management of our total fishery. As such, there has been virtually no development of new fisheries in Australia for the last 15 or 20 years, and the strategic issues, the big-picture issues, of how we manage our fisheries and the level of the industry's involvement in that have been totally neglected.¹⁵

- 6.25 Professor Kearney commented that 'there is no Australian fishing industry', but instead 'a collection of different fisheries' and 'not even a national fishing industry body'.¹⁶

- 6.26 Other witnesses argued that development of fisheries management cannot be progressed with current constitutional arrangements demarcating responsibility without regard for the permeation of ecosystems.

- 6.27 Dr Nick Rayns (AFMA) described the Offshore Constitutional Settlement (OCS) as being 'highly complex' and causing 'a lot of difficulty for industry' as this necessitates holding 'multiple concessions to fish the same fish stock.' He said there are almost 60 agreements between the Commonwealth and the States.¹⁷

- 6.28 Professor Euan Harvey (UWA Oceans Institute) said:

One of the big problems... is that ecosystems based fisheries management needs to transcend both state and federal boundaries. A fish does not really care that there is a 200-metre mark; it just happens to swim across; it does not know it has gone from federal to state waters. ...you need to look at a way of

14 Dr Nick Rayns, *Committee Hansard*, 12 September 2012, p.10.

15 Prof Bob Kearney, *Committee Hansard*, 29 June 2012, p.17.

16 Prof Bob Kearney, *Committee Hansard*, 29 June 2012, p.17.

17 Dr Nick Rayns, *Committee Hansard*, 30 May 2012, p.11.

integrating the management concepts across federal and state waters.¹⁸

6.29 Two submissions from private individuals with fisheries backgrounds suggested that Australia should have a single fisheries science and management department, based on models in New Zealand, Norway, the United States and Canada.¹⁹

6.30 According to the CSIRO:

No arrangements currently exist to provide a forum for identifying integrated strategic marine management or for setting spatial management across multiple sectors.²⁰

6.31 Dr James Findlay (AFMA) cited the Australian Fisheries Managers Forum as an example of cooperation, though the case remains that fishers 'might require four or five different licences to use the same boat in the same place catching the same things.'²¹

6.32 Mr Brian Jeffriess (CFA) agreed that a more uniform approach to rules and regulations among jurisdictions would be 'easier' and 'makes sense'. He said: 'We as an industry cannot understand why that issue is not being addressed.'²²

6.33 Not all witnesses were supportive of having uniform and standardised legislation. 'There will be specific species on which it may be appropriate to head in that direction in specific fisheries and others probably not,'²³ said Mr Robert Gott (Tasmanian Department of Primary Industries, Parks, Water and the Environment). Mr Gott said he could understand the industry's position in relation to dealing with multiple jurisdictions, but believed such a move would be costly:

The caution that I urge my colleagues is that this is not simple and is not something where one size fits all, and the complexity and the resources required to head off down a path to achieve it are significant. That needs to be considered in the case of Tasmania where our resources are shrinking to the point where our capacity to engage in significant policy development work involving changes to legislation, changes to business rules, changes to

18 Prof Euan Harvey, *Committee Hansard*, 9 July 2012, p.23.

19 Mr Joshua Aldrige, Submission 15, p.1; Mr Dennis Reid, Submission 16, p.2.

20 CSIRO, Submission 23, p.3.

21 Dr James Findlay, *Committee Hansard*, 30 May 2012, p.12.

22 Mr Brian Jeffriess, *Committee Hansard*, 20 August 2012, p.20.

23 Mr Robert Gott, *Committee Hansard*, 12 July 2012, p.52.

information technology systems comes against that significant cost.²⁴

6.34 Mr Neil Stump (Tasmanian Seafood Industry Council) agreed: 'be careful what you wish for because you might get it,' he said. Mr Stump said there has been 'enough trouble trying to do that at a regional level', such as with abalone, where size limits vary locally depending on growth rates. Standardisation would 'probably not' improve management outcomes, he said.²⁵

6.35 Mr Warwick Nash (Queensland Department of Agriculture, Fisheries and Forestry) said any decision on standardisation of rules and catch limits for fish species 'needs to be based around their biology.'²⁶

6.36 He said:

I used to work in the abalone fishery in Tasmania. One of the striking things about that fishery is that you have abalone growing to different sizes in different parts of the state and reaching sexual maturity at different sizes.²⁷

6.37 He continued:

So a single size limit for the different areas of the state just did not make sense because, for a given size limit, you had populations that were not protected at all – they had not had a chance to reproduce at all before they entered the fishery – and in other areas they would have been reproducing for many years before they entered the fishery. I think the same pattern applies to some of our fisheries along the eastern coast of Australia.²⁸

6.38 Mr Nash said there may be merit in other aspects of standardisation, such as for registering boats and improving the exchange of fisheries data between jurisdictions and institutions.²⁹

6.39 However, evidence from a number of governments highlighted the work currently being done to improve regulatory efficiency across all jurisdictions. Evidence from AFMA highlighted the progress that it and the NSW Government are making:

24 Mr Robert Gott, *Committee Hansard*, 12 July 2012, p.52.

25 Mr Neil Stump, *Committee Hansard*, 12 July 2012, p.56.

26 Mr Warwick Nash, *Committee Hansard*, 20 August 2012, p.5.

27 Mr Warwick Nash, *Committee Hansard*, 20 August 2012, p.5.

28 Mr Warwick Nash, *Committee Hansard*, 20 August 2012, p.5.

29 Mr Warwick Nash, *Committee Hansard*, 20 August 2012, p.5.

In New South Wales we are committed to a set of principles about stock based management and we are even undertaking a single stock assessment at the moment for a number of the species. New South Wales used to do a stock assessment and we used to do one and then compare scientists at 10 paces. We are actually getting over all of that now, but there is still a long way to go.³⁰

- 6.40 A specific example of collaboration was provided by the South Australian Government. In the case of the southern rock lobster fishery, the governments of South Australia and Victoria are working together to reduce inefficiencies:

...South Australia is undertaking rock lobster assessments for the Victorian rock lobster fishery, with additional fisheries likely to be assessed under similar contractual arrangements in the future.³¹

- 6.41 A high-level focus on productivity, through the Council of Australian Governments (COAG), is also seeking to improve fisheries regulation:

Under the Primary Industries Standing Committee, we are pursuing a fisheries productivity agenda with the states which will look at deregulation, regulation streamlining, consistency or institutional frameworks which may make fisheries regulation more streamlined and more efficient. We have also been speaking to colleagues in the environment department about how we can better align fisheries management arrangements and environmental protection arrangements, and similar agendas occur at the state level. ABARES is also commencing a study relating to fisheries regulation, looking at the costs of the current regulatory framework, compliance with it and the extent to which it could be improved. It is very early days. The work has barely started, but we see it fitting into the work that we are doing with the states.³²

Committee Comment

- 6.42 It is considerably difficult to understand the relationships and hierarchies between governments, research institutes and industry in the fisheries and aquaculture sector. There is also a lack of clarity about the strategic direction of scientific research priorities and the scientific principles behind fisheries management practices.

30 Dr James Findlay, *Committee Hansard*, 30 May 2012, p.14.

31 Primary Industries and Regions South Australia, Submission 22, p.10.

32 Mr Ian Thompson, *Committee Hansard*, 30 May 2012, p.9.

- 6.43 Whilst the Committee received varying evidence about the complexity of Australia's fisheries management arrangements, there is an obvious lack of data about the inefficiencies of the current system. The Committee is supportive of ongoing efforts to harmonise fisheries management across multiple jurisdictions, but acknowledges that no single jurisdiction has a monopoly on good management.
- 6.44 As discussed in Chapter 2, there is also a need to assess the efficiency of the industry and to investigate whether its current structure and size is ideal.
- 6.45 In order to properly understand the size of these problems, the Committee believes that a review should be undertaken into the current structure of the industry across Australia and the efficiency and effectiveness of the inter-jurisdictional governance arrangements for Australian fisheries (particularly as they relate to fisheries that exist in multiple jurisdictions). Such a review could be led by the Productivity Commission. The review could also look at existing Offshore Constitutional Settlement arrangements, and assess their contribution and suitability for encouraging efficient fisheries management in Australian waters.

Recommendation 18

- 6.46 **The Committee recommends that the Treasurer refer to the Productivity Commission an inquiry into the efficiency of the fisheries industry across Australia and the efficiency and effectiveness of the inter-jurisdictional governance arrangements for Australian fisheries.**

Fisheries management and environmental policy interactions in Australia

- 6.47 This section summarises the objectives of fisheries management and related environmental legislation in Australia and then outlines its historical development. Stakeholder's views are then given on the separate administration of fisheries management and environmental approvals.

The objectives of environmental and fisheries legislation

- 6.48 In Australia, fisheries are managed towards multiple economic, social and environmental objectives. This requires a balance to be struck between

maximising net economic returns, improving accountability, and ensuring environmental protection and conservation. Despite the need to balance multiple aims and the different focuses of each Act, there is a common thread between *FM Act*, the *FA Act* and the *EPBC Act* in terms of the need to adhere to the principles of ecologically sustainable development (ESD) and ecosystems-based management (EBM).

6.49 The objectives within the *FM Act* require the Minister and AFMA to be:

- (a) implementing efficient and cost-effective fisheries management on behalf of the Commonwealth; and
- (b) ensuring that the exploitation of fisheries resources and the carrying on of any related activities are conducted in a manner consistent with the principles of ecologically sustainable development (which include the exercise of the precautionary principle), in particular the need to have regard to the impact of fishing activities on non-target species and the long term sustainability of the marine environment; and
- (c) maximising the net economic returns to the Australian community from the management of Australian fisheries; and
- (d) ensuring accountability to the fishing industry and to the Australian community in AFMA's management of fisheries resources; and
- (e) achieving government targets in relation to the recovery of the costs of AFMA.³³

6.50 The *FM Act* also requires the Fisheries Minister, AFMA and Joint Authorities to 'have regard' to the additional objectives of:

- (a) ensuring, through proper conservation and management measures, that the living resources of the AFZ [Australian Fishing Zone] are not endangered by over-exploitation; and
- (b) achieving the optimum utilisation of the living resources of the AFZ; and
- (c) ensuring that conservation and management measures in the AFZ and the high seas implement Australia's obligations under international agreements that deal with fish stocks; and
- (d) to the extent that Australia has obligations -
 - (i) under international law; or

33 *Fisheries Management Act 1991*, s.3.

(ii) under the Compliance Agreement or any other international agreement; in relation to fishing activities by Australian-flagged boats on the high seas that are additional to the obligations referred to in paragraph (c) – ensuring that Australia implements those first-mentioned obligations; – but must ensure, as far as practicable, that measures adopted in pursuit of those objectives must not be inconsistent with the preservation, conservation and protection of all species of whales.³⁴

- 6.51 The FM Act requires AFMA to ‘determine plans of management for all fisheries.’ Once in place, following consultative and other processes: ‘AFMA must perform its functions, and exercise its powers, under this Act in relation to the fishery in accordance with the plan of management.’³⁵
- 6.52 As well as fisheries management focused legislation, approval of fisheries management plans are subject to separate environmental assessments in accordance with the EPBC Act.³⁶
- 6.53 The first three objectives of the EPBC Act are:
- (a) to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance; and
 - (b) to promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources; and
 - (c) to promote the conservation of biodiversity; ...³⁷
- 6.54 Within the three related Acts – the *FM Act*, the *FA Act* and the *EPBC Act* - common thread between them of ESD is replicated and defined in the same terms, as:
- (a) decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations;
 - (b) if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;

34 *Fisheries Management Act 1991*, s.3.

35 *Fisheries Management Act 1991*, s.17(1) and 17(10).

36 AFMA, ‘Annual Report 2010-11’, p.10.

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

- (c) 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;
- (d) the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making;
- (e) improved valuation, pricing and incentive mechanisms should be promoted.³⁸

Historical development

- 6.55 The objectives listed above and the related fisheries and environmental policy have a long history. The key historical documents include the:
- 1989 Fisheries 'New Directions' Policy Statement;
 - 1991 *FM Act and FA Act*;
 - 1995 International Code of Conduct for Responsible Fishing
 - 1997 Managing Commonwealth Fisheries committee report;
 - 1998 Oceans Policy;
 - 1999 *EPBC Act*;
 - 2000 Commonwealth Policy on Fisheries Bycatch
 - 2003 'Looking to the Future: A Review of Commonwealth Fisheries Policy'
 - 2007 'Harvest Strategy Policy';
 - 2007 'Guidelines for the Ecologically Sustainable Management of Fisheries';
- 6.56 In 1995, Australia agreed to the *Code of Conduct for Responsible Fishing*, a voluntary international instrument adopted at the UN Food and Agriculture Organisation (FAO) Conference by 170 member governments. The Code outlines standards for fisheries management, conservation, trade and aquaculture, amongst others; Article 6.1 states: 'The right to fish carries with it the obligation to do so in a responsible manner so as to

38 *Fisheries Management Act 1991, s.3A; Fisheries Administration Act 1991, s.6A; Environment Protection and Biodiversity Conservation Act 1999, s.3A.*

ensure effective conservation and management of the living aquatic resources.’³⁹

- 6.57 The Australian Government’s 1989 Fisheries Policy Statement - *New Directions for Commonwealth Fisheries Management* – recognised the relationship between environmental protection and fisheries by stating:

The full range of marine ecosystems must be protected so as to maintain biological food chains and associated habitats and to ensure continued biodiversity.⁴⁰

- 6.58 The 1989 Statement also recognised the need to create the Australian Fisheries Management Authority. This was achieved with passage of the *FM Act* and *FA Act* in 1991. The Statement advocated that the creation of this new body was necessary to ‘streamline the administration of management programs’ and also to ‘enable the Government to effect its responsibilities in a flexible open and less bureaucratic way’.⁴¹

- 6.59 Notwithstanding acknowledgement in the 1989 statement of the need to balance protecting the environment and maximising the fishing industry’s economic efficiency, tensions persisted. These tensions were a major theme in this Committee’s 1997 report entitled ‘Managing Commonwealth Fisheries’.⁴²

- 6.60 The 1998 Oceans Policy pronounced the need for bioregional planning to achieve environmental outcomes:

At the core of the Oceans Policy is the development of Regional Marine Plans, based on large marine ecosystems, which will be binding on all Commonwealth agencies.⁴³

- 6.61 In 1999, the *EPBC Act* was a major reform of how Australia approached environmental regulation. It also added a new dimension to fisheries management by widening responsibility to include the environment

39 FAO, *Code of Conduct for Responsible Fisheries* (FAO, Rome, 1995); see also DAFF, ‘Code of Conduct for Responsible Fishing’, at <http://www.daff.gov.au/fisheries/legal-arrangements/code-conduct>

40 Department of Primary Industries and Energy, ‘New Directions for Commonwealth Fisheries Management in the 1990s’, December 1989, p.75.

41 Department of Primary Industries and Energy, ‘New Directions for Commonwealth Fisheries Management in the 1990s’, December 1989, p xiv.

42 House of Representatives Standing Committee on Primary Industries, Resources and Rural and Regional Affairs, ‘Managing Commonwealth Fisheries: the Last Frontier’, June 1997.

43 Australian Government, ‘Australia’s Oceans Policy: Vol. 1’, 1998, p.2.

portfolio (currently SEWPaC), whereas historically fisheries agencies had had sole responsibility.⁴⁴

6.62 All of AFMA's fisheries management plans are subject to the requirements of the *EPBC Act* and are accredited under Part 10 (strategic assessment), Part 13 (wildlife interactions) and Part 13A (export approval).⁴⁵

6.63 This also extends to fisheries in State and Territory waters: fisheries in all Australian jurisdictions must undergo an initial assessment; thereafter agencies may supply annual assessments, starting with a simplified report and, if changes occur, graduating to additional comprehensive reports.⁴⁶

6.64 The Commonwealth Policy on Fisheries Bycatch was released in 2000, which aimed to achieve 'bycatch reduction, improved protection for vulnerable and threatened species and minimising adverse impacts of fishing on the marine environment'⁴⁷. The primary reason behind the policy was to 'ensure that direct and indirect impacts on marine systems are taken into account and managed accordingly'⁴⁸.

6.65 The last major review of Commonwealth fisheries policy occurred in 2003 with the release of the 'Looking to the Future' report. This review confirmed commitment to the concept of ecosystem-based fisheries management. The report stated that DAFF and AFMA:

...will continue to contribute towards the integration of Commonwealth fisheries policy arrangements with new and emerging national policy initiatives relevant to marine resources management, including ecosystem-based fisheries management, bycatch, regional marine planning, marine protected areas and the development of an updated National Coastal Policy.⁴⁹

6.66 However, management of Commonwealth fisheries reached a low point during the mid-2000s. AFMA's 2003-04 Annual Report stated:

Stock assessments and scientific analysis increasingly confirm the view of the AFMA Board – that Australia's fish resources have now reached the limit of their sustainable exploitation in most

44 AFMA, Submission 29, p.4.

45 AFMA, Annual Report 2010-11', p.10.

46 SEWPaC, 'Guidelines for the Ecologically Sustainable Management of Fisheries', (Edition 2), p.4.

47 DAFF, 'Fisheries Bycatch', at <http://www.daff.gov.au/fisheries/environment/bycatch>

48 DAFF, 'Fisheries Bycatch', at <http://www.daff.gov.au/fisheries/environment/bycatch>

49 DAFF, 'Looking to the Future: A Review of Commonwealth Fisheries Policy', July 2003, p.48.

Commonwealth fisheries. In general, catches cannot be increased in the short term, and for some stocks, must be further reduced.⁵⁰

- 6.67 In the same report, AFMA recognised the need to increase its efforts and introduced the concept of the ecological risk management (ERM) framework:

AFMA is also advancing 'ecosystem based' approaches to fisheries management. This means managing the impacts of fishing on target species, non-target species and the broader marine environment. Underpinning this approach are ecological risk assessments (ERAs) for fisheries to identify management priorities.⁵¹

- 6.68 In November 2005, a structural adjustment package totalling \$220 million, mostly comprising exit assistance, was offered to businesses and communities affected by the impact of reduced access to certain fisheries at risk of overfishing. At the same time, AFMA was issued with a Ministerial Direction pursuant to s.91 of the *FA Act* to recover the overfished stocks and develop a best practice harvest policy. A later evaluation of this approach in 2010 found that in general, 'net economic returns have improved in the post-buyback period', which was linked to 'fishery level cost decreases associated with reductions in vessel numbers as well as other factors including positive impacts from environmental and stock variation and previous management changes.'⁵²
- 6.69 The 'Guidelines for the Ecologically Sustainable Management of Fisheries' were released by SEWPaC in 2007 to assist with the process of compliance with aspects of the *EPBC Act*.⁵³
- 6.70 The Harvest Strategy Policy (HSP) was also released in 2007. It states that harvest strategies should 'control the fishing intensity in order to achieve defined biological and economic objectives' to achieve 'the sustainable and profitable utilisation of Australia's Commonwealth fisheries in perpetuity'. A qualification in the HSP noted that it is one mechanism among others to achieve ecologically sustainable and profitable fisheries.⁵⁴

50 AFMA, 'Annual Report 2003-04', p.4.

51 AFMA, 'Annual Report 2003-04', p.5.

52 ABARES, 'Impact of the Structural Adjustment Package on the Profitability of Commonwealth Fisheries', February 2010, pp.11-13.

53 SEWPaC, 'Guidelines for the Ecologically Sustainable Management of Fisheries', (Edition 2), p.2.

54 DAFF, 'Commonwealth Fisheries Harvest Strategy: Policy and Guidelines', September 2007, p.2 and p.4.

- 6.71 The design of the harvest strategy is based around a calculation of:
- maximum economic yield (MEY) and
 - maximum sustainable yield (MSY)
- 6.72 When there is excessive fishing effort, fish stocks decrease, dollar returns decline and costs rise. This is illustrated by the figure below (the abbreviations are prefixed with 'R' for 'return' and 'E' for 'effort'):

Figure 3 Harvest Strategy Policy yield model

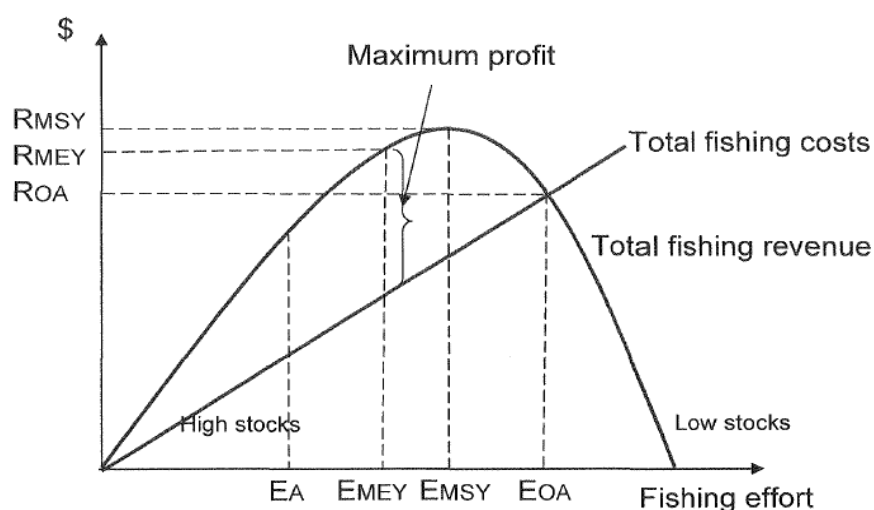


Figure 6: Maximum economic yield (see text for explanation).

Source DAFF, 'Commonwealth Fisheries Harvest Strategy: Policy and Guidelines', September 2007, p.28

- 6.73 Regarding the 2007 Harvest Strategy Policy, Dr James Finlay (AFMA) said it, 'sets some very tight rules about what we are trying to achieve'.⁵⁵
- 6.74 The Harvest Strategy Policy and the Commonwealth Policy on Fisheries Bycatch were currently under review at the time this inquiry was conducted.
- 6.75 In 2010 the result of this long history of developing in fisheries management and related environmental legalisation was that 13 fisheries were regarded as overfished or subject to overfishing (compared to 24 in 2005) and the number of uncertain status fisheries also reduced to 27 (down from a peak of 52 in 2007).⁵⁶

55 Dr James Findlay, *Committee Hansard*, 30 May 2012, p.13.

56 ABARES, 'Fisheries Status Reports 2010', October 2011, p.9.

- 6.76 The Australian Bureau of Agricultural and Resource Economics Sciences' (ABARES) 2010 Fisheries Status Report attributed these improvements to the: 2005 Fishing Future buyback; AFMA's imposition of stricter management measures (catch reductions, area and depth closures); and DAFF's 2007 Harvest Strategy Policy, amongst other actions.⁵⁷
- 6.77 The CSIRO's submission agreed that there has been progress:
- Australia's fisheries jurisdictions have adopted ecosystem-based fisheries management as a policy goal. This is consistent with demand for environmentally friendly produced products. Spatial management and participatory or co-management are also key features of the fishery management system. Our fisheries are well managed by global standards.⁵⁸

Separate administration of fisheries management and environment protection

- 6.78 The administration of fisheries management and environmental protection activities is separated within the federal administration itself, and also between state and federal governments. These divisions have been the focus of significant public comment and also in evidence presented during this inquiry.
- 6.79 The Australian Government administers its fisheries management and marine environment protection responsibilities separately: the former through the Australian Fisheries Management Authority, the latter through the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC). As noted above, these responsibilities are legislated, respectively, through the *Fisheries Administration Act 1991*, the *Fisheries Management Act 1991* and the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*.
- 6.80 In 2009, the Hawke Review of the *EPBC Act* found that:
- The Act has made a major contribution to shifting fisheries management from a target species-based management approach towards ecologically sustainable practices... Following application

57 ABARES, 'Fisheries Status Reports 2010', October 2011, p.8.

58 CSIRO, Submission 23, p.3.

of the Act, the environmental performance of Commonwealth-managed fisheries improved significantly.⁵⁹

- 6.81 The Hawke review addressed the issue of overlap between fisheries management and national environmental protection (both State and Commonwealth). The review noted the concerns of industry, as well as State and Territory governments, that the separate administration of the *EPBC Act* can cause additional assessments and potential 'double jeopardy'.
- 6.82 However, the Review did not accept that a case for major change had been made, stating that:
- fisheries assessments under the *EPBC Act* should continue to be conducted independently of fisheries management agencies. However, with the knowledge gained from several rounds of fishery assessments, improvements could be made to streamline and refine the assessment process without compromising environmental outcomes.⁶⁰
- 6.83 The report stated that if duplication were to be reduced, this should not be at the expense of the *EPBC Act's* standards.⁶¹
- 6.84 However, the Review did recommend that the *EPBC Act*:
- Be amended so that the fishery provisions under Parts 10, 13 and 13A are streamlined into a single strategic assessment framework for Commonwealth and State and Territory-managed fisheries to deliver a single assessment and approval process.⁶²
- 6.85 The Government has formally responded to the recommendations of the Hawke Review, and has also engaged with the Council of Australian Governments to progress a streamlining agenda for environmental approvals. The Government's position and progress of the COAG initiative are discussed below, following consideration of evidence to the inquiry.
- 6.86 The debate over the separate administration of fisheries management and environmental legalisation, as well as measures available to minimise

59 Dr Allan Hawke, *Report of the Independent Review of the Environment Protection and Biodiversity Conservation (EPBC) Act 1999*, October 2009, p.206.

60 *Report of the Independent Review of the Environment Protection and Biodiversity Conservation (EPBC) Act 1999*, October 2009, p.208.

61 *Report of the Independent Review of the Environment Protection and Biodiversity Conservation (EPBC) Act 1999*, October 2009, p.206.

62 *Report of the Independent Review of the Environment Protection and Biodiversity Conservation (EPBC) Act 1999*, October 2009, p.209 – Recommendation 40.

unnecessary regulatory burden, were a prominent theme of this inquiry. Much of the evidence to the inquiry contested the view that the separation of environment protection and fisheries management continued to provide benefits.

6.87 AFMA, in its submission, remained concerned that 'the duplication of process and poor specification of the *EPBC Act* in relation to fisheries remains.' AFMA argued that while the *EPBC Act* 'adds an additional layer of bureaucracy', it 'does not fill any gaps in fisheries legislation regarding the objectives relating to resource sustainability.'⁶³

6.88 AFMA submitted that:

arguments for the application of the *EPBC Act* to fisheries have been around transparency of process and decision making, involvement of conservation stakeholders, preventing marine species from going extinct and providing a 'level playing field' for all native species being exported from Australia. In AFMA's case in the 1990s and early 2000s there was a perception from some stakeholders that the Authority's Board was industry dominated and therefore biased in its decision making.

In 2008, following the Uhrig Review, AFMA moved from being a *Commonwealth Authorities and Companies Act 1997* agency to a *Financial Management and Accountability Act 1997* agency. In doing so the AFMA Board became a Commission and its membership changed to reflect these new arrangements including that industry office bearers cannot serve as Commissioners.⁶⁴

6.89 Dr Nick Rayns (AMFA) told the Committee:

We would like to see the change go a bit deeper than the Hawke review has done... We are almost both doing the same thing in quite a few areas. Sustainable fisheries is our business and we would like to see our agency placed in a position of leading that business, with support from the environment agency – perhaps more in an audit role, if that is appropriate, but certainly not in a direct fisheries management role.⁶⁵

6.90 Dr Rayns also stated that AFMA is using money and time to satisfy the requirements of environmental legislation, which, given 'that AFMA is a

63 AFMA, Submission 29, p.4.

64 AFMA, Submission 29, p.5.

65 Dr Nick Rayns, *Committee Hansard*, 30 May 2012, p.11.

cost-recovery agency... a lot of the time we are also talking about the fishing industry's money.'⁶⁶

6.91 AFMA elaborated on this issue in a supplementary submission to the Committee:

...AFMA is currently assessed under three parts of the *EPBC Act*. ... Although these assessments have been completed for all Commonwealth-managed fisheries, there is a requirement for further assessments when management arrangements change substantially. Removing this requirement and relying on the management plan public comment process and other environmental assessments under Parts 13 and 13A of the *EPBC Act* would significantly streamline the process for introducing or amending management plans.⁶⁷

6.92 Ms Trixi Madon (CFA) said that the Hawke Review of the *EPBC Act* had made a recommendation 'about streamlining the two Acts... but still not at the priority level we would like to see'.⁶⁸

6.93 Mr Brian Jeffriess (CFA) said that although the *EPBC Act* has 'some real benefits to fisheries', there should be legislative reform. He identified two areas that are 'taking money away from scientific research':⁶⁹

- overlapping obligations for assessments. There is a need for 'internal rationalisation' of the *EPBC Act* to reduce overlapping obligations to routinely conduct similar assessments of the same fisheries (such as tuna, which Mr Jeffriess said is covered by four individual assessments). He said there should be 'internal rationalisation' and;⁷⁰
- 'duplication between the *FM Act* and the *EPBC Act*'. Mr Jeffriess argued that Fisheries Management Act should be the primary point of accountability and the *EPBC Act*'s provisions should be a 'last resort'.⁷¹

6.94 IMAS was also not convinced that fisheries legislative and policy objectives work in unison. IMAS stated in its submission:

The management of fisheries harvests in all Australian jurisdictions involves a hierarchy of decision-making with

66 Dr Nick Rayns, *Committee Hansard*, 30 May 2012, p.11.

67 AFMA, Supplementary Submission 29.1, p.1.

68 Ms Trixi Madon, *Committee Hansard*, 20 August 2012, p.22.

69 Mr Brian Jeffriess, *Committee Hansard*, 20 August 2012, pp.21-22.

70 Mr Brian Jeffriess, *Committee Hansard*, 20 August 2012, pp.21-22.

71 Mr Brian Jeffriess, *Committee Hansard*, 20 August 2012, pp.21-22.

protection of [the] ecosystem and biodiversity placed above [the] sustainable economic performance of fisheries.⁷²

- 6.95 Professor Harvey (UWA Oceans Institute) expanded these ideas further, recommending:

There is a need for a greater integration of fisheries and environmental legislation between all levels of government and within the levels of government. One of the biggest challenges that we are facing over here is the disconnect between some of the environmental legislation and some of the fisheries legislation. They do not align, they do not work together, they work in opposition and they do not create certainty. In fact, people spent a lot of time and wasted a lot of money.⁷³

- 6.96 Mr Ian Thompson (DAFF) told the Committee there are no plans to dispense with the *FM Act* or the *EPBC Act*; however, he said there is an idea of having a process of mutual recognition of assessments.⁷⁴

- 6.97 He said he did not believe that present legislative arrangements are 'wholly inefficient', although:

The industry have drawn to our attention opportunities for improvements where they see similar activities being regulated under different pieces of legislation that could be more streamlined.⁷⁵

- 6.98 Mr Thompson added:

We have also been speaking to colleagues in the environment department about how we can better align fisheries management arrangements and environmental protection arrangements, and similar agendas occur at the state level.⁷⁶

- 6.99 Mr Stephen Oxley (SEWPaC) informed the Committee that the Australian Government is hopeful of moving to an audit role, rather than continuing with active assessment, through building capacity and confidence in management systems. Mr Oxley said that the Australian Government is considering whether 'we can get to the point where fisheries management

72 IMAS, Submission 27, p.5.

73 Prof Euan Harvey, *Committee Hansard*, 9 July 2012, p.26.

74 Mr Ian Thompson, *Committee Hansard*, 12 September 2012, p.4.

75 Mr Ian Thompson, *Committee Hansard*, 12 September 2012, p.10.

76 Mr Ian Thompson, *Committee Hansard*, 30 May 2012, p.9.

regimes in toto are assessed or accredited... so we do not have this continuing system of the assessment of individual fisheries one by one'.⁷⁷

- 6.100 Mr Oxley noted that the Australian Government has made a full response to the Hawke Review, and agreed in principle to the streamlining recommendation.⁷⁸ However, as detailed in the Government's response:

The government agrees with the intent of this recommendation, but notes that the fisheries assessment provisions under the EPBC Act serve different functions – for example, ecological communities and listed migratory species in a Commonwealth area (Part 13), strategically assessing impacts on matters of national environmental significance (Part 10), and ecologically sustainable management of commercial export fisheries (Part 13A).

[...]

The government supports reducing the administrative and regulatory process involved in fishery assessments, including through less frequent assessments of well-managed fisheries.

In streamlining these provisions, it will be essential to preserve the above functions. In doing this, the government recognises that any legislative changes will need to be consistent with the extent of Commonwealth constitutional power, as well as with Australia's Offshore Constitutional Settlement on provisions governing fisheries operating in Commonwealth or state/territory waters.

Consistent with Recommendations 4 and 6 [relating to strategic assessments and the accreditation of state approvals processes], the government supports in principle a progressive shift under the amended Act from individual assessments of fisheries to accreditation of fisheries management arrangements. The government will ensure that the amended Act provides the appropriate legislative capabilities for this to occur.⁷⁹

- 6.101 In addition to better coordination between fisheries management and environmental administration at the Commonwealth level, there have been advances by COAG towards streamlining environmental approvals.

77 Mr Stephen Oxley, *Committee Hansard*, 19 September 2012, p.2.

78 Mr Stephen Oxley, *Committee Hansard*, 19 September 2012, p.2.

79 Australian Government, 'Australian Government Response to the Report of the Independent Review of the *Environment Protection and Biodiversity Conservation Act 1999*', August 2011, p.73.

6.102 In April 2012, 'COAG agreed to prioritise the development of assessment and approval bilateral agreements under the *EPBC Act*.'⁸⁰ Towards this end, in November 2012 Australian Government released a draft *Framework of Standards for Accreditation* of state assessment processes. The framework is expected to be finalised by December 2012.⁸¹

Committee Comment

6.103 The Committee notes the evidence calling for fisheries management and environment protection to be undertaken by a single agency within the Australian Government. The Committee also notes the view of the Hawke Review that these responsibilities continue to be administered separately.

6.104 Whilst a single administrative body would likely provide administrative efficiencies, the Committee is aware of the considerable improvements to fisheries sustainability that have occurred as a result of the separate administration of the *EPBC Act* from the *FM Act*. The Committee does not believe that, at this time, there is enough evidence to support a move to abolish the separate administration of the *EPBC Act* requirements from the *FM Act* requirements.

6.105 However, the Committee believes that progress can be made at an administrative level to provide the industry with a more streamlined process. This should include working towards a single application process and potentially a single point of contact with the Australian Government for fisheries approvals. Ideally the aim should be towards a 'one-stop-shop' arrangement from an applicant's perspective; with any necessary co-ordination between government agencies happening behind the scenes as much as possible.

6.106 The Committee also notes the broader recommendation to allow greater accreditation of State environmental assessment processes, and looks forward to seeing this advance through the Council of Australian Governments, noting the Minister's release of a draft *Framework of Standards for Accreditation* of state assessment processes on 2 November 2012.

80 SEWPaC, 'Reform of the EPBC Act', at <http://www.environment.gov.au/epbc/reform/index.html>

81 SEWPaC, 'Reform of the EPBC Act', at <http://www.environment.gov.au/epbc/reform/index.html>

Recommendation 19

- 6.107 **The Committee recommends that the fisheries management and environment protection responsibilities of the Australian Government continue to be administered by separate agencies, but that these agencies work towards a single application process (and potentially a single point of contact) for fisheries approvals, with the aim of providing a 'one-stop-shop' from the applicant's perspective.**

Stakeholder engagement

- 6.108 During the inquiry the absence of a peak national body for fishing (across all sectors) that could provide central representation became evident. This proved a challenge for the Committee in terms of identifying a cohesive national position from fishing stakeholders. It may also be part of the difficulty with communication between government and fishing stakeholders. There are some representative bodies at a national level and peak bodies within the States, but these groups are relatively fragmented and appear to lack the resources to coherently address high-level strategic policy relevant to fisheries. If a peak fishing body could be established it may be well-placed to participate in discussions to set national research and development priorities.

Recommendation 20

- 6.109 **The Committee recommends that commercial fishing organisations in Australia form a national peak body. This process could be initially assisted by the Department of Agriculture, Fisheries and Forestry through facilitating contact and coordination.**

Review of Australia's fisheries management system and amendments to the *EPBC Act*

- 6.110 The Minister for Agriculture, Fisheries and Forestry Senator the Hon Joe Ludwig announced a review of Australia's fisheries management system on 13 September 2012.

- 6.111 The review was announced in the context of recent amendments to the *EPBC Act*, and the national debate on the arrival of the 'super trawler' in Australian waters.⁸²
- 6.112 In order to properly understand the circumstances of the fisheries management system review, the *EPBC Act* amendments will firstly be outlined below, followed by a description of the fisheries review's terms of reference.

Amendments to the *EPBC Act*

- 6.113 Amendments were made to the *EPBC Act*, by the passage of the *Environment Protection and Biodiversity Conservation Amendment (Declared Commercial Fishing Activities) Bill 2012 (the Amendment Bill)*. The amendment Bill was passed by Parliament, and entered into force on 19 September 2012.⁸³

- 6.114 The amended *EPBC Act* provides for the Environment Minister and Fisheries Minister jointly:

to declare a commercial fishing activity, to be a 'declared commercial fishing activity' on an interim basis (interim declaration) if both Ministers agree that:

- there is uncertainty about the environmental impacts of the commercial fishing activity;
- it is appropriate to consult with fishing concession holders who consider themselves to be detrimentally affected by the making of a final declaration for the same fishing activity (declaration affected person); and
- the declared commercial fishing activity should be prohibited while consultation occurs.⁸⁴

- 6.115 The amended Act also enables:

the Minister, with the agreement of the Fisheries Minister, to declare a commercial fishing activity to be a declared commercial fishing activity for a period of no longer than 24 months (final declaration) if both Ministers agree that:

82 The Hon. Tony Burke, Media Release, September 11 2012, at <http://www.environment.gov.au/minister/burke/2012/mr20120911.html>

83 At the time of writing, the *Amendment Act* had received Royal Assent, but an amended version of the *EPBC Act* had not yet been placed on the Australian Government's legislation website, www.comlaw.gov.au. References to sections of the updated *EPBC Act* have been made on the assumption that the *EPBC Act* is updated to include amendments from the *Amendment Act*.

84 *Environment Protection and Biodiversity Conservation Amendment (Declared Commercial Fishing Activities) Bill 2012*, Revised Explanatory Memorandum, p.3.

- there is uncertainty about the environmental impacts of the commercial fishing activity;
 - it is appropriate to establish an expert panel to conduct an assessment of the commercial fishing activity; and
 - the declared commercial fishing activity should be prohibited while the expert panel conducts its assessment of the commercial fishing activity.⁸⁵
- 6.116 Other provisions of the *Amendment Bill* provide for a 12-month sunset clause on the declaration provisions⁸⁶, create civil penalties for engaging in a declared fishing activity, and provide for the establishment of the expert panel, as well as the publication and tabling of its report.⁸⁷

Terms of reference for the fisheries management review

- 6.117 The terms of reference provide for a review of the principle legislation that governs the Australian Government's fisheries management, being the *Fisheries Management Act 1991* and *Fisheries Administration Act 1991*.
- 6.118 The terms of reference note that the advice from AFMA to the Minister is limited, particularly in relation to the operation of the 'precautionary principle'. The terms of reference further note that:
- As a consequence, the powers of the Minister to make decisions based on the precautionary principle are therefore equally limited in their scope, and the community is exposed to a less than sustainable model of fisheries management.⁸⁸

- 6.119 In detail, the terms of reference direct the review to:
- Recommend changes to the Acts that clearly establish the *Fisheries Management Act 1991* as the lead document in fisheries management, and that all aspects of environmental, economic, and social consideration, and the relevant planning processes required be incorporated into the Acts, in a co-ordinated way;
 - Recommend any necessary changes to the Acts that affirm the powers of a Minister to take advice, and make decisions, with the full scope of the precautionary principle available within the *Fisheries Management Act 1991*, and that same definition of the precautionary principle apply in both the *Fisheries*

85 *Environment Protection and Biodiversity Conservation Amendment (Declared Commercial Fishing Activities) Bill 2012*, Revised Explanatory Memorandum, p.3.

86 *Environment Protection and Biodiversity Conservation Act 1999*, s. 390SM.

87 *EPBC Act 1999*, s. 390SB, s. 390SH and s. 390SL.

88 Senator the Hon Joe Ludwig, *Review of Fisheries Management Act 1991 and Fisheries Administration Act 1991 Terms of Reference*, 13 September 2012.

Management Act 1991 and the Environment Protection and Biodiversity Conservation Act 1999; and

- Consider the need for modernising Commonwealth fisheries resource management legislation and approaches including penalty provisions, licence cancellations, the use of modern technology and co-management. Consideration of cost recovery arrangements will include consideration of the degree to which cost recovery might impact on the management of fisheries including investment in research and stock assessment.

6.120 The review is due to be completed by 13 December 2012, with any necessary legislative changes presumably to be introduced into Parliament early in 2013. The review notes that subsequent changes to the *EPBC Act* may also be necessary.

Committee Comment

6.121 The Committee notes that the review of the fisheries management system will consider the interaction of the fisheries legislation with the *EPBC Act*, itself the subject of the recent Hawke Review.

6.122 Without pre-empting the outcomes of the review, the Committee looks forward to seeing improvements in the coordination of fisheries management and environment protection responsibilities between AFMA and SEWPaC and for greater clarity about the division of these responsibilities between ministers and departments.

6.123 The Committee notes the points made leading up to the establishment of AFMA as an independent statutory authority in the 1989 *New Directions for Commonwealth Fisheries Management* policy statement. The Statement argued that one of the strengths of setting up a statutory authority was 'less need for the Minister to become involved in day-to-day decision making'.⁸⁹

6.124 The Committee believes that fisheries management should not be subject to political direction, except as provided by law. The Committee has every confidence that AFMA has the capability to fulfil its responsibilities according to its legislative objectives. Fisheries should not be managed by making exceptions to the rules depending on the weight of interests at stake.

89 Department of Primary Industries and Energy, 'New Directions for Commonwealth Fisheries Management in the 1990s', December 1989, p.89.

Recommendation 21

- 6.125 **The Committee recommends that fisheries management should not be subject to political direction, except as explicitly provided for in legislation.**

The way forward

- 6.126 Fisheries management, aquaculture development and the pursuit of higher environmental standards have a long history in Australia - as detailed throughout this report.
- 6.127 There have been numerous policy statements, legislative changes and reviews conducted over the last two decades.
- 6.128 However, throughout this inquiry the Committee heard of the ongoing complexity and confusion surrounding the overarching national policy objectives for how we manage our fish.
- 6.129 The Committee is heartened that this problem may be partially remedied by the current review of Australia's fisheries management system and by the work under COAG to streamline environmental assessment processes. The Harvest Strategy Policy and Bycatch policies are also currently under review. However, the Committee notes that all of these activities remain focused on individual parts of the puzzle.
- 6.130 The Committee has made a number of recommendations throughout this report that would contribute in part to overcoming the challenges of developing good policy, including:
- that a dedicated and detailed national aquaculture plan be developed to guide the future of the sector and help it reach its full potential;
 - that the Productivity Commission be asked to review efficiency of the fisheries industry across Australia and the efficiency and effectiveness of the inter-jurisdictional governance arrangements for Australian fisheries; and
 - that several regular publications are compiled to improve the data available for good policy development, including reporting on:
 - ⇒ the total national investment in fisheries and aquaculture RD&E;
 - ⇒ recreational fishing impacts;
 - ⇒ comprehensive national stock information reporting; and

⇒ fisheries and aquaculture industry statistics.

- 6.131 Even if fully implemented, however, the Committee believes that these initiatives and those already underway by governments would not overcome the current stakeholder confusion or the absence of an overarching national policy statement.
- 6.132 Therefore, the Committee feels that a comprehensive national regional policy statement needs to be developed that covers fisheries, aquaculture and recreational fishing in one place. The statement also needs to work across jurisdictional boundaries, between Federal and State/Territory approaches. The policy statement needs to encourage and have actions to support the highest quality science, capitalising on Australia's already strong and internationally recognised capacity for research.
- 6.133 Despite the complexities faced within these sectors, a comprehensive national regional policy statement needs to pull the threads together and present a national vision for the future. Together these sectors are vital to our economy and our communities - and untapped potential remains. But this potential will only be achieved if all stakeholders come together to get the statement right and then work together to make the statement a reality.

Recommendation 22

- 6.134 **The Committee recommends that the Australian Government, through the Council of Australian Governments, lead the development of a comprehensive national regional policy statement for fisheries, aquaculture and recreational fishing, which includes:**
- **an overall statement of strategic intent to drive future direction;**
 - **a new guideline on precaution; and**
 - **a research, development and extension work program.**





Appendix A – Submissions

- 1 Ms Jessica Tosti
- 2 Australian Shellfish Quality Assurance Advisory Committee
- 3 Western Australian Museum
- 4 Mr Maurice Schinkel
- 5 Australian Museum
- 6 Dr Robert Kearney
- 7 Mr David Cook
- 7.1 CONFIDENTIAL
(Supplementary to Submission No. 7)
- 8 Centre for Fish, Fisheries and Aquatic Ecosystem Research
- 9 Northern Territory Department of Resources
- 10 Dr Elizabeth Smith
- 11 World Wildlife Fund-Australia
- 12 National Marine Science Centre
- 13 Dr Symon Dworjanyn
- 14 Australian Marine Sciences Association
- 15 Mr Joshua Aldridge
- 16 Mr Dennis Reid
- 17 Tasmanian Conservation Trust
- 18 Assoc. Prof. Robert Day and Dr Timothy Dempster

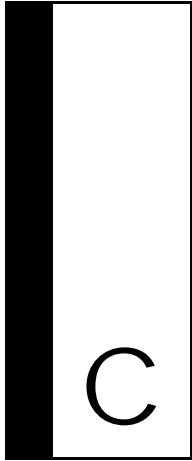
- 18.1 Assoc. Prof. Robert Day et al
(Supplementary to Submission No. 18)
- 19 Fisheries Research & Development Corporation
- 20 Australian Institute of Marine Science (AIMS)
- 21 Australian Marine Alliance
- 22 Primary Industries and Regions South Australia
- 23 Commonwealth Scientific and Industrial Research Organisation (CSIRO)
- 24 Department of Agriculture, Fisheries and Forestry
- 24.1 Department of Agriculture, Fisheries and Forestry
(Supplementary to Submission No. 24)
- 25 Sunfish Queensland Inc
- 26 Mr Lindsay Dines
- 27 Institute for Marine and Antarctic Studies
- 27.1 Institute for Marine and Antarctic Studies
- 28 James Cook University
- 29 Australian Fisheries Management Authority
- 29.1 Australian Fisheries Management Authority
(Supplementary to Submission No. 29)
- 30 Environmental Defenders Office (Tas) Inc
- 30.1 CONFIDENTIAL
(Supplementary to Submission No. 30)
- 31 Western Australian Fishing Industry Council Inc.
- 32 NSW Department of Primary Industries
- 33 Ms Miranda Howie
- 34 Tasmanian Government
- 35 National Aquaculture Council
- 36 Department of Climate Change and Energy Efficiency
- 37 Victorian Government
- 38 Office of the Chief Scientist
- 39 Australian Fishing Trade Association

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- 40 Mr Kevin & Vicky Baker
- 41 Recfishwest
- 42 Department of Fisheries Western Australia
- 43 Pacific Reef Fisheries (Australia) Pty Ltd
- 44 Tasmanian Salmonid Growers Association Ltd.
- 45 Australian Prawn Farmers Association
- 46 Food Standards Australia New Zealand
- 47 Commonwealth Fisheries Association
- 48 Australian Pesticides and Veterinary Medicines Authority
- 49 Department of Sustainability, Environment, Water, Population and
Communities
- 49.1 Department of Sustainability, Environment, Water, Population and
Communities (Supplementary to Submission No. 49)
- 50 Mr Bruce England



Appendix B – Exhibits

- 1 Department of Agriculture, Fisheries and Forestry
Working Together: the National Fishing and Aquaculture RD&E Strategy 2010
- 2 Mr Walter Starck
Australia's Unappreciated and Maligned Fisheries
- 3 Western Australian Fishing Industry Council
12 07 05 GVP figures and real terms seafood production
- 4 Aquaculture Council of Western Australia
Recent Advances and New Species in Aquaculture
- 5 Challenger Institute of Technology
Aussie tuna hatchery specialist works with world's best
- 6 Tasmanian Conservation Trust
Video: Centro
- 7 Australian Institute of Marine Science (AIMS)
Seafood Supply: The Role of Science and Technology
- 8 University of Western Australia
Bullet Points on the Role of Science for Fisheries and Aquaculture



Appendix C – Public Hearings

Wednesday, 30 May 2012 - CANBERRA

**Australian Bureau of Agricultural and Resource Economics and Sciences,
Department of Agriculture, Fisheries and Forestry**

Dr Ilona Catherine Stobutzki, Acting Assistant Secretary, Fisheries and
Quantitative Sciences Branch

Australian Fisheries Management Authority

Mr John Bridge, General Manager, Corporate Governance

Dr James Findlay, Chief Executive Officer

Ms Beth Gibson, Senior Manager, Research and Policy

Dr Nick Rayns, Executive Manager, Fisheries

Department of Agriculture, Fisheries and Forestry

Mr Reg Butler, Acting Assistant Secretary, Animal Health Policy Branch

Dr Andrew Cupit, Acting Assistant Secretary, Animal Biosecurity Branch

Mr Gordon Neil, Assistant Secretary, Sustainable Resource Management
Division

Mr Ian Thompson, First Assistant Secretary, Sustainable Resource
Management Division

Wednesday, 20 June 2012 - CANBERRA

Fisheries Research and Development Corporation

Dr Patrick Hone, Executive Director

The Hon. Harry Woods, Chair

Wednesday, 27 June 2012 - CANBERRA

Department of Climate Change and Energy Efficiency

Ms Jo Mummery, Assistant Secretary, Science and International
Adaptation Branch

Friday, 29 June 2012 - CANBERRA

Individuals

Dr Robert Kearney

Australian Marine Alliance

Mr Dean Logan, Chief Executive

Office of the Chief Scientist

Dr Michael Hughes, Director

The University of Melbourne

Assoc. Prof. Robert Day, Department of Zoology

Dr Timothy Dempster, Department of Zoology

World Wildlife Fund Australia

Prof Michael Harte, National Manager Marine

Monday, 9 July 2012 - PERTH

Aquaculture Council of Western Australia

Mr Trevor Blinco, Chair

Dr Bruce Phillips, Committee Member

Challenger Institute of Technology

Mr Gregory Ian Jenkins, Director, Australian Centre for Applied
Aquaculture Research

Department of Fisheries Western Australia

Dr Warwick Jeffrey Fletcher, Executive Director, Research

Mr Timothy Robert Nicholas, Acting Deputy Director General

Murdoch University

Prof Neil Randell Loneragan, Professor of Fisheries Science and Director,
Centre for Fish, Fisheries and Aquatic Ecosystem Research

Prof Alan John Lymbery, Associate Professor of Parasitology and Deputy
Director, Centre for Fish, Fisheries and Aquatic Ecosystem Research

Recfishwest

Dr Andrew Rowland, Chief Executive Officer

Miss Ellen Smith, Regional Policy Officer

University of Western Australia

Prof Euan Sinclair Harvey, Associate Professor, Oceans Institute

Mrs Tara McLaren, General Manager, Oceans Institute

Western Australian Fishing Industry Council

Mr Neil MacGuffie, Research Officer

Mr Richard Stevens, Development and Extension Manager

Western Australian Museum

Dr Jane Fromont, Head of Department of Aquatic Zoology

Ms Diana Susanne Jones, Executive Director, Collections and Research

Mrs Susan Morrison, Collection Manager, Fish Section of Aquatic Zoology

Thursday, 12 July 2012 - HOBART

Individuals

Ms Miranda Howie

Dr Elizabeth Smith

Commonwealth Scientific and Industrial Research Organisation

Mr Ian David Cresswell, Acting Director, Wealth from Oceans National
Research Flagship

Dr Nicholas G Elliott, Aquaculture Breeds Stream Leader, Food Futures
Flagship

Dr Anthony David Smith, Stream Leader, Ecosystem Based Development,
Wealth from Oceans National Research Flagship

Department of Primary Industries, Parks, Water and Environment

Mr Robert Gott, Director, Marine Resources

Environmental Defenders Office (Tas) Inc

Ms Jessica Feehely, Principal Lawyer

Institute for Marine and Antarctic Studies

Professor Colin David Buxton, Director, Fisheries, Aquaculture & Coasts
Centre

Institute for Marine and Antarctic Studies

Associate Professor Caleb Gardner, Program Leader, Fisheries

Tasmanian Conservation Trust

Mr Jon Bryan, Marine Spokesperson

Mr Peter McGlone, Director

Tasmanian Salmonid Growers Association Ltd.

Dr Adam Robert Main, Chief Executive Officer

Tasmanian Seafood Industry Council

Mr Neil Eric Stump, Chief Executive

Tuesday, 31 July 2012 - TOWNSVILLE

Individuals

Mr Walter Starck

Australian Institute of Marine Science (AIMS)

Ms Susan English, Manger, Government Business

Dr Mike Hall, Principal Research Scientist

Commonwealth Scientific and Industrial Research Organisation CSIRO

Dr Nigel Preston, Research Scientist, Theme Leader, Breed Engineering,
Food Futures Flagship

James Cook University

Professor Michael Kingsford, Head of School, Marine and Tropical Biology

A/Professor Colin Simpfendorfer, Director, Centre for Sustainable Tropical Fisheries and Aquaculture

Pacific Reef Fisheries (Australia) Pty Ltd

Mr Alistair Dick, General Manager & President

Sunfish Queensland Inc

Ms Judith Lynne, Executive Officer

Wednesday, 15 August 2012 - CANBERRA

Australian Marine Conservation Society

Miss Tooni Mahto, Marine Campaigns Officer

NSW Department of Primary Industries

Professor Steven James Kennelly, Director Fisheries Research

Monday, 20 August 2012 - CANBERRA

Australian Museum

Ms Patricia Ann Hutchings, Senior Principal Research Scientist

Dr Jeffrey Martin Leis, Senior Principal Research Scientist

Commonwealth Fisheries Association

Mr Brian Jeffriess, Director

Ms Trixi Madon, Chief Executive Officer

Food Standards Australia New Zealand

Ms Marion Joy Healy, Executive Manager

Mr Steve McCutcheon, Chief Executive Officer

Queensland Department of Agriculture, Fisheries and Forestry

Mr Warwick Nash, Science Leader, Fisheries and Aquaculture

Wednesday, 22 August 2012 - CANBERRA

Seafood Cooperative Research Centre

Dr Len Stephens, Managing Director

University of Western Australia

Professor Carlos M Duarte, Director, The Oceans Institute

Wednesday, 12 September 2012 - CANBERRA

**Australian Bureau of Agricultural and Resource Economics and Sciences,
Department of Agriculture, Fisheries and Forestry**

Dr Ilona Catherine Stobutzki, Acting Assistant Secretary, Fisheries and
Quantitative Sciences Branch

Australian Fisheries Management Authority

Dr Nick Rayns, Executive Manager, Fisheries

Department of Agriculture, Fisheries and Forestry

Dr Robert Biddle, Assistant Secretary

Mr Gordon Neil, Assistant Secretary

Mr Ian Thompson, First Assistant Secretary, Sustainable Resource
Management Division

Fisheries Research & Development Corporation

Mr Brett McCallum, Director

Fisheries Research and Development Corporation

Dr Patrick Hone, Executive Director

Wednesday, 19 September 2012 - CANBERRA

**Department of Sustainability, Environment, Water, Population and
Communities**

Mr Dean Knudson, First Assistant Secretary, Environment Assessment &
Compliance Division

Mr Stephen Oxley, First Assistant Secretary, Marine Division