The Parliament of the Commonwealth of Australia

Scaling Up

Inquiry into Opportunities for Expanding Aquaculture in Northern Australia

Joint Select Committee on Northern Australia

February 2016

Canberra

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Contents

APPENDICES

TABLES

Chair's Foreword

With an ever increasing global population, seafood has become a more popular source of protein. Consumption has largely been serviced by the aquaculture industry which has increased its share of the total global food fish supply from 9 per cent in 1980 to 48 per cent in 2011.

Most seafood that Australians consume is imported and this provides local producers with a significant opportunity and challenge to increase market share through import replacement. Northern Australia has a natural advantage for aquaculture production with a long coastline, pristine waters, the availability of suitable land, and its proximity to Asia. This is in addition to boasting a tropical climate which encourages high aquaculture growth rates and the natural occurrence of a number of tropical species found in Northern Australia.

In its first report, *Pivot North,* the Northern Australia Committee recommended that the Government facilitate the development of the aquaculture industry in Northern Australia by improving the framework for approving aquaculture projects.

Scaling Up is the report of the Committee's deeper investigation of the aquaculture industry in Northern Australia. As part of its inquiry, the Committee examined the current state of aquaculture in Northern Australia, including the framework for aquaculture approvals, and reviewed the opportunities for further development of the aquaculture industry.

The Committee found that an obstacle to import product replacement is exemption from country of origin labelling requirements for food prepared for immediate consumption, including in dining establishments such as restaurants, cafes, and clubs.[1] Consumers should know where the food they eat is produced so they can make informed choices. There is compelling evidence for extending country of origin labelling to food prepared in the food services industry and the Committee has supported a Senate committee[2] recommendation that this anomaly be removed. Similar arguments apply to the retail pearling industry and consideration should be given to introducing country of origin labelling for aquaculture products such as pearls.

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1 This is not a requirement in the Northern Territory.

2 Rural and Regional Affairs and Transport References Committee, *Current requirements for labelling of seafood and seafood products*, Australian Senate, Canberra, December 2014, p. 28.

The Northern Australian aquaculture industry is relatively under-developed when compared to other Australian jurisdictions, but is well placed to benefit from an increased demand for seafood. The aquaculture of barramundi and prawns in the region is poised to expand and there are moves to increase the involvement of Aboriginal and Torres Strait Islander communities in crocodile farming and trepang ranching enterprises.

The Committee has acknowledged and supports the development of criteria for engaging local Aboriginal and Torres Strait Islander communities in aquaculture ventures by the Australian Institute of Marine Science. These criteria could be adopted and inform aquaculture ventures wishing to operate in remote areas.

Across the top-end and the Torres Strait, where there is good water quality and greater potential for Aboriginal and Torres Strait Islander management of coastal waters and fisheries, there are opportunities for sea ranching of clams, oysters, pearl meat, triton shell and trochus shell. For example, the production of triton shell for the environmental management of the crown of thorns starfish has the potential for boosting Aboriginal and Torres Strait Islander employment.

The Committee found that the Australian South Sea pearling industry is facing significant challenges due to competition from readily available, low-cost overseas sources and a decline in demand for luxury goods in the wake of the Global Financial Crisis. There has also been widespread damage to the pearling industry due to the spread of oyster oedema disease. As a result, the Committee has recommended that an Australian Pearl Industry Recovery Taskforce be established to fund research to identify the causative agent and possible remedial action to mitigate the impacts of the disease.

While Government sets the framework for development of new aquaculture ventures (through regulations at both the State and Federal levels), the Committee is encouraged by the move to create aquaculture development zones in Western Australia and the Northern Territory. The establishment of these zones will ensure certainty for industry by defining approval conditions and reducing regulatory approval times.

In Queensland, the development of aquaculture is influenced by the need to protect the waters of the Great Barrier Reef (GBR). The GBR is heritage listed and as such is one of Australia's most significant environmental assets. Ensuring its long-term health is of central importance to the economy of Queensland and more broadly Australia. Nevertheless, the regulation of aquaculture in Northern Queensland appears to have impeded the development of the industry to a degree not commensurate with its projected impact on the health of the GBR.

The Committee was of the view that the most pressing need for the aquaculture industry in Queensland is scientific certainty and regulatory clarity. Accordingly, the Committee has recommended that the Great Barrier Reef Marine Park (Aquaculture) Regulations 2000 (Cwlth), (which have not been used for a decade

due to the accreditation of Queensland regulations) be revoked in accordance with the Great Barrier Reef Marine Park Authority's Regulatory Plan 2014–15.

The Committee was heartened by the degree to which there is common ground amongst stakeholders as to how to resolve the development impasse which occurred in Queensland. Australian aquaculture companies have a history of benefiting from a 'clean green' marketing image and so the Committee is confident that aquaculture companies are taking steps to reduce their environmental impact and comply with environmental regulatory requirements.

The Committee found that the greater use of planning mechanisms, including development zones, is supported by almost all stakeholders. To assist science-based decision-making, the Committee recommended that research be undertaken into the potential for environmental impact arising from aquaculture ventures in areas adjacent to the GBR, including: the capacity of new technologies and management techniques to treat water to a standard that effectively eliminates nutrient discharge; the capacity of different ecosystems to absorb and assimilate any residual nutrient discharge; and the relative environmental impacts of aquaculture farming of different species, and using different farming techniques.

Consequently, the expansion of aquaculture in Northern Australia will increase the need for a skilled workforce and training institutions will need to provide industry focused courses to train employees to meet the anticipated skill-set requirements of expanding aquaculture ventures.

Opportunities also exist for universities located in Northern Australia to increase research relevant to tropical aquaculture. An avenue for research funding is the Fisheries Research and Development Corporation and the Committee has recommended that the Corporation consider introducing a 'northern node' for supporting research into Northern Australian issues.

In its first report, *Pivot North*, the Committee recognised the need for significant infrastructure investment in Northern Australia. In this vein, the Committee has recommended funding assistance for developing road and port infrastructure to service the Kimberley Aquaculture Development Zone and Project Sea Dragon in the Northern Territory.

Another consideration is the location of pest and disease diagnosis facilities which are an important adjunct to aquaculture ventures because pest and disease outbreaks need to be identified and treated in real time. There is a pressing need for such aquaculture-related infrastructure, particularly in Queensland. Locating a diagnosis facility within a university campus enables access to a broad range of scientific expertise which could be harnessed to serve other primary industries. Other supporting infrastructure such as hatcheries, feed mills and fish processing facilities will be needed as the aquaculture industry expands, however developing these facilities should ideally be led by industry demand.

Finally, I would like to thank the individuals, businesses, organisations and government agencies that participated in the inquiry by providing submissions or appearing at public hearings. I would also like to thank my Committee colleagues for their commitment to the work of this Committee and in particular this inquiry.

Hon Warren Entsch MP

Chair

Committee Membership

Chair Hon Warren Entsch MP

Deputy Chair Hon Alannah MacTiernan MP

Members

Senator Matthew Canavan
Mr George Christensen MP
Hon Gary Gray AO MP
Mrs Natasha Griggs MP
Senator Hon Jan McLucas
Senator Deborah O'Neill
Ms Melissa Price MP
Senator Rachel Siewert
Senator Dean Smith
Hon Warren Snowdon MP

Participating Members

Senator Hon Eric Abetz (From 12 October 2015)
Senator Chris Back
Senator Cory Bernardi
Senator Catryna Bilyk
Senator Carol Brown
Senator David Bushby
Senator Hon Doug Cameron
Senator Hon Kim Carr
Senator Hon Jacinta Collins
Senator John Madigan
Senator Gavin Marshall
Senator Jenny McAllister (from 14 May 2015)
Senator Anne McEwen
Senator James McGrath (Until 12 October 2015)
Senator Bridget McKenzie
Senator Claire Moore
Senator Barry O'Sullivan
Senator Nova Peris OAM

Senator Hon Stephen Conroy

Senator Sam Dastyari

Senator Sean Edwards

Senator David Fawcett

Senator Alex Gallacher

Senator Katy Gallagher (from 26 March 2015)

Senator Hon Bill Heffernan

Senator Hon David Johnston (From 12 October 2015)

Ms Michelle Landry MP

Senator David Leyonhjelm

Senator Joanna Lindgren (From 12 October 2015)

Senator Sue Lines

Senator Hon Joe Ludwig

Senator Hon Ian Macdonald

Senator Helen Polley

Senator Linda Reynolds

Senator Hon Michael Ronaldson (From 12 October 2015)

Senator Anne Ruston (Until 12 October 2015)

Senator Zed Seselja

Senator Hon Lisa Singh

Senator Glenn Sterle

Senator Anne Urquhart

Senator Larissa Waters

Senator John Williams

Senator Hon Penny Wong

Committee Secretariat

Secretary	Ms Stephanie Mikac
Inquiry Secretary	Dr John Carter
Senior Research Officer	Mr Timothy Brennan
Administrative Officers	Mrs Alex Fabbo Ms Carissa Skinner

Terms of Reference

The Joint Select Committee on Northern Australia will inquire into and report on opportunities for expanding the aquaculture industry in Northern Australia including:

- the ability to commercialise new innovation;
- develop new aquaculture projects and products; and
- seek out new markets.

List of Abbreviations

AAQ	Aquaculture Association Queensland
ABARES	The Australian Bureau of Agriculture and Resource Economics and Sciences
ABFA	Australia Barramundi Farmers' Association
ACWA	The Aquaculture Council of Western Australia
AFANT	Amateur Fishermen's Association of the Northern Territory
AIMS	Australian Institute of Marine Science
APFA	Australian Prawn Farmers Association
AQIS	Australian Quarantine and Inspection Service
ARC	Aquaculture Research Council
CDU	Charles Darwin University
CG	Coordinator-General
CITES	Convention on the International Trade of Endangered Species of Wild Fauna and Flora
CoOL	Country-of-origin Labelling
CRCs	Cooperative Research Centres
CSIRO	The Commonwealth Scientific and Industrial Research Organisation
DFAT	Department of Foreign Affairs and Trade
DoA	Department of Agriculture

DoE	Department of the Environment
DNA	Deoxyribonucleic acid
DPIF	Department of Primary Industries and Fisheries
EIS	Environmental Impact Statement
EPA	Environmental Protection Authority
EPBC Act	The Environment Protection and Biodiversity Conservation Act 1999
FAO	Food and Agriculture Organization
FRDC	Fisheries Research and Development Corporation
FTA	Free Trade Agreement
GBR	The Great Barrier Reef
GBRMPA	Great Barrier Reef Marine Park Authority
GFB	Good Fortune Bay
GFC	Global Financial Crisis
GST	Goods and Services Tax
IOFA	Indian Ocean Fresh Australia
JCU	James Cook University
KADZ	Kimberley Aquaculture Development Zone
KMRP	Kimberley Marine Research Project
KTI	Kimberley Training Institute
MPA	Marine Produce Australia Ltd
MSC	Maritime Stewardship Council
MSc	Master of Science
NAIF	Northern Australia Infrastructure Facility
NT	Northern Territory
NTDPIF	The Northern Territory Department of Primary Industry and Fisheries

NTSC	Northern Territory Seafood Council
OOD	Oyster Oedema Disease
Pew	Pew Charitable Trusts
PhD	Doctor of Philosophy
PNG	Papua New Guinea
PPA	Pearl Producers Association
QCA	Queensland Competition Authority
QCFA	Queensland Crayfish Farmers Association
R&D	Research and Development
RAS	Recirculating Aquaculture System
RRATC	Rural and Regional Affairs and Transport Committee
RRATRC	Rural and Regional Affairs and Transport References Committee
RRRC	The Reef and Rainforest Research Centre
SDC	Sustainable Development Corporation
TAA	Tropical Aquaculture Australia
UN	United Nations
UNEP-WCMC	United Nations Environment Programme World Conservation Monitoring Centre
US	United States
WA	Western Australia
WADF	Western Australian Department of Fisheries
WAMSI	West Australian Marine Science Institute (WAMSI)

Recommendations

2 The Aquaculture Industry in Northern Australia

Recommendation 1

The Committee recommends the establishment of an Australian Pearling Industry Recovery Taskforce to fund a research program focussed on identifying the causative agent of the oyster oedema disease and possible remedial actions to reduce the incidence, and mitigate the impacts of the disease.

3 Regulatory Issues

Recommendation 2

The Committee recommends that the Department of the Environment, in collaboration with the Queensland Government, fund a program to review and expand the science relating to the environmental impact of aquaculture in areas adjacent to the Great Barrier Reef. The review should include research organisations with recognised expertise in this area including, but not limited to: the Commonwealth Scientific and Industrial Research Organisation, the Australian Institute of Marine Science, and James Cook University.

The research should be an examination of:

- the capacity of new technologies and management techniques to treat water to a standard that effectively eliminates nutrient discharge into the surrounding ecosystem;
- the capacity of different ecosystems to absorb and assimilate any residual nutrient discharges; and
- the relative environmental impacts of aquaculture farming of different species, and using different farming techniques (e.g. land-based, sea cage, ranching, recirculating systems).

Recommendation 3

The Committee recommends that the Department of the Environment and the Great Barrier Reef Marine Park Authority support the Queensland Government in determining the need for and the positioning of special aquaculture development zones. These zones should be identified using criteria, considering:

- the capacity of new technological developments to address nutrient discharge;
- the ability of nearby waterways to assimilate nutrient discharges to ensure that extra nutrients do not reach the Great Barrier Reef; and
- economic considerations including access to necessary infrastructure and labour force, and the biological suitability of sites for targeted aquaculture species.

Recommendation 4

The Committee recommends that the Great Barrier Reef Marine Park Authority, in accordance with the planned actions outlined in its Regulatory Plan 2014-2015, revoke the Great Barrier Reef Marine Park (Aquaculture) Regulations 2000 (Cwlth).

Recommendation 5

The Committee recommends that the Department of the Environment ensures the framework for developing offsets in the Great Barrier Reef is comprehensive, transparent and accessible for potential aquaculture investors. The framework should allow potential investors to accurately estimate:

- the quantity of offsets required;
- the cost of the required offsets; and
- how the offsets will be implemented.

Recommendation 6

The Committee recommends that the Queensland Government conduct a survey of crocodile egg numbers in Northern Queensland to determine the sustainability of crocodile egg harvesting.

4 Developing the Aquaculture Industry in Northern Australia

Recommendation 7

The Committee recommends that the Fisheries Research and Development Corporation should consider introducing a 'northern node' as an avenue for providing funding research relevant to Northern Australia.

Recommendation 8

The Committee recommends that the Australian Government provide funding assistance for developing road and port infrastructure to service the Kimberley Aquaculture Development Zone and Project Sea Dragon subject to establishing a positive cost-benefit analysis.

Recommendation 9

The Committee strongly recommends that the Australian Government provide funding assistance for the establishment of a pest and disease diagnosis facility in Northern Queensland.

Recommendation 10

The Committee recommends that the Australian Government, through COAG, remove the exemption from country of origin labelling requirements under Standard 1.2.11 of the Australia New Zealand Food Standards Code for cooked or pre-prepared seafood sold by the food services industry.

Recommendation 11

The Committee recommends that the Department of Industry reports within 12 months on the feasibility of introducing country of origin labelling for aquaculture products such as pearls and crocodile teeth.

1

Introduction

Background

1.1 The global consumption of seafood has been steadily growing for the last five decades. This growth is driven not just by population growth but also by a growth in the per capita consumption of seafood, particularly in China.[1]

1.2 Growing seafood consumption has largely been serviced by the aquaculture industry which has increased its share of the total global food fish supply from 9 per cent in 1980 to 48 per cent in 2011.[2] Production from wild caught fisheries appears to have reached a peak, with production levels stagnating in recent years. Future consumption growth will need to be met by continued expansion of the aquaculture sector.[3]

1.3 Australia is a small player in the aquaculture industry, comprising less than one per cent of global production,[4] with the majority of Australia's aquaculture located in the southern states. The Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) reported that the Tasmanian salmon industry is worth more than double the combined value of the aquaculture industries of Queensland, Western Australia, and the Northern Territory.[5]

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1 Food and Agriculture Organisation (FAO), *The State of World Fisheries and Aquaculture 2014*, 2014, p. 3.

2 World Bank, *Fish to 2030: Prospects for Fisheries and Aquaculture*, December 2013, p. 1.

3 FAO, *The State of World Fisheries and Aquaculture 2014*, 2014, p. 5.

4 Department of Agriculture (DoA), *Submission 11*, p. 2.

5 Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), *Australian Fisheries and Aquaculture Statistics 2014*, December 2015, pp. 18-22. The ABARES statistics take into account Australia's pearling industry, but do not include crocodile farming in Northern Australia.

1.4 Australia has a significant pearling industry located in Western Australia and the Northern Territory. The challenges facing the industry arising from foreign imported pearls, oyster oedema disease, and seismic testing are discussed in Chapter 2 and Chapter 4.

1.5 Despite its current, relatively modest production scale, there are significant growth opportunities for aquaculture in Northern Australia. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) estimates that there are over 1.5 million hectares of land suitable for aquaculture operations in Northern Australia.[6] Much of this land is adjacent to undeveloped coastlines of Australia with pristine waters suitable for the development of clean, green, premium seafood.[7]

1.6 Aquaculture has the potential to make a significant impact on the development of Northern Australia; the proposed Project Sea Dragon alone is projected to employ over 1600 people.[8] Crucially, aquaculture and the economic development opportunities it can generate, has support from a number of Aboriginal and Torres Strait Islander communities in Northern Australia.[9]

1.7 Northern Australia's proximity to Asia provides an opportunity for Australian aquaculture to provide sustainable seafood produced in a bio-secure environment to Asia's growing, and increasingly food safety conscious, middle classes.[10] The domestic market also has significant growth potential. Perhaps surprisingly, Australia currently imports 69 per cent of its seafood; substituting imports with Australian farmed seafood has the potential to drive investment in the aquaculture industry into the future.[11]

1.8 There are also substantial challenges to operating in the aquaculture industry in Northern Australia. Farms are often located in remote areas with minimal infrastructure investment making deliveries to and from the farm complex and costly. Regulatory frameworks, particularly in Queensland, have also often impeded the development and expansion of new and existing farms.

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6 Joint Select Committee on Northern Australia (JSCNA), Inquiry into the Development of Northern Australia: CSIRO, *Submission 108*, p. 12.

7 Northern Territory Department of Primary Industry and Fisheries (NTDPIF), *Submission 13*, p. 3.

8 Dr Chris Mitchell, Seafarms, *Committee Hansard,* Brisbane 27 August 2015, p. 19.

9 NTDPIF, *Submission 13*, p. 3.

10 NTDPIF, *Submission 13*, p. 3.

11 ABARES, *Australian Fisheries and Aquaculture Statistics 2014*, December 2015, p. 2.

Defining Aquaculture

1.9 The Food and Agriculture Organisation (FAO) defines aquaculture as:

> … the farming of aquatic organisms, including fish, molluscs, crustaceans and aquatic plants. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc.[12]

1.10 The FAO highlights the rearing and ownership of the aquatic organisms as the key factors that define aquaculture. By contrast, the harvest of fisheries, regardless of licenses, involves collection of aquatic organisms from a common property resource.[13]

1.11 During the *Inquiry into Opportunities for Expanding the Aquaculture Industry in Northern Australia* (the Inquiry) the Joint Select Committee on Northern Australia (the Committee) received evidence on a wide range of aquatic species, including amphibious species such as crocodiles. The Committee also considered diverse production methods that include the capture of wild–sourced aquatic juveniles or broodstock (e.g. pearls), and the release of farm-raised stock into the wild for maturation (e.g. trepang). For the purposes of this Inquiry, aquaculture includes the cultivation of the following species:

- Algae;
- Barramundi;
- Cherabin and Redclaw Freshwater Crayfish;
- Clams, oysters, sea shells and sponges;
- Cobia, Grouper, and other finfish;
- Crocodiles;
- Pearl Oysters;
- Prawns; and
- Trepang (sea cucumber).

Committee's Role

1.12 The Joint Select Committee on Northern Australia (the Committee) was created by a resolution of appointment passed by the House of

12 FAO, 'Definitions: Aquaculture', http://www.fao.org/docrep/003/x6941e/x6941e04.htm, accessed 12 November 2015.

13 FAO, 'Definitions: Aquaculture', http://www.fao.org/docrep/003/x6941e/x6941e04.htm, accessed 12 November 2015.

Representatives on 21 November 2013[14] and passed with amendment by the Senate on 4 December 2013.[15]

1.13 On 27 and 28 August 2014, the House of Representatives and Senate respectively, amended the Committee's Resolution of Appointment to enable it to continue its work for the life of the 44th Parliament.[16]

1.14 On 4 September 2014, following the presentation of its first major report on its *Inquiry into the Development of Northern Australia* titled *Pivot North*, the Committee's resolution of appointment was amended to empower it to:

- monitor issues relevant to the development and implementation of the government's white paper[17] [on developing Northern Australia], and
- consider any related issues as may be referred to it by either House of the Parliament or a Minister.

1.15 As part of its *Inquiry into Developing Northern Australia*, the Committee examined evidence from the Commonwealth Scientific and Research Organisation (CSIRO) on the 'significant potential for the development of large-scale, saltwater pond aquaculture in coastal regions in Northern Australia'.[18] The CSIRO identified about 528 000 hectares in the Northern Territory, 594 000 hectares in Queensland, and 516 000 hectares in Western Australia as having potential for aquaculture.[19] As part of its *Pivot North* Report, the committee recommended that the Government facilitate the development of the aquaculture industry in Northern Australia by improving the regulatory framework.[20]

1.16 Consequently, on 5 March 2015, the Committee wrote to the then Prime Minister, the Hon Tony Abbott MP to seek to undertake an *Inquiry into Opportunities for the Aquaculture Industry in Northern Australia*.

1.17 On 6 March 2015, the then Prime Minister, the Hon Tony Abbott MP agreed to refer the matter of '*Opportunities for Expanding the Aquaculture Industry in Northern Australia*' to the Committee for inquiry and report.

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14 Commonwealth of the Parliament of Australia, *House of Representatives Votes and Proceedings No. 7*, 21 November 2013, p. 129.

15 Commonwealth of the Parliament of Australia, *Senate Journal No. 6*, 4 December 2013, p. 224.

16 Commonwealth of the Parliament of Australia, *House of Representatives Votes and Proceedings No. 60*, 27 August 2014, p. 761; *Senate Journal No. 48*, 28 August 2014, p. 1346.

17 The Government's White Paper on Developing Northern Australia was released on 18 June 2015.

18 JSCNA, Inquiry into the Development of Northern Australia: CSIRO, *Submission 108*, p. 12.

19 JSCNA, Inquiry into the Development of Northern Australia: CSIRO, *Submission 108*, p. 12.

20 JSCNA, *Pivot North: Inquiry into Development of Northern Australia Final Report*, Canberra, September 2014, p. 189.

About the Inquiry

Objectives and Scope

1.18 The Committee was tasked with inquiring into and reporting on opportunities for expanding the aquaculture industry in Northern Australia including:

- the ability to commercialise new innovation;
- develop new aquaculture projects and products; and
- seek out new markets.

1.19 As part of its Inquiry, the Committee sought to receive information about best practice in use nationally and internationally in regard to all types of aquaculture product that is potentially able to be produced, farmed or ranched in Northern Australia.

1.20 The Committee received information about:

- Research and innovation, including data collection and the potential for industry-led research and innovation.
- Country of origin labelling and the impact of import product substitution on the Northern Australian aquaculture market.
- Opportunities for involving Aboriginal and Torres Strait Islander communities in aquaculture enterprises.
- The economic incentives for attracting and maintaining investment in Northern Australian aquaculture, which included an examination of required infrastructure, and the impact of regulatory frameworks for new project approvals as well as the impact of aquaculture on the physical environment.
- The creation of strategic aquaculture development zones.

Inquiry Conduct

1.21 Following receipt of a reference from the then Prime Minister, the Committee formally adopted the Inquiry into Opportunities for Expanding the Aquaculture Industry in Northern Australia on 17 March 2015.

1.22 A media release which called for submissions officially launched the inquiry on 19 March 2015.

1.23 Unsolicited correspondence advertising the inquiry and inviting submissions was also sent to a wide range of organisations and individuals including: local, state/territory and Commonwealth

governments and agencies, peak aquaculture organisations and universities.

1.24 The Committee received 49 submissions and 17 exhibits, which are listed at Appendix A. The Committee subsequently held 10 public hearings across Northern Australia and in Canberra as outlined in the table below. The Committee also conducted 4 days of inspections.

Public Hearings Held	
Date	**Place**
9 June 2015 10 June 2015	Broome, WA
11 June 2015	Perth, WA
14 July 2015	Darwin, NT
24 August 2015	Cairns, Qld
26 August 2015	Townsville, Qld
27 August 2015	Brisbane, Qld
15 September 2015 13 October 2015 10 November 2015	Canberra, ACT

1.25 A list of witnesses who appeared before the Committee at public hearings is at Appendix B. Submissions received and transcripts of evidence of public hearings are available from the Committee's website at: www.aph.gov.au/jscna

Report Structure

1.26 Chapter 2 compares and contrasts aquaculture in Northern Australia in relation to aquaculture in the rest of Australia, including: production, the trade in aquaculture products, and opportunities to develop new aquaculture species.

1.27 Chapter 3 focuses on the regulation issues which impact aquaculture enterprises, including: the approvals process for new ventures (particularly in the Great Barrier Reef region), the creation of aquaculture development zones, and approval processes which affect routine operations.

1.28 Chapter 4 discusses opportunities to develop aquaculture in Northern Australia, including: financing aquaculture ventures, strategic leadership requirements, skills training, opportunities for the involvement of Aboriginal and Torres Strait Islander communities, research and

development, industry infrastructure requirements, and marketing opportunities such as country of origin labelling.

2

The Aquaculture Industry in Northern Australia

Global Aquaculture

2.1 With an ever increasing global population, seafood has become a more popular source of protein. The Australian Bureau of Agriculture and Resource Economics and Sciences (ABARES) reports that from the 1960s global per capita seafood consumption has increased from 10 kilograms per person to 19 kilograms per person. This is attributed to 'rising incomes and urbanisation, expansion of aquaculture production and increased efficiency of distribution channels.' The ABARES added that much of the growth in seafood consumption has been in Asia, and especially China.[1]

2.2 Increased global demand for seafood has spurred production in both wild-caught fisheries and aquaculture. The World Bank found that :

> During the last three decades [the 1980s, 1990s and 2000s], capture fisheries production increased from 69 million to 93 million tons; during the same time, world aquaculture production increased from 5 million to 63 million tons.[2]

2.3 The World Bank also found that aquaculture was one of the most rapidly growing food sectors globally. During the 1980s and 1990s, aquaculture production grew on average 10 per cent annually and since then growth has fallen to six per cent annually. This was in sharp contrast to wild-caught fisheries production which over the same period stagnated and then contracted in 2000–09.[3]

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1 Australian Bureau of Agriculture and Resource Economics and Sciences (ABARES), *Australian Fisheries and Aquaculture Statistics 2014*, December 2015, p. 2.

2 The World Bank, *Fish to 2030 – Prospects for Fisheries and Aquaculture*, December 2013, p. xiii.

3 The World Bank, *Fish to 2030 – Prospects for Fisheries and Aquaculture*, December 2013, pp 4–5.

2.4 The Aquaculture Council of Western Australia (ACWA) observed that global aquaculture is worth US$144 billion and is forecast to grow to US$202 billion by 2020. The ACWA added that 'just under 50 per cent of the world's seafood now comes from aquaculture'.[4]

2.5 The Pearl Producers Association (PPA) reported that the World Bank estimated that by 2030:

> 62 per cent of the seafood we eat will be farm-raised to meet growing demand from regions such as Asia, where roughly 70 per cent of fish will be consumed. [China will produce 37 per cent of the world's fish, while consuming 38 per cent of the world's food fish].[5]

2.6 Globally, aquaculture investment is being pursued to meet food demand and also build economies. The BMT Oceanica stated:

> US$16 billion will be invested in Saudi Arabia in the next 16 years on aquaculture alone. … As the oil prices drop and the oil starts to dry up, they have got a real problem. They need to feed their populations, and they see fish farming as a way to do that.[6]

Australian Aquaculture

Current Production

2.7 Compared to global seafood production, Australia 'is a minor global player, producing less than 0.2 per cent of global fisheries and aquaculture supply'[7] and Australia's aquaculture production comprises less than one per cent of global aquaculture.[8]

2.8 Table 2.1 shows Australia's aquaculture and wild caught fisheries production by jurisdiction for 2013-14. In 2013-14 Australia produced 74 913 tonnes of aquaculture valued at $1 billion. This represented 33 per cent of total Australian fisheries production by volume, and 40 per cent by value.[9] In the same year the aquaculture industry employed 5111 people and 3594 people were employed in the commercial fishing industry.[10]

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4 Aquaculture Council of Western Australia (ACWA), *Submission 8*, p. 1.

5 Pearl Producers Association (PPA), *Submission 26*, p. 6.

6 Dr Glenn Shiell, Associate Principal, BMT Oceanic P/L, *Official Committee Hansard,* Perth 11 June 2015, p. 10.

7 ABARES, *Australian Fisheries and Aquaculture Statistics 2014*, December 2015, p. 2.

8 Department of Agriculture (DoA), *Submission 11*, p. 2.

9 ABARES, *Australian Fisheries and Aquaculture Statistics 2014*, December 2015, p. 7.

10 ABARES, *Australian Fisheries and Aquaculture Statistics 2014*, December 2015, p. 37.

Table 2.1 Australia's Aquaculture and Wild-Caught Fisheries Production by jurisdiction 2013–14 [11]

Jurisdiction	Aquaculture		Wild-caught	
	Value ($m)	*Vol. (tonnes)*	*Value ($m)*	*Vol. (tonnes)*
WA	73 (7.3%)	966 (1.3%)	417 (27.7%)	18 995 (12.5%)
NT	15 (1.5%)	815 (1.1%)	31 (2.1%)	5351 (3.5%)
QLD	89 (9.0%)	6446 (8.6%)	191 (12.7%)	20 785 (13.7%)
NSW	51 (5.1%)	4331 (5.8%)	86 (5.7%)	12 618 (8.3%)
SA	181 (18.2%)	15 447 (20.6%)	210 (14.0%)	41 886 (27.5%)
TAS	559 (56.3%)	44 488 (59.4%)	176 (11.7%)	5516 (3.60%)
VIC	25 (2.5%)	2420 (3.2%)	55 (3.7%)	4252 (2.8%)
Commonwealth[12]	—	—	338 (22.5%)	42 826 (28.1%)
Total	**993**	**74 913**	**1504**	**152 229**

Source *ABARES*, Australian fisheries and aquaculture statistics 2014, *pp 76–85, 88.*

Production in Northern Australia

2.9 Table 2.1 shows that the combined value of the aquaculture industries in the Northern Territory, Queensland, and Western Australia is less than the value of the South Australian aquaculture industry and less than a third of the value of the Tasmanian industry.

2.10 In addition, the saltwater crocodile, *Crocodylus porosus*, is found across Northern Australia. While, the ABARES statistics do not include production information for *Crocodylus porosus*, Porosus Pty Ltd stated that 'the best estimate is that there are probably now 170 000 or 175 000 crocodiles in captivity—certainly more in captivity than are in the wild' across Northern Australia.[13] A first grade skin, 40 centimetres wide, is worth $800.[14]

Northern Territory

2.11 The Northern Territory Department of Primary Industry and Fisheries (NTDPIF) stated that in the Northern Territory:

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11 The ABARES statistics for Queensland and Western Australia do not distinguish between production in Northern Australia and the rest of the state. The statistics include pearl production but do not include crocodile production.

12 The Commonwealth jurisdiction includes the Northern Prawn Fishery, the Torres Strait fisheries and the Southern and Eastern Scale Fish and Shark Fishery. A full list of fisheries is at: ABARES, *Australian fisheries and aquaculture statistics 2014*, pp 53–54.

13 Mr Michael Burns, Managing Director, Porosus Pty Ltd, *Official Committee Hansard,* Darwin 14 July 2015, p. 37.

14 Mr John Lever, Koorana, *Official Committee Hansard,* Brisbane 27 August 2015, p. 28.

> … there is currently a small number of active licences … In 2012/13 the NT aquaculture industry was valued at approximately $25 million; the pearling industry was [approximately valued at] $14.81 [million] and pond-based farmed barramundi was [approximately valued at] $10.22 million. … The number of pond-based barramundi farms has reduced from four to one … [15]

Queensland

2.12 The Commonwealth Scientific and Industrial Research Organisation (CSIRO) commented that in Queensland, 'prawns and barramundi are the most important farmed species, and a significant proportion of the State's aquaculture is based in the North.'[16]

2.13 In North Queensland one hundred tonnes of cobia fish[17] is being farmed by Pacific Reef Fisheries. Pacific Reef Fisheries recounted its progression in farming cobia fish and stated:

> In the last two years, we have had a lot of success from a production point of view. It has taken developing new diets and a lot of water quality understandings about what the needs of the animals are. … we have also undertaken quite significant marketing campaigns and are having a lot of success. It is a very high quality fish, so we are targeting the high-end, five-star restaurant type market and are getting extremely good feedback.[18]

2.14 Redclaw freshwater crayfish production is based in Queensland and in 2013–14 the industry produced about 36 tonnes of crayfish valued at $682 000.[19] The Queensland Crayfish Farmers Association (QCFA) stated that there are currently 'several long-term successful family-based farming operations', but the industry had declined from a production peak of 100 tonnes in 2006 'mainly due to the loss of a couple of major players [but also] a few minor ones.'[20]

2.15 The Aquaculture Association of Queensland (AAQ) commented that redclaw freshwater crayfish farming is successful in other parts of the

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15 NT Department of Primary Industry and Fisheries (NTDPIF), *Submission 13*, p. 2.

16 Joint Select Committee on Northern Australia (JSCNA), Inquiry into the Development of Northern Australia: CSIRO, *Submission 108*, p. 12.

17 Cobia is a tropical pelagic fish which grows at triple the rate of barramundi.

18 Mr John Maloney, General Manager, Pacific Reef Fisheries (Pacific Reef), *Official Committee Hansard,* Brisbane 27 August 2015, p. 33.

19 ABARES, *Australian Fisheries and Aquaculture Statistics 2014*, December 2015, p. 88.

20 Mr John Stevenson, President, Queens and Crayfish Farmers Association (QCFA), *Official Committee Hansard,* Townsville 26 August 2015, p. 28.

world, but that Queensland Government policy has only encouraged small aquaculture ventures. The AAQ stated:

> When the extension services or the government came along with a business plan and said, 'This is what you as a fish farmer should be able to do; you should be able to produce your aquaculture species on five hectares or maybe 10,' suddenly, when you actually go out there and do it, you find out that your economies of scale are not large enough. It is driven that way with the way the policies are set up. If you have under five hectares in Queensland freshwater aquaculture, you do not even need to go to the government. There is a self-assessable code to do it. You just have a set of rules that you must apply. … But, at five hectares, you are never going to get enough income off it to sustain a family.[21]

Western Australia

2.16 The ACWA stated that aquaculture in Western Australia is not a 'very big industry'.[22] There are about 450 aquaculture licences, but the majority are 'not terribly active at this stage'.[23] The biggest aquaculture sector in the State apart from pearl oysters, is barramundi which in 2012–13 was worth about $12.5 million.[24] Marine Produce Australia Ltd (MPA) which farms barramundi in a sea cage operation in the Kimberley Aquaculture Development Zone (KADZ), advised that it had annually produced between 800 tonnes and 1300 tonnes.[25] The ABARES figures for the pearl oyster industry for 2013–14 indicate production was worth $61 million.[26]

21 Mr Robert Bartley, President, Aquaculture Association Queensland, *Official Committee Hansard,* Brisbane 27 August 2015, p. 12.

22 Ms Tina Thorne, Executive Officer, ACWA, *Official Committee Hansard,* Perth 11 June 2015, p. 14.

23 Ms Tina Thorne, ACWA, *Official Committee Hansard,* Perth 11 June 2015, p. 14.

24 Ms Tina Thorne, ACWA, *Official Committee Hansard,* Perth 11 June 2015, p. 14.

25 Dr Desiree Allen, Managing Director, Marine Produce Australia Ltd (MPA), *Official Committee Hansard,* Perth 11 June 2015, p. 50.

26 ABARES, *Australian Fisheries and Aquaculture Statistics 2014*, December 2015, p. 88.

Barramundi Fish – from the Egg to the Plate

In the Natural Environment

Barramundi fish naturally occurs from the Arabian Gulf to Taiwan and throughout Northern Australia extending as far south as the Noosa River on the east coast and the Ashburton River on the west coast of Australia. [27] Barramundi has a complex lifecycle, can change its sex and move between freshwater and saltwater. In the natural environment barramundi eggs hatch in saltwater bays and river mouths before being washed into coastal swamps and estuaries that are nurseries for the juvenile fish. After the wet season juveniles migrate upstream where they spend three to four years maturing as males. The male fish then return to their spawning grounds before heading out into the ocean where they change sex. [28]

Aquaculture Farming

In the early 1970s Thailand trialled barramundi aquaculture production. Australian production began with fingerlings produced by the Northern Fisheries Research Centre in Cairns in 1983, followed by the first commercial farm in Innisfail in 1986. [29] Australian barramundi is grown in freshwater ponds in Northern Queensland, saltwater ponds in the Northern Territory, sea cages in the Kimberley region of Western Australia, and recirculating systems in the southern Australian states. The industry predominantly produces larger fish for fillets with a small amount of plate sized fish also produced. The Australian barramundi aquaculture industry is currently worth approximately $60 million per annum. [30]

The Aquaculture Process

Farmed barramundi is grown in three distinct environments: the hatchery; the nursery; and the grow-out facility. While the lifecycle adds to the complexity of

27 Northern Territory Department of Primary Industry and Fisheries , *NT Barramundi Farming Handbook*, September 2007, p. 1.

28 Western Australia Department of Fisheries, 'Fisheries Fact Sheet: Barramundi', June 2011, http://www.fish.wa.gov.au/Documents/recreational_fishing/fact_sheets/fact_sheet_barramundi.pdf Accessed 11 November 2015; Schipp, G., 'Introduction to the Life History and Biology of Barramundi', October 1991, Darwin Aquaculture Centre, http://www.nt.gov.au/d/Content/File/p/Fishnote/FN07.pdf Accessed June 17 2015.

29 Northern Territory Department of Primary Industry, Fisheries, *NT Barramundi Farming Handbook*, September 2007, p. 2.

30 Australian Barramundi Farmers Association, *Submission 3*, April 2015, p. 1.

farming the species, the progression from hatchery to nursery, to grow-out facility is typical of most aquacultured species. [31]

Hatchery

Adult barramundi is kept in the hatchery as broodstock. The males are kept in conditions that purposefully limits their growth until a sex change is induced by moving them to more favourable conditions. The hatched larvae are fed simple foods such as algae, rotifers, and zooplankton. The larvae spend three to four weeks in the hatchery until they reach a size of 15-20 mm.

Nursery

Barramundi fingerlings are transferred to a nursery environment where they will continue to grow until they reach up to 100 mm. During this stage of development barramundi is highly cannibalistic, and so the fingerlings are regularly graded to ensure that larger fish do not share a tank with smaller fish. During the nursery period the fingerlings are weened onto the formulated feeds that they will eat as adults.

Grow-out

Fish are grown out to a range of sizes; an entrée sized fish may be harvested at 250 grams, a plate-sized fish at 600-800 grams, and fish to be filleted at around 3 kilograms. The grow-out period can range from three months to 18 months. Barramundi can be grown out in ponds on land (e.g. Humpty Doo Barramundi); in sea-cages in the ocean (e.g. Marine Produce Australia); or in Recirculating Aquaculture Systems (RAS) which are large tanks (e.g. Mainstream Aquaculture).

From Melbourne to the Kimberley – the Barramundi of Marine Produce Australia[32]

Marine Produce Australia (MPA) produces barramundi at Cone Bay, WA, in the Kimberley Aquaculture Development Zone (KADZ). The KADZ is an extremely remote area, six hours north of Derby by boat. The process used by MPA to obtain stock for its farm provides an example of the challenges faced by aquaculture operators in remote locations.

The MPA purchases either eggs or fingerlings from the Mainstream Aquaculture hatchery in Melbourne. As a result of Mainstream Aquaculture's breeding program these eggs and fingerlings develop into fast growing barramundi. The eggs or fingerlings are shipped to the Challenger Institute of TAFE in Perth, where they are grown to a one gram size. They are then packed in transport containers

31 The following description of the stages of barramundi aquaculture is drawn from: Northern Territory Department of Primary Industry, Fisheries, *NT Barramundi Farming Handbook*, September 2007.

32 Adapted from: Dr Desiree Allen, Managing Director, Marine Produce Australia, *Official Committee Hansard*, Perth, 11 June 2015, p. 53; Challenger Institute of TAFE, *Submission 5*, p. 1.

specially designed by Challenger to provide the fish with a constant supply of oxygen. They are then transported 2700 km to Derby by truck, where they are transferred to a boat and transported to an island in Cone Bay where MPA operates a small nursery. The fingerlings are grown to a size of 50 grams in the nursery before being transported to sea-cages for growing to their harvestable size.

Pond Farming in the Northern Territory

Humpty Doo Barramundi (Humpty Doo) is a saltwater pond based barramundi farm located on the Adelaide River, Northern Territory. Established in 1993, Humpty Doo was initially a small farm producing 300 kilograms of fish per annum,[33] but it has since grown to become one of the largest barramundi farms in Australia with sales in excess of $10 million per annum.[34] Humpty Doo supplies major supermarket chains and has onsite cooling and packing facilities to enable harvested fish to be processed for transport interstate.[35]

Humpty Doo has developed a low discharge farming system based on the use of artificial wetlands as a water treatment system. Water discharged from the farm passes through a wetland that filters nutrients from the water enabling it to be reused in the farm or released into the Adelaide River. Currently the wetlands take up between 50 and 70 per cent of the farm site.[36]

[33] Humpty Doo Barramundi, 'Our Farm', http://humptydoobarramundi.com.au/our-farm Accessed 20 November 2015.

[34] Mr Robert Richards, Managing Director, Humpty Doo Barramundi, *Official Committee Hansard*, Darwin, 14 July 2015, p. 31; NTDPIF, *Submission 13*, p. 2.

[35] Humpty Doo Barramundi, 'Farm Story', http://humptydoobarramundi.com.au/our-story/farm-story Accessed 20 November 2015.

[36] Mr Robert Richards, Humpty Doo Barramundi, *Official Committee Hansard*, Darwin, 14 July 2015, pp. 31-32; ABC, 'NT barramundi farm doubles size to meet growing local and national demand', http://www.abc.net.au/news/2014-09-10/barra-expansion/5733530 Accessed 20 November 2015.

Aquaculture Production Growth

2.17 The ABARES reported that 'since 2002–03 the real gross value of aquaculture production has increased by 4 per cent ($41 million), in real terms', with the largest increase being in salmonids[37] and barramundi.[38] The NTDPIF observed, however, that in Northern Australia:

> The long-term growth of tropical aquaculture industry has been significantly slower compared to most southern states. Queensland's aquaculture industry had a compound annual growth rate (in value terms) of around 4 per cent, while WA's was –3% and NT + 2%. In comparison, Tasmanian aquaculture industry has had a compound annual growth rate of around 14 per cent in recent years.[39]

Expansion of Existing Aquaculture Enterprises

Barramundi

2.18 Farmed barramundi production in both WA and the NT is expected to increase. The MPA stated that its production in the KADZ was set to expand significantly following an increase in its annual permit to 7000 tonnes. The MPA forecast that it would reach this level of production within 'six to seven years'.[40]

2.19 The NTDPIF advised that Humpty Doo Barramundi, the sole remaining barramundi farm in the NT, and 'now one of the largest barramundi producers in Australia' had an agenda for continual expansion.[41]

Grouper

2.20 Since 2013, when it took over the operation and brood stock of the Cairns Northern Fisheries Centre, Finfish Group (Finfish) has developed the aquaculture of grouper fish species.[42] The holding company of the Finfish Group, the Sustainable Development Corporation, stated that the facility in Cairns:

> … has a capacity to produce about 360 000 fingerlings per year, but our aim, over the next year or two, is to take that to 2½ million fingerlings. … We also lease a 17 hectare pond farm at Yorkeys

37 Salmon and trout.

38 ABARES, *Australian Fisheries and Aquaculture Statistics 2014*, December 2015, p. 13.

39 NTDPIF, *Submission 13*, p. 2.

40 Dr Desiree Allen, *Official Committee Hansard,* Perth 11 June 2015, p. 54.

41 NTDPIF, *Submission 13*, p. 2.

42 Mr Alan Wigan, Chief Executive Officer, Sustainable Development Corporation (Finfish), *Official Committee Hansard,* Cairns 24 August 2015, p. 28.

> Knob, which basically grows our fingerlings into consumption-sized fish for sale into the seafood market, and it has an annual capacity of about 350 tonnes per annum.[43]

2.21 In Australia, Finfish sells to 'high end Western restaurants and also wholesale distributors.' Live fish are also sold to Cantonese-style restaurants:[44]

> The restaurants like three-kilo [gram] fish because they can get more fillets out of that. The live-fish restaurants like anywhere from 800 grams to 1.5 kilo [grams], 800 grams being a plate-sized fish and 1.5 kilograms being more of a banquet-sized fish.[45]

2.22 The Finfish expansion program involves investing 'well over $20 million' in a recirculating aquaculture system (RAS)[46] for growing grouper indoors. The aim is to produce 1500 tonnes per annum thereby creating 100 jobs. Finfish Group stated:

> … we are looking at the giant grouper for Australia and Asia and the gold spot grouper for the Middle East. Gold spot is also known as orange spot or, in the Middle East, hamour. …
>
> In Asia, over 50 000 tonnes of grouper is consumed every year. …
>
> In the Middle East, one in every two table fish served at a restaurant in the [United Arab Emirates] is hamour.[47]

Pearl Oyster

2.23 The pearl oyster industry is currently valued at about $48 million per annum.[48] The NTDPIF stated, however, that the value of the pearling industry was predicted to increase as one major pearling producer steadily expanded its production.[49]

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43 Mr Alan Wigan, Finfish, *Official Committee Hansard,* Cairns 24 August 2015, p. 27.

44 Mr Alan Wigan, Finfish, *Official Committee Hansard,* Cairns 24 August 2015, p. 29.

45 Mr Alan Wigan, Finfish, *Official Committee Hansard,* Cairns 24 August 2015, p. 30.

46 A RAS is effectively an indoor tank facility where the water is treated and recirculated. With a large capital investment, a RAS can have zero discharge or, with a lesser investment, can have a 5-10 per cent daily discharge of treated water. Mr Alan Wigan, Finfish, *Official Committee Hansard,* Cairns 24 August 2015, pp 32–33.

47 Mr Alan Wigan, Finfish, *Official Committee Hansard,* Cairns 24 August 2015, p. 28.

48 Pearl Producers Association, *Submission 26*, p. 9.

49 NTDPIF, *Submission 13*, p. 2.

Case Study – The South Sea Pearl Industry

The pearling industry was integral to the economic development of Broome and the Kimberley region. By 1910 Broome was the world's largest pearl centre with 3500 people directly employed in the industry.[50] Initially the industry was focussed on diving for naturally produced pearls and the creation of cultured pearls was prohibited. In 1949 this prohibition was lifted and gradually the industry moved to culturing pearls using a mix of wild harvested and hatchery produced shells.[51]

Recent Difficulties

Prior to the Global Financial Crisis (GFC) the Australian wholesale south sea pearl (*Pinctada maxima)* industry was worth $200 million per annum.[52] Recent years, however, have been difficult for the industry with the overall value of production falling to $48 million per annum, and the number of pearl producers falling from twelve to three.[53] Many factors have contributed to this downturn including the reduced demand for luxury products in the wake of the GFC; the emergence of low-cost competitors in Southeast Asia; the high Australian dollar; the increased costs of production due to the mining boom in Northwest WA; and the impact of Oyster Oedema Disease.[54]

Current Challenges

Despite the recent challenges the pearl industry remains Western Australia's most valuable aquaculture industry,[55] and is an important part of the economy of the Kimberley region. If the industry is to halt its recent decline and recover some of its lost value it must overcome significant challenges including:

The emergence of low-cost Asian pearls: Australia has by far the world's largest supply of natural south sea pearl oyster beds. South sea pearls are widely regarded as the highest grade of pearls and therefore Australian producers enjoyed a competitive advantage during the period when pearls were exclusively cultured in wild harvested shells. The development of hatchery technology to produce juvenile oysters has allowed overseas companies to produce large

50 Australian Government, 'Australia's pearling industry', http://www.australia.gov.au/about-australia/australian-story/australias-pearling-industry Accessed on 3 June 2015.

51 Fletcher, W., Friedman, K., Weir, V., McCrea, J. and Clark, R. *Pearl Oyster Fishery,* Department of Fisheries, Western Australia, January 2006, p. 11.

52 Cygnet Bay Pearls, *Submission 27*, May 2015, p. 2.

53 Pearl Producers Association, *Submission 26*, May 2015, p. 8; Cygnet Bay Pearls, *Submission 27*, May 2015, p. 5.

54 Cygnet Bay Pearls, *Submission 27*, May 2015, p. 5.

55 ABARES, *Australian fisheries and aquaculture statistics 2014*, Australian Bureau of Agricultural and Resource Economics and Sciences, December 2015, p. 21.

numbers of pearls, reducing Australia's competitive advantage and depressing world pearl prices.[56] While the industry has contracted in Australia it is growing rapidly in China, the Philippines, and especially Indonesia where export values doubled between 2008 and 2012.[57]

Infrastructure limitations: The pearl industry is largely located in remote locations with limited road access and is burdened by the resulting transport and logistics challenges. The industry is also under pressure from competition for marine and port space from the oil and gas industries. [58]

Oyster Oedema Disease: Oyster Oedema Disease (OOD) first appeared in Australia in October 2006 when it infected producers and hatcheries in the Exmouth Gulf region resulting in the death of 2.8 million shells and the closing or sale of a number of farms.[59] The disease has continued to affect the industry with Cygnet Bay Pearls reporting that almost 100 per cent of juvenile shells produced in their hatcheries die as a result of the disease.[60]

Opportunities

Australia's reputation for quality pearls: Australia has consistently produced the world's highest quality pearls and Australian pearls attract a premium price. [61] As there is no official labelling system for Australian pearls it is difficult for consumers to identify the origin of pearls. Some producers believe that it is common for Southeast Asian pearls to be falsely sold as Australian pearls.[62]

Tourism and vertical integration: The depressed prices in the wholesale pearl market have forced Australian producers to seek alternative revenue streams. Producers have begun selling former by-products such as pearl meat and mother of pearl shells, as well as operating showrooms and selling pearls online, in an attempt to realise a greater share of the retail value of their products. Cygnet Bay Pearls has opened tourist accommodation and a restaurant at its farm. Cygnet Bay Pearls considers further integration with tourism vital for the pearling industry, suggesting the development of a 'Broome Pearl Region' modelled on the Margaret River Wine Region.[63]

56 Cygnet Bay Pearls, *Submission 27*, May 2015, pp 4-5.
57 Pearl Producers Association (PPA), *Submission 26*, May 2015, p. 9.
58 Clipper Pearls, *Submission 20*, May 2015, p. 2; PPA, *Submission 26*, May 2015, p. 7.
59 Cygnet Bay Pearls, *Submission 27*, May 2015, p. 5.
60 Cygnet Bay Pearls, *Submission 27*, May 2015, p. 5.
61 PPA, *Submission 26*, May 2015, p. 8.
62 Cygnet Bay Pearls, *Submission 27*, May 2015, p. 5.
63 Cygnet Bay Pearls, *Submission 27*, May 2015, p. 7.

New Aquaculture Projects

Prawns

2.24 The CSIRO's evidence to the Committee's *Inquiry into the Development of Northern Australia* stated:

> Recent CSIRO advances in tropical aquaculture technology, together with emerging commercial interest in large-scale prawn farming (approximately $1 billion potential production value) indicate a strong trajectory for the growth of tropical aquaculture in Northern Australia. Research has identified significant potential for the development of large-scale, saltwater pond aquaculture [in] coastal regions of Northern Australia, (about 528 000 ha in NT, 594 000 ha in Qld and 516 000 ha in WA).[64]

2.25 Seafarms Group (Seafarms) is proposing *Project Sea Dragon*, 'a large-scale, integrated, land-based aquaculture project in Northern Australia' producing 'world scale volumes of black tiger prawns':

> Stage 1 will consist of 1080 ha of grow-out ponds supported by a breeding centre, broodstock centre and commercial hatchery.
>
> Ultimately the project is scaled to consist of 10 000 hectares of grow-out farm supported by: a feed mill; broodstock and hatchery facilities; a power station; processing plant; and storage and export facilities.[65]

2.26 Seafarms hoped to commence construction during the 2017 dry season,[66] and expected the project to take 10 years to reach completion.[67] When fully operational, the 100 000 tonne production would be valued at $1.7 billion,[68] which represents a 20-fold increase in Australia's farmed prawn production.[69]

2.27 Seafarms predicted that at full capacity, Project Sea Dragon would employ 1600 to 1700 people 'spread across Kununurra, Legune Station, Darwin and Exmouth.' The workforce would need to be locally based because the operation is 'not well suited to a fly-in fly-out' employment arrangement.[70] The production site at Legune Station is estimated to employ 700 people and the processing plant at Kununurra would employ 600 people.[71]

64 JSCNA, Inquiry into the Development of Northern Australia: CSIRO, *Submission 108*, p. 12.
65 Seafarms, *Submission 4*, pp 5–6.
66 Dr Chris Mitchell, Seafarms, *Official Committee Hansard,* Brisbane 27 August 2015, p. 20.
67 Dr Chris Mitchell, Seafarms, *Official Committee Hansard,* Brisbane 27 August 2015, p. 17.
68 Dr Chris Mitchell, Seafarms, *Official Committee Hansard,* Brisbane 27 August 2015, p. 21.
69 Dr Chris Mitchell, Seafarms, *Official Committee Hansard,* Brisbane 27 August 2015, p. 16.
70 Dr Chris Mitchell, Seafarms, *Official Committee Hansard,* Brisbane 27 August 2015, p. 17.
71 Dr Chris Mitchell, Seafarms, *Official Committee Hansard,* Brisbane 27 August 2015, p. 19.

2.28 In Queensland, Pacific Reef Fisheries (Pacific Reef) has proposed a new prawn farm at Guthalungra, between Ayr and Bowen. It is estimated the 259 hectare site would produce between 2500 to 3000 tonnes of prawns worth approximately $50 million and employ 100 full-time and 100 casual employees. Approval for the project is yet to be granted.[72]

2.29 Further discussion about the regulations affecting the establishment of new aquaculture projects along the Great Barrier Reef seaboard is included in Chapter 3.

Redclaw Freshwater Crayfish

2.30 A five-year selective breeding project, completed in 2012, on the redclaw crayfish industry in Queensland resulted in increased growth rates of the crayfish and enabled hatchery production of stage 3 juveniles. The QCFA has since promoted the redclaw crayfish industry through a website, a published crayfish growing manual, a conference, and regular workshops. Consequently, there are four farms under construction and another 'four or six people actively getting organised to start farming' this product.[73]

2.31 As redclaw crayfish are not native to WA, new farms growing this aquaculture product in WA would have licensing constraints as barriers to market entry. In regard to redclaw crayfish farming requirements in WA, the Kimberley Training Institute commented that farms needed:

> … to be a long way away from anywhere with waterways … Redclaw have a fairly unique taxis in that when they notice that the water is flowing they will actually move into the water flow, which means that they can get out of ponds and move all over the place.[74]

Trepang

2.32 Trepang or sea cucumber (sand fish) is a saltwater bottom dwelling sea animal native to Northern Australia. Larval trepang settle in shallow water and move to deeper water as they grow and reach harvestable size.[75] When harvested the trepang is dried for 4 to 5 weeks which reduces their weight by 90 per cent. One kilogram of dry weight trepang is worth

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72 Mr John Maloney, Pacific Reef, *Official Committee Hansard,* Brisbane 27 August 2015, p. 32; Pacific Reef, *Submission 6*, p. 1.

73 Mr John Stevenson, President, QCFA, *Official Committee Hansard,* Townsville 26 August 2015, p. 28.

74 Mr Geoffrey Cooper, Portfolio Manager, Kimberley Training Institute, *Official Committee Hansard,* Broome 10 June 2015, p. 8.

75 Tasmanian Seafoods, *Submission 16*, p. 2.

about AUD $150 in the Chinese market. Japanese trepang, regarded as a superior species, is worth between AUD $1200 to $1500 per kilogram.[76]

2.33 Tasmanian Seafoods is currently trialling trepang sea ranching in the NT, with 100 000 trepang being raised in each hatchery batch and released into shallow water.[77] In October 2015, the first harvest of 200 tonnes of trepang was completed at Goulburn Island.[78] Tasmanian Seafoods is planning to expand its sea ranching project to 'the Kimberley in Western Australia including Napier Broome Bay, Vansittart Bay, the Osborne Island group and the Pilbara.'[79]

Trade in Aquaculture Products

Seafood

2.34 In 2013–14, Australians consumed 345 500 tonnes of seafood, 69 per cent of which was imported (around 65 per cent of barramundi[80] and 64 per cent of prawns[81] consumed in Australia are imported).[82]

2.35 Competition from frozen imports from Asia has, amongst other factors, seriously limited the growth of the aquaculture industry in the NT.[83] Charles Darwin University (CDU) stated that:

> We all know that when the imported prawns came in, it was just crazy. It hit Queensland. It smacked [the market] in two and cut it by 50 percent up here. [The prawn producers] held on and held on and then they realised the cost of it.[84]

2.36 Despite this view, the MPA commented that there was demand from Australia's major supermarkets for its product and that some 5000 tonnes of barramundi could be supplied to supermarkets. The MPA could also easily sell between 2000 to 3000 tonnes to the premium restaurant segment of the market.[85]

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76 Mr Chauncey Hammond, Commercial Adviser, Tasmanian Seafoods, *Official Committee Hansard,* Darwin 14 July 2015, p. 55.

77 Tasmanian Seafoods, *Submission 16*, p. 2.

78 ABC Radio National Breakfast, *First Commercial Crop of Farmed Sea Cucumber Harvested off Australia's Top End*, <http://www.abc.net.au/radionational/programs/breakfast/first-commercial-crop-of-farmed-sea-cucumber/6864864> Accessed 21 October 2015.

79 Tasmanian Seafoods, *Submission 16*, p. 3.

80 ABFA, *Submission 3*, p. 1.

81 APFA, *Submission 10*, p. 3.

82 ABARES, *Australian Fisheries and Aquaculture Statistics 2014*, December 2015, pp 1, 2.

83 NTDPIF, *Submission 13*, p. 3.

84 Mr Chadd Mumme, A/g Team Leader, Horticulture and Aquaculture for Primary Industries, Charles Darwin University (CDU), *Committee Hansard,* Darwin 14 July 2015, p. 15.

85 Dr Desiree Alan, MPA, *Official Committee Hansard,* Perth 11 June 2015, p. 51.

2.37 Mainstream Aquaculture believed there was an opportunity for barramundi to rival salmon in the market and stated:

> … we think barramundi should be bigger than salmon. We consume 200 000 tonnes of premium white fish every year. We consume 20 000 tonnes of barramundi and 60 000 tonnes of salmon. Why the differential when every consumer survey suggests barramundi is Australia's most popular fish? …
>
> I think the first step is import substitution—those 13 000 tonnes that are coming in, produced locally, we can achieve that. The second step is to capture a big part of the premium white [fish] category. Why can't barramundi be 80 per cent of those 200 000 tonnes rather than 10 per cent? There is no reason that can't happen.[86]

2.38 Pacific Reef which sells about 80 per cent of its farmed prawns to a major supermarket chain stated that there is demand for Australian prawns:

> We are the main supplier to [the supermarket chain]. They want more. They are pushing us to try and put more ponds in, because they currently would like to replace the imported product on their shelves but they cannot get it within Australia.[87]

2.39 Australia's free trade agreements with its North Asian trading partners will provide opportunities for seafood exporters as 'tariffs of up to 20 per cent on seafood will be eliminated.'[88]

2.40 Seafarms observed that Australian aquaculture producers needed to be in the lowest quartile of lowest cost producers to be globally competitive. Small scale production is unlikely to be internationally cost-competitive because of relatively high labour costs, a small local Australian market, and transport logistics (particularly for Northern Australia).[89]

2.41 The Department of Agriculture (DoA) observed that on average aquaculture incurred 'a higher cost of production compared to wild-catch fisheries, largely due to higher feed costs and capital requirements.'[90]

2.42 Humpty Doo Barramundi (which used to export product to the United States of America, but stopped when the Australian dollar rose above

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86 Mr Boris Musa, Managing Director, Mainstream Aquaculture, *Official Committee Hansard,* Townsville 26 August 2015, p. 36.

87 Mr John Maloney, General Manager, Pacific Reef, *Official Committee Hansard,* Brisbane 27 August 2015, pp 32–33.

88 Ms Jane Madden, General Manager, Investment Division, Austrade, *Official Committee Hansard,* Canberra 15 September 2015, p. 9.

89 Seafarms, *Submission 4*, p. 5.

90 Department of Agriculture (DoA), *Submission 11*, p. 6.

US$0.75), observed that efficiency in the barramundi industry was growing:

> … there is a strong incentive to mechanise, automate and improve the efficiency of the industry. Long-term, there could be a turnaround in who is producing the cheapest fish.[91]

Pearls

2.43 Prior to the global financial crisis (GFC) in 2007–08, Australia's annual turnover of south sea pearls exceeded $200 million.[92] Cygnet Bay Pearls stated that:

> … the Australian industry was hit by the 'perfect storm' of insults including the GFC, high Australian dollar, rapid increase in production cost due to [a] surrounding mining and resource boom, and ultimately oyster shell health and subsequent reduced pearl crop quality from the introduction of the oyster oedema disease.[93]

2.44 The number of independent producers fell from twelve to three 'with an annual value of under $50 million and falling'.[94]

2.45 Australian producer Cygnet Bay Pearls stated that Australian south sea pearls retain one competitive advantage over imported pearls and that is 'the premium that consumers are prepared to pay for the provenance of an Australian pearl.'[95] This premium is now being affected by imported pearls grown specifically in Southeast Asia and marketed as Australian pearls. Cygnet Bay Pearls explained:

> As one of the three remaining producers in WA and cognisant of the dramatic drop in supply of Australian pearls over the past five to ten years, we are unfortunately acutely aware of the misleading sales practices that are utilised throughout the sales supply chain which result in local consumers purchasing what they believe to be a 'Broome Pearl' but are in fact not.[96]

2.46 Cygnet Bay Pearls recommended there be a mechanism 'which discourages and penalises retailers selling "low-cost" imported pearls under the guise that they are Australian' pearls. Cygnet Bay Pearls

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91 Mr Robert Richards, Managing Director, Humpty Doo Barramundi, *Official Committee Hansard,* Darwin 14 July 2015, p. 34.

92 PPA, *Submission 26*, p. 9.

93 Cygnet Bay Pearls, *Submission 27*, p. 5.

94 Cygnet Bay Pearls, *Submission 27*, p. 5.

95 Cygnet Bay Pearls, *Submission 27*, p. 8.

96 Cygnet Bay Pearls, *Submission 27*, p. 9.

suggested that the Marine Stewardship Council certification[97] of the pearling industry may also assist with this objective.[98]

Saltwater Crocodiles

2.47 In Australia, the saltwater crocodile, *Crocodylus porosus*, is listed in Appendix II of the Convention on the International Trade of Endangered Species of Wild Fauna and Flora (CITES).[99] Consequently, the export of *C. porosus* products requires a CITES certificate.[100]

2.48 A report prepared for the United Nations Environment Programme World Conservation Monitoring Centre (UNEP–WCMC) using the CITES Trade Database indicates that Australia is the major exporter of *C. porosus* skins. Since 2002, Australian production of saltwater crocodiles has tripled, and in 2011 Australia exported 60 per cent of the world's trade of over 50 000 skins.[101] Australian crocodile skins are generally exported to France and Italy.[102]

2.49 Only farmed crocodiles are suitable for skin production. Hartley's Creek Crocodile Farming Company stated:

> … you could never use a poached crocodile skin because it would be so covered in scratches, marks and blemishes that you would not be able to use it … The minute it has one line or one mark on it, it is worth nothing. Wild crocodiles bite and scratch each other and damage their skins every day of the week.[103]

2.50 There is also a trade in crocodile meat. The UNEP–WCMC report stated that in 2011, Australia exported 16 tonnes of crocodile meat annually, a decrease from 28 tonnes in 2010. Japan, New Zealand, Malaysia, Hong

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97 The certification system allows certified products to be traced back to the production fishery. Marine Stewardship Council, *Traceability in the Supply Chain*, https://www.msc.org/about-us/credibility/traceability-in-the-supply-chain Accessed 26 October 2015.

98 Cygnet Bay Pearls, *Submission 27*, p. 10.

99 Appendix II includes species that, although currently not threatened with extinction, may become so without trade controls. It also includes species that resemble other listed species and need to be regulated in order to effectively control the trade in those other listed species. Exporters must obtain a CITES permit from their national CITES Management Authority for each shipment that contains CITES listed specimens.

100 U.S. Fish & Wildlife Service, *Understanding CITES – CITES Appendix II Supports Sustainable Use*, https://www.fws.gov/international/pdf/factsheet-cites-appendix-ii-2014.pdf Accessed 27 October 2015.

101 John Caldwell, *World Trade in Crocodilian Skins 2009–2011*, United Nations Environment Programme world conservation monitoring Centre, Cambridge, 2013, p. 14.

102 Mr John Lever, Owner, Koorana Crocodile Farm (Koorana), *Official Committee Hansard*, Brisbane 27 August 2015, p. 27.

103 Mrs Angela Freeman, Co-owner, Hartley's Creek Crocodile Farming Company, *Official Committee Hansard*, Cairns 24 August 2015, p. 12.

Kong and Taiwan are the main export destinations for Australian crocodile meat. The UNEP–WCMC report attributed the decline in exports to a possible increase in local consumption.[104]

2.51 Koorana Crocodile Farm (Koorana) commented that it had operated an AQIS accredited abattoir 'for years', but operating 'in the bush' had created difficulties with AQIS inspections and so it had relinquished accreditation.[105] Koorana added:

> We were selling 10 tonnes [of crocodile meat] a year to Japan. I could not ever supply 10 tonnes; I had to buy it in from other farms and market their meat for them to make up the container load. … The meat [from an] animal is worth about $100. A lot of farms just do not even want to bother with the meat. [106]

2.52 Koorana now supplies the domestic Australian market,[107] but commented that it would have an excess of meat by 2017 and 'might look at getting export accreditation again'.[108]

2.53 The UNEP–WCMC report also found that 'Australia is the world's foremost importer of crocodile teeth and between 2002 and 2010 imported over 222 000' teeth. Most crocodile teeth were from *C. porosus* captive-breeding operations in Malaysia, Papua New Guinea (PNG) and Singapore. In 2011, over 35 000 teeth ('almost 12 tonnes') were exported from PNG to Australia.[109]

Potential New Aquaculture Products for Northern Australia

Finfish

2.54 Several northern species of finfish have been identified as having the potential for aquaculture, including: silver cobbler (a catfish), some cod species, gold band snapper and the sooty grunter.[110] A further species—the threadfin salmon—was recommended by the Kimberley Training Institute:

> … threadfin salmon would be a fantastic species for aquaculture. They have many attributes which are similar to barramundi: they are fast growing, they are hermaphrodites and, from what we can

104 John Caldwell, *World Trade in Crocodilian Skins 2009–2011*, p. 25.

105 Mr John Lever, Koorana, *Official Committee Hansard,* Brisbane 27 August 2015, p. 26.

106 Mr John Lever, Koorana, *Official Committee Hansard,* Brisbane 27 August 2015, p. 28.

107 Mr John Lever, Koorana, *Official Committee Hansard,* Brisbane 27 August 2015, p. 26.

108 Mr John Lever, Koorana, *Official Committee Hansard,* Brisbane 27 August 2015, p. 28.

109 John Caldwell, *World Trade in Crocodilian Skins 2009–2011*, p. 27.

110 Mr Chris Mitchell, Councillor, Shire of Broome, *Official Committee Hansard,* Broome 9 June 2015, p. 6; Mr Kenneth Robinson, *Official Committee Hansard,* Darwin 14 July 2015, p. 63.

> tell, they have good feed conversion rates. … And they taste fantastic. I would take threadfin salmon over barra any day …[111]

2.55 The NTDPIF observed that the coral reef habitat of Northern Australia was largely unexplored and unexploited and offered 'unique, new, high-value species for the ornamental aquarium trade.' The aquarium sector believed there was little scope to grow the industry through wild-caught product and was 'keen to explore opportunities to farm ornamental species.' The NTDPIF added that:

> … the Aquaculture Unit is establishing an R&D partnership with industry to assess production methods and national and international market potential for a range of potentially high-value ornamental marine species.[112]

Turtles

2.56 Wildlife Management International suggested that hawksbill turtles could be farmed in Northern Australia and stated:

> Sea turtles, contrary to popular belief, are at carrying capacity. You cannot put any more in the ocean here. Every time there is a cyclone and seagrass beds get disturbed the turtles all starve to death. … Their [reproduction strategy] is masses of eggs and very low survival.[113]

2.57 Wildlife Management International drew attention to the demand for the shell plates of hawksbill turtles from the bekko artisan industry in Japan.[114]

Cherabin Freshwater Prawn

2.58 Mr Kenneth Robinson advocated the aquaculture of the Australian giant freshwater prawn, *Macrobrachium spinepes,* known as cherabin. A closely related species 'is widely farmed throughout the Asian and South East Asia area and the South Pacific, [and] there is about 200 000 tonnes sold annually.'[115] The species needs brackish water for larval development but can then be grown out in freshwater ponds. Formulated feeds containing 'relatively low animal/plant protein content (20 to 25 per cent)' can be used. Stocking density, however, 'needs to be much lower (5 to 10 per

111 Mr Jeffrey Cooper, KTI, *Official Committee Hansard,* Broome 9 June 2015, p. 27.

112 NTDPIF, *Submission 13*, p. 6.

113 Professor Grahame Webb, Director, Wildlife Management International, *Official Committee Hansard,* Darwin 14 July 2015, p. 42.

114 Professor Grahame Webb, Wildlife Management International, *Official Committee Hansard,* Darwin 14 July 2015, p. 42.

115 Mr Kenneth Robinson, *Submission 19*, p. 1.

square metre) than marine penaeid prawns … because of male aggression and cannibalism'.[116]

2.59 The UN FAO Fisheries and Aquaculture Department found that:

> The development of freshwater prawn farming was inhibited in the past by its longer hatchery phase and lower grow-out productivity compared to marine shrimp. These constraints are now balanced by a number of positive factors concerning its sustainability …
>
> The culture of *Macrobrachium* spp. is less likely to have a detrimental impact because freshwater prawns cannot be reared at densities as high as those commonly used in marine shrimp farming. … and (unlike the inland culture of marine shrimp) the grow-out of *Macrobrachium* does not make agricultural land saline.[117]

Clams, Oysters, and Sea Snails

2.60 Cygnet Bay Pearls advised that a desk top survey conducted in the early 2000s identified two issues holding back the development of Kimberley rock oysters:

> … the investment in infrastructure to support it, such as the pearling infrastructure that now lies dormant all over the coast; and the access to market.[118]

2.61 Cygnet Bay Pearls stated that the Kimberley Marine Research Project (KMRP) had support from local traditional owners to undertake a feasibility study to develop an edible rock oyster industry in the Kimberley. The feasibility study 'could lead to commercialisation within three to five years.'[119]

2.62 The Reef and Rainforest Research Centre (RRRC) stated that clam aquaculture in the 1980s could not compete with the wild harvest of clams. The capacity to harvest wild clams however is 'hugely diminished', so commercial clam aquaculture is now potentially viable.[120]

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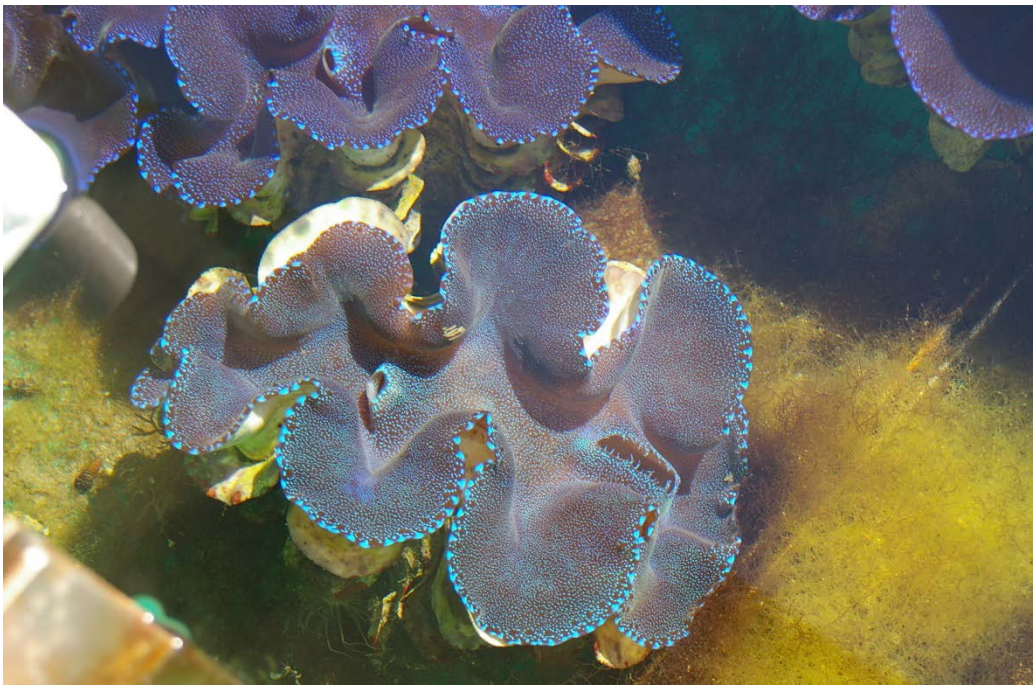
116 Mr Kenneth Robinson, *Submission 19.1*, p. 1.

117 UN FAO Fisheries and Agriculture Department, *Cultured Aquatic Species Information Programme Macrobrachium rosenbergii (De Man, 1879)* http://www.fao.org/fishery/culturedspecies/Macrobrachium_rosenbergii/en Accessed 30 October 2015.

118 Mr James Brown, Cygnet Bay Pearls, *Official Committee Hansard,* Broome 9 June 2015, p. 12.

119 Cygnet Bay Pearls, *Submission 27*, p. 14.

120 Ms Sheridan Morris, Managing Director, Reef and Rainforest Research Centre (RRRC), *Official Committee Hansard,* Cairns 24 August 2015, p. 6.



A giant clam being cultured at the Darwin Aquaculture Centre

2.63 The NTDPIF stated it was currently investigating the markets for black lip tropical rock oyster and the fluted giant clam through 'various market analysis and product specification activities.'[121] A broader analysis of the potential for black lip tropical rock oyster in the national seafood market was planned as a result.[122]

2.64 The RRRC commented that the aquaculture of depleted species such as triton shell (a species of sea snail) could replenish depleted stocks and contribute to the management strategy for pest species such as the crown of thorns starfish, which is a major threat to the health of coral in the Great Barrier Reef.[123] The Kimberley Aquaculture Aboriginal Corporation commented that a reseeding project for trochus shell (a species of sea snail) had been successful in the past.[124]

Sponges

2.65 The RRRC noted that there had been 'some research around some of the [sea] sponges' and one species had 'significant potential':

> … the live sponge or real sponge industry has basically collapsed around the world. It was mostly in the Mediterranean and through

121 NTDPIF, *Submission 13*, p. 6.

122 NTDPIF, *Submission 13*, pp 6–7.

123 Ms Sheridan Morris, RRRC, *Official Committee Hansard,* Cairns 24 August 2015, p. 6.

124 Mr Charles Prouse, Kimberley Aquaculture Aboriginal Corporation, *Official Committee Hansard,* Broome 9 June 2015, p. 21.

> Florida and those areas. We have a collagen-based sponge in the Torres Strait, of very good quality.[125]

Algae

2.66 The Western Australian Department of Fisheries (WADF) drew attention to a June 2012 *Pilbara Algae Industry Study* report which identified 'several areas in which future investment in the algae industry could be fostered.'[126] The report found that:

- the 'open pond system is the preferred practical method for large-scale algal production';
- for the use of algae in biofuel production: 'the establishment of commercially viable operating facilities is still a considerable way off';
- for health foods and pharmaceuticals: 'the current scale of the markets for algae-based products is relatively small, and … there already exists commercially viable operating facilities producing algae-based health food products'; and
- for feedstock products: algal feedstock products are seen as 'an end use for the large accumulation of spent algae.'[127]

2.67 The WADF advised that a private company proposed establishing an algae aquaculture industry in the Pilbara, but later withdrew its proposal. Another company, however, has recently applied for a new aquaculture licence to grow algae 'using the facilities developed by the initial organisation.'[128]

2.68 In Queensland a collaboration between MBD Energy and James Cook University:

> … has invested more than $40 million of private equity and $30 million of government grants/rebates over [the] last five years to create a strong commercial business in:
>
> - the provision of biological-based remediation of industrial waste systems, and
> - the high-yield production of valuable algae-based by-products.[129]

125 Ms Sheridan Morris, RRRC, *Official Committee Hansard,* Cairns 24 August 2015, p. 6.

126 Western Australian Department of Fisheries (WADF), *Submission 23*, p. 2.

127 WorleyParsons, *Pilbara Algae Industry Study,* June 2012, pp 5, 7.

128 Western Australian Department of Fisheries (WADF), *Submission 23*, p. 2.

129 James Cook University, *Submission 14, Attachment A*, p. 3.

Environmental Impacts and Sustainability

2.69 Pew Charitable Trusts (Pew) and the Amateur Fishermen's Association of the NT (AFANT) raised specific concerns about the potential environmental impact of aquaculture. Both organisations were supportive of aquaculture in principle, Pew describing aquaculture as potentially a 'low-impact and positive industry' but with the need to manage potential risks to the environment.[130]

2.70 Pew raised the following potential environmental impacts of aquaculture that should to be managed or avoided:

- the potential transfer of pests and diseases from aquaculture operations to wild fish stocks;
- local or regional pollution from nutrient run-off;
- genetic contamination of wild fish populations through fish escapes; and
- removal of native vegetation such as mangroves.[131]

Concluding Comment

Global Aquaculture

2.71 There is an increasing global demand for seafood as a source of high quality protein. Globally, countries are turning towards aquaculture to meet seafood protein demand as reliance on wild-caught fisheries cannot meet this demand. In Australia aquaculture production is increasing as seafood demand increases. Most seafood that Australians consume is imported and this provides local producers with a significant opportunity and challenge to increase market share through import replacement.

Production in Northern Australia

2.72 Northern Australia has a natural advantage of a long coastline, pristine waters, availability of suitable land, and proximity to Asia, where there is significant demand for seafood. In addition there are also a number of tropical species found in Northern Australia which are highly suited for use in aquaculture.

2.73 Aquaculture production in the Northern Australian jurisdictions is small compared to the rest of Australia. Table 2.1 which details aquaculture production figures for each jurisdiction in 2013–14 shows that the total

130 Mr Tim Nichol, Kimberley Manager, Pew Charitable Trusts (Pew), *Official Committee Hansard*, Perth, 11 June 2015, p. 26.

131 Pew, *Submission 24*, p. 3.

value of aquaculture in Western Australia, the Northern Territory and Queensland was $177 million. This was significantly less than the production of salmonids in Tasmania in the same period, which was valued at $531 million.[132]

2.74 The Committee is concerned by the rapid decline in the value of the south sea pearl industry. In recent times the Australian pearl industry has encountered challenging market conditions caused by increased competition from readily available, low-cost overseas sources, coupled with a decline in demand for luxury goods such as pearls, in the wake of the Global Financial Crisis. In addition to this many producers have suffered widespread damage to their stock due to the spread of oyster oedema disease. To address this, the Committee has recommended the establishment of an Australian Pearling Industry Recovery Taskforce. Additional comments in this vein are included in Chapter 4.

Aquaculture Production Growth

2.75 The Committee welcomes the expansion of barramundi farming in WA and the NT and the proposed Project Sea Dragon prawn farm in the NT. When it reaches full capacity, the Project Sea Dragon is predicted to annually produce 100 000 tonnes of prawns and generate $800 million in export revenue.[133] While the project is set to become a major industry in Northern Australia,[134] annual prawn production in Australia would still be significantly less than annual production in Vietnam (500 000 tonnes) and China (1.2 million tonnes).[135]

Trade in Aquaculture Products

2.76 Aquaculture products have a high cost of production and unless they are of a high value they will have difficulty in competing in the international marketplace. Project Sea Dragon aspires to achieve the efficiencies and economies of scale which will enable it to enter the export market. Increased production by other aquaculture ventures to meet local demand and improved production efficiency may see more companies becoming internationally competitive and seek to export their product.

2.77 The Committee believes that when this occurs there will be significant opportunities provided by Australia's recent FTAs with its North Asia trading partners which have seen the reduction of seafood tariffs.

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132 ABARES, *Australian Fisheries and Aquaculture Statistics 2014*, December 2015, p. 88.

133 Seafarms, *Submission 4*, p. 6.

134 In comparison, although prices for cattle have risen significantly, live cattle exports from Northern Australia in 2009–10 generated $416.7 million: see Northern Australia Ministerial Forum, *Strategic Directions for the Northern Australia Beef Industry*, November 2012, p. 2.

135 Seafarms, *Submission 4*, p. 3.

Recommendations

Recommendation 1

2.78 **The Committee recommends the establishment of an Australian Pearling Industry Recovery Taskforce to fund a research program focussed on identifying the causative agent of the oyster oedema disease and possible remedial actions to reduce the incidence, and mitigate the impacts of the disease.**

3

Regulatory Issues

3.1 In 2004, the Productivity Commission published a research paper entitled *Assessing Environmental Regulatory Arrangements for Aquaculture*. The Productivity Commission found that:

> Aquaculture production is subject to an unnecessarily complex array of legislation and agencies—covering marine and coastal management, environmental management, land use planning, land use tenure, and quarantine and translocation.[1]

3.2 The Productivity Commission also found that government and industry have attempted to promote the expansion of the aquaculture industry through funding research and development but that:

> At times, this focus on industry development has occurred despite the compelling prior need to establish or refine environmental regulatory arrangements for aquaculture. Without appropriate regulatory arrangements, the aquaculture industry is unlikely to realise its potential, and any government funding of industry development will be less effective than otherwise.[2]

3.3 The focus of this chapter is on the regulatory framework applied to aquaculture at both the Commonwealth and state/territory level.[3] The main regulatory instruments in place in each jurisdiction are considered as well as the use of development zones to stimulate aquaculture development. The Great Barrier Reef region, due to its World Heritage

1 Productivity Commission, *Assessing Environmental Regulatory Arrangements for Aquaculture: Productivity Commission Research Paper*, Canberra, 2004, p. xx.

2 Productivity Commission, *Assessing Environmental Regulatory Arrangements for Aquaculture: Productivity Commission Research Paper*, Canberra, 2004, p. 168.

3 In some instances the development or operation of aquaculture projects may also require the approval of Local Governments or Traditional Owner Organisations. Issues relating to approvals from these organisations are noted where appropriate.

status, has unique regulatory arrangements and this is discussed separately below.

Commonwealth Regulations

Environment Protection and Biodiversity Conservation Act

3.4 The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) is the 'Australian Government's key piece of environmental legislation'.[4] The objectives of the EPBC Act include conserving Australia's biodiversity; protecting the environment, especially matters of national environmental significance; and streamlining environmental assessment and approval processes.[5]

3.5 The EPBC Act requires that all actions that will, or are likely to, have a significant impact on matters of national environmental significance must be approved by the Commonwealth Environment Minister.[6] The matters of national environmental significance with most potential relevance to aquaculture are:

- world heritage properties;…
- wetlands of international importance (often called 'Ramsar' wetlands after the international treaty under which such wetlands are listed);
- nationally threatened species and ecological communities;
- migratory species;
- Commonwealth marine areas; and
- the Great Barrier Reef Marine Park…[7]

3.6 The EPBC Act does not grant the Environment Minister the authority to act as a 'court of appeal' for those seeking to overturn a state or local government decision. The Environment Minister:

> … only has the power to make decisions in relation to matters of national environmental significance, the minister has no power to intervene in decisions of state or local governments that do not have an impact on these matters.[8]

3.7 The Northern Territory, Queensland and Western Australia have signed bilateral agreements with the Commonwealth Government that allow

4 Department of the Environment (DoE), *Submission 21*, p 1.

5 DoE, 'About the EPBC Act', https://www.environment.gov.au/epbc/about Accessed 14 October 2015.

6 DoE, *Exhibit 16b: Matters of Environmental Significance*, p. 1.

7 DoE, *Exhibit 16b: Matters of Environmental Significance*, p. 2.

8 DoE, 'EPBC Act – Frequently asked questions', https://www.environment.gov.au/epbc/publications/factsheet-epbc-act-frequently-asked-questions Accessed 14 October 2015.

projects requiring EPBC Act approval in these jurisdictions to be assessed using the relevant state or territory assessment processes. Approval from the Commonwealth Minister for the Environment is still required and the Minister has the authority to decide that a project is approved, approved with conditions, or rejected.[9]

State and Territory Regulations

Northern Territory

3.8 Proponents of potential aquaculture projects are required, under the Northern Territory *Fisheries Act*, to apply for an aquaculture license. The license application is also used to assess the project under the *Environmental Assessment Act*. The proponent is also required to submit an Environmental Management Plan, and if the project is marine based or is proposed to take place on public land, an aquaculture lease is also required.[10]

3.9 The Northern Territory Department of Primary Industries and Fisheries (NTDPIF) stated that the assistance provided to potential aquaculture developers is probably better in the Northern Territory (NT) than in most jurisdictions. The NTDPIF commented that for nearly twenty years aquaculture investors have been allocated a case manager whose role it is to 'assist clients negotiate the government approvals process.'[11]

3.10 The NTDPIF also compared the approvals process for the Guthalungra project in Queensland (discussion follows) with a 100-hectare prawn farm in the NT that was granted approval within two years in the early 2000s.[12]

Queensland

3.11 Commercial scale aquaculture projects[13] are regulated through a range of planning, fisheries and environment regulations.[14] A larger project may be

9 DoE, *Exhibit 16b: Matters of Environmental Significance*, pp 27-28.

10 Northern Territory Government, *Guide to writing a Notice of Intent for Aquaculture in the Northern Territory*, http://www.nt.gov.au/d/Content/File/p/Fishnote/Notice_of_Intent_for_Aquaculture_Guideline.pdf Accessed 5 November 2015, pp 3-5.

11 Mr Glenn Schipp, Director, Department of Primary Industries and Fisheries Northern Territory (NTDPIF), *Official Committee Hansard*, Darwin, Tuesday 14 July 2015, p. 2.

12 Mr Glenn Schipp, NTDPIF, *Official Committee Hansard*, Darwin, Tuesday 14 July 2015, p. 2.

13 Small projects that do not discharge waste, operate a hatchery, or source fish from interstate or wild stocks can be self-assessed without government approval.

14 Queensland Competition Authority (QCA), *Exhibit 1: Agriculture Regulation in Queensland Draft Report*, July 2014, Brisbane, p. 12.

declared a 'coordinated project'[15] necessitating a whole-of-government response from the Queensland Government.

3.12 A coordinated project will generally require the proponent to prepare an environmental impact statement (EIS) addressing the proposed development's environmental impact and the planned methods of avoiding, mitigating or offsetting these impacts.[16] The EIS is delivered to the Coordinator-General (CG) who will seek input from Queensland Government agencies and undertake public consultations. The CG will then prepare a report recommending the project be rejected or to proceed subject to any conditions the CG deems necessary to manage the project's environmental impacts.[17]

3.13 If the CG recommends that a project can proceed, the project still requires approval from the project's assessment manager,[18] who may also attach additional conditions to the approval.[19] Technical advice would be provided by the Department of Agriculture and Fisheries and the Department of Environment and Heritage Protection.[20]

Western Australia

3.14 Aquaculture proponents in Western Australia are required to obtain an aquaculture license and an aquaculture lease from the Western Australian Department of Fisheries (WADF). Aquaculture projects that have the potential to cause significant environmental impacts are also required to be assessed by the Environment Protection Authority. Operators are required to demonstrate ongoing environmental management by lodging a Management and Environmental Monitoring Plan annually when renewing their license.[21]

3.15 The WADF noted that gaining access to land for aquaculture developments can be challenging and that 'suitable land areas should be identified and attempts made by Governments at all levels to reduce the time and cost impost on proponents.'[22]

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15 The proponent may recommend the project be treated as a coordinated project or the Coordinator General may decide that a project will be treated as a coordinated project.

16 QCA, *Exhibit 1: Agriculture Regulation in Queensland Draft Report*, p. 13.

17 QCA, *Exhibit 1: Agriculture Regulation in Queensland Draft Report*, pp 13-14.

18 Either a Local Government or the Queensland Department of Local Government, Infrastructure and Planning.

19 QCA, *Exhibit 1: Agriculture Regulation in Queensland Draft Report*, pp 13-14.

20 QCA, *Exhibit 1: Agriculture Regulation in Queensland Draft Report,* p. 12.

21 Western Australian Department of Fisheries (WADF), 'Aquaculture management', http://www.fish.wa.gov.au/Fishing-and-Aquaculture/Aquaculture/Aquaculture-Management/Pages/default.aspx Accessed 5 November 2015.

22 WADF, *Submission 23*, p. 4.

3.16 The Western Australian Government has recently begun implementing marine aquaculture development zones to provide 'investment-ready' areas for commercial development.[23] Aquaculture development zones are discussed in more detail below. The WADF is also considering granting longer-term aquaculture licenses to provide increased certainty to aquaculture operators.[24]

Great Barrier Reef Region Regulatory Framework

3.17 The Great Barrier Reef (GBR) is managed as a 'multiple-use area that supports a range of communities and industries that depend on the Reef for recreation or their livelihoods'.[25] The GBR has a significant role in the economy of Northern Queensland supporting almost 70 000 jobs. Related tourism in the GBR region generates activity worth $5.2 billion per annum and over $40 billion of exports depart from ports in the region per annum.[26]

3.18 The management of the GBR is regulated by two key conservation zones— the Great Barrier Reef Marine Park (established 1975) and the Great Barrier Reef World Heritage Area (established 1981). The two conservation zones cover almost the same area but the Marine Park is slightly smaller due to the exclusion of Queensland's managed islands, 13 coastal zones around major cities and ports, and Queensland inland waters (including the Hinchinbrook Channel).[27]

3.19 The GBR is governed cooperatively by the Commonwealth and Queensland Governments. The framework for this cooperation is the

23 WADF, 'Aquaculture in Western Australia: Industry Overview August 2015', http://www.fish.wa.gov.au/Documents/Aquaculture/aquaculture_position_paper.pdf Accessed 5 November p. 3.

24 WADF, 'Aquaculture in Western Australia: Industry Overview August 2015', http://www.fish.wa.gov.au/Documents/Aquaculture/aquaculture_position_paper.pdf Accessed 5 November p. 7.

25 Great Barrier Reef Marine Park Authority (GBRMPA), 'How the Reef is managed', http://www.gbrmpa.gov.au/managing-the-reef/how-the-reefs-managed Accessed 14 October 2015.

26 Commonwealth of Australia, *Reef 2050 Long-Term Sustainability Plan*, 2015, p. 1.

27 DoE, *Exhibit 16a: EPBC Act referral guidelines for the Outstanding Universal Value of the Great Barrier Reef World Heritage Area*, p 33; QCA, *Exhibit 1: Aquaculture Regulation in Queensland Draft Report*, p. 75; Great Barrier Reef Marine Park Authority (GBRMPA), 'Area statement for the Great Barrier Reef Marine Park', http://www.gbrmpa.gov.au/__data/assets/pdf_file/0010/14122/area_statement_082010_updated_WebVersion.pdf Accessed 4 November 2015.

Great Barrier Reef Intergovernmental Agreement (Intergovernmental Agreement) which was most recently updated in June 2015.[28]

3.20 The recent update to the Intergovernmental Agreement describes the *Reef 2050 Long-Term Sustainability Plan* (Reef 2050 Plan), released in 2015, as the 'overarching strategy for management of the Great Barrier Reef' through to 2050.[29]

3.21 The Reef 2050 Plan states that it is 'very clear the Reef is under pressure',[30] and that one of the key threats to the Reef is from land-based run-off; primarily nutrients, sediments, and pesticides. Land-based run-off has been linked to increased frequency of crown-of-thorns outbreaks, increased algal blooms, and increased the impact of temperature stress on corals.[31] To address the impact of land-based run-off, the Reef Plan 2050 includes an objective that:

> Over successive decades the quality of water in or entering the Reef from all sources including industry, aquaculture, port (including dredging), urban waste and stormwater sources has no detrimental impact on the health and resilience of the Great Barrier Reef.[32]

3.22 The Reef 2050 Plan also includes water quality targets including a 50 per cent reduction in end-of-catchment dissolved nitrogen by 2018 and a 20 per cent reduction in end-of-catchment particulate nutrient loads in priority areas.[33]

Application of the EPBC Act

3.23 The EPBC Act lists all World Heritage Areas, and additionally the GBR Marine Park, as matters of national environmental significance.[34] Any action that is likely to have a significant impact on the GBR Marine Park or is likely to result in one of the GBR's world heritage attributes[35]

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28 This updated the 2009 Great Barrier Reef Intergovernmental Agreement, which was preceded by the 1979 Emerald Agreement. See: DoE, 'Great Barrier Reef Intergovernmental Agreement', http://www.environment.gov.au/marine/gbr/protecting-the-reef/intergovernmental-agreement Accessed 4 November 2015.

29 Commonwealth of Australia, *Reef 2050 Long-Term Sustainability Plan*, 2015, p. 3; Commonwealth of Australia & State of Queensland, *Great Barrier Reef Intergovernmental Agreement 2015*, p. 6.

30 Commonwealth of Australia, *Reef 2050 Long-Term Sustainability Plan*, 2015, p. 13.

31 Commonwealth of Australia, *Reef 2050 Long-Term Sustainability Plan*, 2015, p. 24.

32 GBRMPA, Submission 12, p. 1.

33 GBRMPA, Submission 12, p. 2.

34 DoE, *Exhibit 16b: Matters of National Environmental Significance*, p. 2.

35 The Great Barrier Reef was declared a World Heritage Area under Criteria vii, viii, ix, and x.

being lost, degraded, altered or diminished therefore triggers the EPBC Act.

3.24 There are a number of criteria which are used to assess whether an action is likely to have a significant impact on the GBR Marine Park. The criteria potentially most relevant to aquaculture states that the action is likely to have a significant impact if there is the possibility the action will:

> Result in a substantial change in air quality or water quality (including temperature) which may adversely impact on biodiversity, ecological health or integrity or social amenity or human health.[36]

3.25 The *EPBC Act referral guidelines for the Outstanding Universal Value of the Great Barrier Reef World Heritage Area* state that aquaculture could potentially impact upon any of the GBR's four world heritage attributes.[37] The guidelines state that:

> Aquaculture developments may result in the discharge of high concentrations of suspended solids and nutrients with potential impacts on the water quality and other associated ecological processes of the Great Barrier Reef.[38]

Role of Great Barrier Reef Marine Park Authority

3.26 The GBR Marine Park is managed by the Great Barrier Reef Marine Park Authority (GBRMPA), a Commonwealth statutory agency within the environment portfolio that reports directly to the Minister of the Environment and advises the minister on the 'control, care and development of the Marine Park'.[39]

3.27 The GBRMPA has regulatory authority over aquaculture projects that are located within the GBR Marine Park or discharge aquaculture waste directly into the GBR Marine Park.

3.28 When assessing the impacts of aquaculture projects GBRMPA is guided by its *Position Statement on Aquaculture within the Great Barrier Reef Marine Park* (Position Statement). In this Position Statement GBRMPA differentiates between two types of aquaculture; extensive aquaculture,

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36 DoE, *Exhibit 16b: Matters of National Environmental Significance*, p. 24.

37 Commonwealth of Australia, *Exhibit 16a: EPBC Act referral guidelines for the Outstanding Universal Value of the Great Barrier Reef World Heritage Area,* 2014, pp 21-25.

38 Commonwealth of Australia, *Exhibit 16a: EPBC Act referral guidelines for the Outstanding Universal Value of the Great Barrier Reef World Heritage Area,* 2014, p. 17.

39 GBRMPA, *Great Barrier Reef Region Strategic Assessment: Strategic Assessment Report*, 2014, Townsville, pp 1-6.

which does not include the addition of feed; and intensive aquaculture, which does include the addition of feed.[40]

3.29 Extensive aquaculture generally involves the farming of filter-feeder organisms, the Position Statement notes that pearl oyster farming is already undertaken within the GBR Marine Park and that existing GBRMPA regulations and policies are 'adequate for the assessment of extensive aquaculture operations'.[41]

3.30 The GBRMPA stated that intensive aquaculture does not currently occur within the GBR Marine Park and that:

> … the ecological risks associated with this type of aquaculture (at the current level of technological development) are likely to be unacceptable in the GBR Marine Park.
>
> Consequently, it is likely that permissions for intensive aquaculture in General Use Zones in the GBR Marine Park would be granted only if the applicant can demonstrate, to the satisfaction of the GBRMPA, that there have been operational and technological advances that substantially mitigate ecological risk.[42]

The Great Barrier Reef Marine Park (Aquaculture) Regulations

3.31 On 23 February 2000, the Commonwealth Government enacted the Great Barrier Reef Marine Park (Aquaculture) Regulations 2000 (Cwlth) (the Aquaculture Regulations).

3.32 Previously GBRMPA was only involved in the regulation of land–based aquaculture projects if they discharged waste directly into the GBR Marine Park. The Aquaculture Regulations extended GBRMPA's regulatory role to include indirect discharge into the GBR Marine Park. A GBRMPA permit was required for any new aquaculture development that was located up to five kilometres inland and discharged waste into rivers and creeks that flowed into the GBR Marine Park.[43]

3.33 On 2 March 2005, Queensland law was accredited for granting approvals under the Aquaculture Regulations so long as Queensland law continues to provide the 'requisite degree of protection for the Marine Park environment'.[44] As long as this accreditation remains active, the Aquaculture Regulations are effectively 'switched off' and GBRMPA

40 GBRMPA, *Position Statement on Aquaculture within the Great Barrier Reef Marine Park*, p. 2.

41 GBRMPA, *Position Statement on Aquaculture within the Great Barrier Reef Marine Park*, p. 3.

42 GBRMPA, *Position Statement on Aquaculture within the Great Barrier Reef Marine Park*, p. 4.

43 Minister of the Environment and Heritage, 'Great Barrier Reef Marine Park (Aquaculture) Regulations 2000: Explanatory Statement', http://www.austlii.edu.au/au/legis/cth/num_reg_es/gbrmpr20002000n6522.html Accessed 15 October 2015.

44 Great Barrier Reef Marine Park (Aquaculture) Regulations 2000, s. 4.

approval is not required. Since 2005, GBRMPA 'has had no regulatory involvement in land-based aquaculture decisions except where they discharge directly to the Great Barrier Reef Marine Park.'[45]

3.34 In its *Regulatory Plan 2014-2015* GBRMPA states that it intends to revoke the Aquaculture Regulations.[46] The GBRMPA states that the timing of this amendment is 'dependent on the Queensland review of aquaculture controls'.[47]

Guthalungra Prawn Farm – Case Study

In January 2001 Pacific Reef Fisheries (a commercial prawn farm) proposed a new 259 hectare aquaculture farm in Guthalungra, Northern Queensland. The project is expected to generate revenue of approximately $50 million per annum and to employ approximately 100 full time and 100 casual employees.[48]

Regulatory Timeline

The project has been assessed under both Queensland and Commonwealth regulatory processes. To date lodging and consideration of the applications has taken 14 years at a cost of approximately $3 million.[49] In January 2008 the Queensland Government recommended that the project proceed and in March 2010 the Commonwealth Department of the Environment approved the project subject to 19 conditions.[50] In December 2015 Pacific Reef received a permit from GBRMPA for the project's discharge into the GBR Marine Park. Pacific Reef is currently awaiting approval from the Whitsunday Shire Council and expects to receive this approval by June 2016.[51] The regulatory process used to approve the project is summarised below.

Date	Regulatory Process
Jan 2001	Referral to the Commonwealth under the EPBC Act.
Jul 2001	Accreditation of Queensland regulations, meaning that the development and assessment of an environmental impact statement (EIS) would take place using Queensland processes.

45 Mr Bruce Elliot, General Manager Biodiversity Conservation and Sustainable Use, GBRMPA, *Official Committee Hansard*, Townsville, 26 July 2015, p. 19.

46 The GBRMPA *Regulatory Plan 2014-2015* stated that it intended to make this amendment during 2014-2015. As yet the Aquaculture Regulations have not been revoked.

47 GBRMPA, Regulatory Plan 2014-2015, p. 13, http://elibrary.gbrmpa.gov.au/jspui/bitstream/11017/2854/1/Annual%20Regulatory%20Plan%202014-15.pdf Accessed 16 October 2015.

48 Mr John Moloney, General Manger, Pacific Reef Fisheries (Pacific Reef), *Official Committee Hansard* Brisbane, 27 August 2015, p. 32; Pacific Reef, *Submission 6*, p. 1.

49 Mr John Moloney, Pacific Reef, *Official Committee Hansard*, p. 31.

50 The conditions of the March 2010 approval included that there was to be no net increase in the background levels of nutrients and suspended solids. In November 2011 a variation to the approval was granted increasing the number of conditions to 21 and allowing limited nutrient discharge so long as these were offset.

51 Pacific Reef, *Submission 6.1*, p. 1.

Jun 2002	Queensland Coordinator-General releases terms of reference for the EIS.
Oct 2003	EIS prepared by Pacific Reef is released to the public.
Mar 2004	The Queensland Coordinator-General asks Pacific Reef to prepare a supplementary EIS in response to issues raised in public submissions.
Jan 2007	Pacific Reef submits a supplementary EIS.
Jan 2008	The Queensland Coordinator-General submits final report on the EIS to the Commonwealth Environment Minister recommending project proceeds subject to 199 conditions including offset requirements for discharges.
Mar – May 2008	The Commonwealth engages CSIRO and the Australian Institute of Marine Science to undertake an independent review of the Queensland report on the EIS.
Mar 2010	The Commonwealth releases final conditions of approval which stipulate that there can be no increase in discharges to Abbot Bay.
Nov 2011	The Commonwealth releases varied conditions of approval to allow for discharges that are offset.
Nov 2011 – Jan 2015	Discussions with GBRMPA to gain approval for discharges into Abbot Bay.
Jan 2015	Pacific Reef submits plans for offsets to GBRMPA.[52]
Dec 2015	GBRMPA approves the Guthalungra prawn farm project and Pacific Reef applies to the Whitsunday Shire Council for development approval.[53]

Source QCA, Exhibit 1: Agriculture Regulation in Queensland Draft Report, pp. 93-95

Project Details

The project is planned to be constructed in three stages over six years. The construction of the second and third stages will begin when previous stages have been in operation for a year and have met the approved environmental management conditions.[54]

The facility will discharge water to Abbot Bay via a pipeline that will extend 520m into the Bay beyond the high tide mark.[55] The pipeline will be situated so that the discharge location is away from seagrass beds in the bay.[56]

The waste water will be filtered using settlement ponds, sand filtration and algal filtration before it is discharged into Abbot Bay. The algal filtration, developed through a partnership between James Cook University, MBD Energy and Pacific Reef, has been trialled at Pacific Reef's existing farm and will be implemented on a large scale for the first time at Guthalungra. The algae removes nitrogen and phosphorous from the water and can be sold as a food item into Asia.[57] Whilst

52 Mr John Moloney, Pacific Reef, *Official Committee Hansard*, p. 32.

53 Pacific Reef, *Submission 6.1*, p. 1.

54 Pacific Reef, *Information Pack: Proposal to construct and operate the Guthalungra Prawn Farm at Abbot Bay*, December 2014, p. 9.

55 Pacific Reef, *Information Pack: Proposal to construct and operate the Guthalungra Prawn Farm at Abbot Bay*, December 2014, p. 10.

56 QCA, *Exhibit 1: Agriculture Regulation in Queensland Draft Report,* p. 92.

57 James Cook University, *Submission 14a*, pp 7-8.

algae does not remove all of the nutrients from the water, trials suggest that the discharged water will have lower nitrogen than the ocean water in Abbot Bay.[58]

Offset Requirements

The nutrient levels in Abbot Bay already exceed water quality guidelines and so it is considered to have no capacity to assimilate extra nutrients. Therefore, Guthalungra's EPBC approval requires that the project offsets all nutrient discharges so that there is no net increase in nutrient levels.[59]

Pacific Reef's preferred offset strategy involves restoring 230 hectares of riparian zones and wetlands and, via the Reef Trust, funding cane growers in the Don and Burdekin River catchments to improve their land management practices. The Reef Trust is currently developing its offset programme and until this is complete accurate offset costings are unavailable.[60] Jacobs SKM, however, provisionally estimated that Pacific Reef could offset Guthalungra's annual nitrogen discharge through improvements to 1680 hectares of cane land at a cost of $95 304.[61]

Guthalungra and 'Zero Net Discharge'

3.35 Pacific Reef Fisheries (Pacific Reef) has proposed a 259 hectare prawn farm at Guthalungra, between Ayr and Bowen. The Commonwealth Minister for the Environment, Heritage and the Arts approved the project in 2010 subject to the condition that the project did not result in a 'net increase in the background levels of nutrients and suspended solids being discharged into Abbot Bay.'[62] The conditions to the approval were amended in November 2011 to allow discharges above background levels, [63] so long as these discharges were completely offset.[64]

3.36 The condition not allowing discharge of nutrients beyond background levels, generally referred to as 'zero net discharge', has been criticised by

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58 Pacific Reef, *Information Pack: Proposal to construct and operate the Guthalungra Prawn Farm at Abbot Bay*, December 2014, pp 13, 16.

59 Mr Bruce Elliot, GBRMPA, *Official Committee Hansard*, Townsville, 26 August 2015, p. 20.

60 Department of the Environment, 'Reef Trust News', http://www.environment.gov.au/marine/gbr/reef-trust Accessed 20 October 2015.

61 Jacobs SKM, *Guthalungra Prawn Farm: Nutrient Offset Strategy*, Pacific Reef, May 2014 pp 13, 17.

62 Department of the Environment, Water, Heritage and the Arts, 'Approval: Guthalungra Aquaculture Facility, north of Bowen, Queensland (EPBC 2001/138)', http://www.environment.gov.au/epbc/notices/assessments/2001/138/approval-decision.pdf Accessed 2 November 2015.

63 Maximum daily discharge limits were set at: 6.59 kilograms/hectare of total suspended solids, 0.49 kilograms/hectare of total nitrogen, and 0.05 kilogram/hectare of total phosphorus.

64 Department of Sustainability, Environment, Water, Population, and Communities, 'Variation to approval conditions: Guthalungra Aquaculture Facility, north of Bowen, Queensland (EPBC 2001/138)', http://www.environment.gov.au/epbc/notices/assessments/2001/138/2001-138-variation.pdf Accessed 2 November 2015.

representatives of the scientific community. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) stated that there 'is no scientific basis for imposing a constraint of zero net nutrient or suspended solids'.[65]

3.37 Further, the CSIRO stated that it was the opinion of international experts that 'there was no prawn farm operating anywhere in the world'[66] that could achieve zero net discharge and that 'in effect this is a ban on the development of aquaculture in coastal regions adjacent to the Great Barrier Reef.'[67] The Australian Institute of Marine Science (AIMS) commented that zero net discharge was theoretically possible but stated that the 'economic penalty is usually too steep to contemplate' and that under these regulations aquaculture 'currently represented a non-viable option'.[68]

3.38 The GBRMPA rejected the proposition that there was a regulatory standard of zero discharge for all aquaculture operations, stating:

> We do not have such a policy and never have. The issue for zero net discharge did arise for one farm—[Guthalungra]—because of the condition of the local bay …[69]

3.39 The Department of the Environment (DoE) supported the position of GBRMPA that the zero net discharge was a condition that applied specifically to Guthalungra rather than a standard that applied broadly to aquaculture. The DoE added:

> It is not uncommon practice for proponents in one sector of the economy to take a look at how other proponents have been treated in terms of their conditions of approval and then to infer that that means a standard. But … I want to be very clear that the conditions that were put in place for [Guthalungra] were specific to the conditions at that time for that location.[70]

3.40 The GBRMPA advised that it was confident that future aquaculture proposals on the coast adjacent to the GBR would not involve as protracted an approvals process as that experienced by Pacific Reef. The GBRMPA stated that the improvements in technology, regulator learning and legislative changes would all assist in streamlining the process. The

65 Commonwealth Scientific and Industrial Research Organisation (CSIRO), *Submission 17*, p. 5.

66 Dr Nigel Preston, Research Director, Aquaculture, CSIRO, *Official Committee Hansard*, Canberra, 15 September 2015, p. 27.

67 CSIRO, *Submission 17*, p. 4.

68 Australian Institute of Marine Science (AIMS), *Submission 31*, p. 3.

69 Dr Russell Reichelt, GBRMPA, *Official Committee Hansard*, p. 1.

70 Mr Dean Knudson, First Assistant Secretary, Environment Standards Division, DoE, *Official Committee Hansard*, Canberra, 15 September 2015, p. 17.

GBRMPA stated that Pacific Reef had lengthened its approval process by choosing to apply for its EPBC and GBRMPA permits separately. Following amendments to the EPBC Act in 2009 this would no longer be possible and the two permits would be processed in parallel.[71]

Offsets

3.41 The Australian Government allows offsets to be used as a tool in managing matters of national environmental significance under the EPBC Act. The DoE defines environmental offsets as 'measures that compensate for the residual adverse impacts of an action on the environment.'[72]

3.42 The GBRMPA stated that all new developments must 'demonstrate how they will contribute to the successful delivery of the targets and objectives described in the Reef 2050 Long-Term Sustainability Plan'.[73] The principles of the Reef 2050 Plan state that decision-making should ensure that:

> Impacts are avoided and residual impacts mitigated. Offsets are considered only where impacts cannot be avoided or mitigated.[74]

3.43 In 2012, the Commonwealth Government developed an offsets policy for projects assessed under the EPBC Act. Offsets must be 'tailored specifically to the attribute that is being impacted',[75] for example if a project was releasing a nutrient that was impacting water quality then the offset should find an alternative means of reducing levels of that same nutrient in the local environment being impacted.

3.44 Despite this policy, Pacific Reef, the proponent of the proposed Guthalungra prawn farm, stated that:

> Unfortunately, we are not given too much guidance on how we achieve those offsets. We are basically told we have to come back to the department and explain to them how we are going to achieve them. I think if offsets are to be used as a management tool for development in general there has to be a solid framework for that as well, without developers having to go off on their own.[76]

3.45 The GRRMPA's 2014 *Strategic Assessment Report* recognised that a 'weakness' in the regulatory regime governing the GBR was that there was

71 Dr Russell Reichelt, GBRMPA, *Official Committee Hansard*, Canberra, 10 November 2015, pp 6-7.

72 Department of Environment, *Exhibit 16: Environment Protection and Biodiversity Conservation Act 1999: Environmental Offsets Policy*, October 2012, p. 7.

73 GBRMPA, Submission 12, p. 2.

74 Commonwealth of Australia, *Reef 2050 Long-Term Sustainability Plan*, 2015, p. 35.

75 Department of the Environment, *Exhibit 16: Environmental Protection and Biodiversity Conservation Act 1999: Environmental Offsets Policy*, October 2012, p. 8.

76 Mr John Moloney, Pacific Reef, *Official Committee Hansard*, p. 32.

'uncertainty for proponents and the public regarding offsetting requirements'. The Strategic Assessment Report recommended that GBRMPA:

> Develop a policy and supporting mechanisms to facilitate strategic and collaborative implementation of offsets across jurisdictions.[77]

3.46 The Australian and Queensland Governments have recently established the Reef Trust to deliver funding to projects addressing threats to the GBR. 'A component of Reef Trust funds will be derived from the pooling of offsets funds to compensate for residual significant impacts on the Great Barrier Reef.'[78] The Reef Trust is currently developing the approach and methodology it will use to calculate offset payments.[79] Pacific Reef indicated that its preferred means of offsetting the impacts of its proposed Guthalungra prawn farm is to fund, via the Reef Trust, improved land management practices on cane farms.[80]

Aquaculture in the Great Barrier Reef Region

3.47 The largest aquaculture industry in area adjacent to the GBR is prawn farming. Australia produced 3774 tonnes of farmed prawns in 2013-14, valued at over $66 million.[81] The majority of Australian farmed prawn production is undertaken by two North Queensland producers, Seafarms Group (approximately 1100 tonnes per year), and Pacific Reef (approximately 1000 tonnes per year).[82]

3.48 Barramundi is also farmed in the coastal region adjacent to the GBR. The GFB Fisheries produce 1000 tonnes of Barramundi per annum from two land based facilities in Bowen and Townsville.[83] A sea cage Barramundi farm previously operated in the Hinchinbrook Channel but this farm closed in 2011 following significant damage caused by Cyclone Yasi.[84]

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77 GBRMPA, *Great Barrier Reef Strategic Assessment: Strategic Assessment Report*, 2014, Townsville, pp 12—17.

78 Dutson, G., Bennun, L., Maron, M., Brodie, J., Bos, M., Waterhouse, J., 'Determination of suitable contributions as offsets within the Reef Trust', The Biodiversity Consultancy, February 2015, p. 5, https://www.environment.gov.au/system/files/resources/19eccee2-f9d2-4722-8f58-a11d81b5ff59/files/reef-trust-offsets.pdf Accessed 23 October 2015.

79 Department of the Environment, 'The Reef Trust', https://www.environment.gov.au/marine/gbr/reef-trust Accessed 23 October 2015.

80 Mr John Moloney, Pacific Reef, *Official Committee Hansard*, p. 32.

81 Australian Prawn Farmers Association (APFA), Submission 10, p. 3.

82 Seafarms Group, *Submission 4*, p. 1; Mr John Moloney, Pacific Reef, *Official Committee Hansard*, p. 33.

83 GFB Fisheries, *Submission 29*, p. 1.

84 QCA, *Exhibit 1: Aquaculture Regulation in Queensland Draft Report*, p. 2.

3.49 Pacific Reef suggested that the North Queensland coastline has 'numerous features that make it ideal for further aquaculture development.' These include:

- climate (extremely important from a biological viewpoint);
- large regional coastal areas suitable for development;
- existing transport infrastructure;
- existing power infrastructure;
- proximity to markets; and
- proximity to labour supply.[85]

3.50 The aquaculture industry in Queensland has been growing at a compound growth rate of 4 per cent per annum. This has been achieved through production improvements in existing aquaculture projects. Despite the potential for growth there have been no new aquaculture projects approved for development in the last decade.[86]

Impact of Regulations on the Aquaculture Industry in the Great Barrier Reef Region

3.51 Several stakeholders in the aquaculture sector were concerned that the regulatory environment in Northern Queensland was deterring further investment in the aquaculture industry in the region. James Cook University (JCU) stated that:

> The industry itself is the most sustainable and has the world's best practice in terms of environmental management. It has an interesting history, given that there were initially very few regulations and now there is very tight regulation. I think it is the lack of clarity of the regulation itself that hinders the growth.[87]

3.52 Overlapping regulations between the Queensland and Commonwealth Governments can result in approval processes being duplicated. The Australian Prawn Farmers Association (APFA) stated:

> Where there are conflicting environmental interests and requirements from State(s) and Federal government, these need to be resolved so that investors have confidence in applying for any new development.[88]

85 Pacific Reef, *Submission 6*, p. 2.

86 QCA, *Exhibit 1: Aquaculture Regulation in Queensland Draft Report*, p. 6.

87 Prof Rocky de Nys, Professor of Aquaculture, James Cook University (JCU), *Official Committee Hansard*, Townsville, 26 August 2015, p. 5.

88 APFA, *Submission 10*, p. 4.

3.53 Pacific Reef highlighted the duplication of processes it has experienced in attempting to have the Guthalungra approved and the impact that this process has had on the wider industry.

> The licencing process for the Guthalungra proposal has been long and complicated. Legislation and administrative processes have changed during this time and the process has been replicated with various federal and state departments…
>
> It will be critical for future investment to occur that this process be rationalised and streamlined. The issues we have had with obtaining approval for the Guthalungra facility have been widely publicised and this has deterred potential new investors.[89]

3.54 The CSIRO described current regulatory arrangements for aquaculture as creating a 'catch 22' situation where:

> … potential investors do not have the required certainty to invest in new aquaculture development projects and the lack of project proposals means that the regulatory requirements are yet to be developed and implemented. Where development has been stimulated and new projects are proposed the environmental requirements can be unclear.[90]

3.55 The Reef and Rainforest Research Centre (RRRC), whose representative had previously worked for GBRMPA and had been involved in developing the Aquaculture Regulations, believed that GBRMPA's policy position in relation to aquaculture has gone beyond the intent of the Aquaculture Regulations:

> The regulations are quite clear in their intent. That is to limit or constrain pollution or products that may harm plants and animals in the marine park. The policy that has gone around those regulations I think is very harsh, probably too harsh for the intent … I think the fact that it has constrained the industry totally is problematic, because we asked them to do a job; we asked them to change; they have changed, and I think that needs to be recognised.[91]

Aquaculture Regulation Relative to Other Industries

3.56 JCU stated that aquaculture that made up 'much, much less' than one per cent of the total nutrient load being discharged into GBR water. Given

89 Pacific Reef, *Submission 6*, p. 1.

90 CSIRO, *Submission 17*, pp 3-4.

91 Ms Sheriden Morris, Director, Reef and Rainforest Research Centre (RRRC), *Official Committee Hansard*, Cairns, 24 August 2015, p. 6.

this, JCU questioned the fairness of the strict regulatory framework for aquaculture stating:

> … a big issue here is the level playing field. An analogy often used is that if you want to set up a new aquaculture facility you have to meet the zero net discharge of nutrients and suspended solids, but a very new cane farm can be set up and operate without any sort of oversight.[92]

3.57 The Aquaculture Association of Queensland also questioned the strictness of regulations encountered by aquaculture in comparison to other industries stating:

> I am in the middle of the coal seam gas industry—I have seen things that they have been able to do when they apply for their environmental permits. It is not zero. It is never a zero issue. It is always: 'What is the local community happy with?' … I find it amazing that when we talk about our industries and the environment we talk about zero … but [the] mining industry can have something completely different.[93]

3.58 The GFB Fisheries highlighted that other agricultural industries, such as cane farms and banana farms, were greater sources of nutrient run-off into the GBR but that the Commonwealth Government has no regulatory powers over these industries. The Commonwealth only had regulatory power over aquaculture and GFB Fisheries has suggested it had used this to place a 'blanket ban on aquaculture development'.[94]

3.59 The GBRMPA stated that, while they were very concerned about the state of GBR waters, it accepted that aquaculture had not caused deterioration in water quality.[95]

3.60 The CSIRO, reflecting on the outcome of its research program into the environmental impacts of prawn aquaculture stated:

> Having successfully introduced the world's best pond-management practices and contributing less than one per cent of the biologically-based input into the GBR, there was an expectation by some in industry that they might be exempt from further restrictions and that more focus would be placed on

92 Professor Dean Jerry, Head of Aquaculture and Fisheries, JCU, *Official Committee Hansard*, Townsville, 26 August 2015, p. 6.

93 Mr Robert Bartley, President, Aquaculture Association of Queensland, *Official Committee Hansard*, Brisbane, 27 August 2015, p. 14.

94 Dr Kenneth Chapman, Director, GFB Fisheries, *Official Committee Hansard*, Cairns, 24 August 2015, p. 18.

95 Dr Russell Reichelt, , GBRMPA, *Official Committee Hansard*, Canberra, 10 November 2015, p. 3.

> improving the environment management of the sectors responsible for the other 99 per cent of the inputs.[96]

3.61 The RRRC noted that the inshore reef is 'clearly still under threat' and that aquaculture should have been a positive example of an industry that has adapted its processes to reduce environmental impacts.[97] The RRRC was concerned, however, that aquaculture would instead be seen as a negative example by other industries stating:

> I worry … about the fact that the [aquaculture] industry still seems under so much pressure and has had a tighter and tighter policy framework placed across it. For any group that cannot see the light at the end of the tunnel, where they are not meeting expectations no matter what they do, I think that sends really quite a poor message. We are going to be asking the sugar industry, the banana industry, the horticulture industry and the grazing industry to be making those substantive changes also. If we cannot give a message that it is possible, that you can make those changes, I think we have a very hard lot to push up a hill.[98]

Research into Environmental Impacts of Prawn Farming

3.62 Between 1995 and 2002, in Queensland and New South Wales, a program of research involving over 30 researchers was undertaken to study the environmental management of prawn farming. The research program was led by the CSIRO but also included representatives of a number of universities, research institutes and government departments.[99] The research program was a 'multidisciplinary study of intensive prawn pond ecosystems, their ecological impacts on downstream environments and the development of cost-effective effluent treatment systems'.[100]

3.63 The research program resulted in the production of 42 peer-reviewed publications and four final reports.[101] Major outputs of the program included: the development of techniques to track and quantify nutrients

96 Dr Nigel Preston, CSIRO, *Official Committee Hansard*, Canberra, 15 September 2015, p. 24.

97 Ms Sheriden Morris, RRRC, *Official Committee Hansard*, Cairns, 24 August 2015, p. 4.

98 Ms Sheriden Morris, RRRC, *Official Committee Hansard*, Cairns, 24 August 2015, p. 5.

99 Organisations involved in the research included: CSIRO; AIMS; University of Queensland; Queensland Department of Environment and Heritage; New South Wales Environment Protection Authority; Griffith University; University of Sydney; University of Technology Sydney; Marine and Freshwater Resources Institute, Victoria; and the University of Maryland, U.S.A.

100 APFA, *Submission 10b: 'The environmental management of prawn farming in Queensland – world's best practice'*, p. 1.

101 APFA, *Submission 10b: 'The environmental management of prawn farming in Queensland – world's best practice'*, p. 1.

discharged from prawn farms; a synthesis of the ecological processes taking place in prawn farms and surrounding environments; and the development of nutrient treatment processes based on settlement ponds and sedimentation processes.[102]

3.64 The research analysed untreated discharge from the Seafarms prawn farm and found that the discharge 'resulted in levels of elevated nutrients that were only transiently detectable for a short distance (2 kilometres) from the points of discharge and there were no obvious effects on downstream sediment processes.'[103]

3.65 The CSIRO state that contemporary prawn farms would be expected to have less environmental impact than the ones studied stating:

> I would emphasise that our studies were based on untreated discharge. Since then and because of the results of our research, every Australian prawn farm treats its discharge prior to either releasing it into adjacent environments or recirculating it. At the time, the largest prawn farm in Australia, Seafarms, was discharging into a tidal creek.[104]

3.66 The GBRMPA did not dispute the findings of the CSIRO research; however it questioned the applicability of the research to the environmental conditions at Guthalungra.[105]

3.67 The GBRMPA reported that the Seafarms site studied by CSIRO, in common with all other prawn farms, discharged into a creek. In contrast, the Guthalungra project proposed to discharge, via a pipeline, directly into the ocean at Abbot Bay.[106]

3.68 The creek that the Seafarms site discharged into flowed into the mangrove estuaries of the Hinchinbrook Channel. The GBRMPA highlighted the difference between the assimilative capacity of the waters in the Hinchinbrook Channel and at Abbot Bay. The Hinchinbrook Channel does not have coral and, due to the high quantity of mangroves, has a high capacity to assimilate nitrogen. By contrast, Abbot Bay is a system comprised of seagrass beds and coral. The GBRMPA advised that nutrient levels of the water in Abbot Bay are approximately double the levels recommended in GBRMPA's water quality guidelines. Consequently,

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102 APFA, *Submission 10b: 'The environmental management of prawn farming in Queensland – world's best practice'*, p. 1.

103 CSIRO, *Submission 17*, p. 4.

104 Dr Nigel Preston, CSIRO, *Official Committee Hansard*, Canberra, 15 September 2015, p. 23.

105 GBRMPA, *Submission 12.1*, p. 2.

106 Dr Russell Reichelt, GBRMPA, *Official Committee Hansard*, Canberra, 10 November 2015, p. 2.

Abbot Bay is considered to have an extremely limited capacity to assimilate further nutrients.[107]

3.69 The CSIRO asserted that's its research was relevant to the fate of nutrients in the marine environment of the GBR lagoon, stating:

> Our paper describes how the effluent, which we were able to track using isotope tracking techniques, changed in nature, and then, when it reached the marine park proper, in the Hinchinbrook Channel, the ability to detect the presence of that material only extended for a narrow zone, at maximum two kilometres.
>
> So this is also an in relation to statements that our work had not encompassed the lagoon. Because this material did reach the lagoon and we were tracking its fate in that lagoon, that statement is incorrect.[108]

3.70 The GBRMPA also questioned whether the assimilation of nitrogen, as found in the CSIRO research, necessarily indicated that there would be no impact on the GBR. The GBRMPA stated:

> We certainly do not dispute that the nitrogen is assimilated into the ecosystem, but that does not mean it does not end up in the marine park. Once it is taken up as dissolved nitrogen, it then turns into other forms of nitrogen such as particulate nitrogen in the form of algae or flocks of marine muddy snow—it is a sticky substance where nutrients bond and form what looks like a very fine snow, which can fall into the marine environment. It has got nutrients in it and it can stick to things like corals. We do not dispute the findings, but it did not cover the whole picture in terms of nutrients that could go into the marine environment.[109]

3.71 The RRRC explained the impact that marine snow can have on the ecosystem of the GBR, stating that fine particle nutrients from aquaculture can:

> … form a thing called marine snow, which is sticky stuff in the water—sticky biological material in the water. That can actually come down and form a bit of a blanket or impact the ecological system, like the benthos, corals and seagrass. We see a change in some of the discharge creeks from a diatom based system to a dinoflagellate type system, where bigger, healthier phytoplankton go down, which you think would be a good thing except that it

107 Dr Russell Reichelt, GBRMPA, *Official Committee Hansard*, Canberra, 10 November 2015, pp 2-3; GBRMPA, *Submission 12.1*, p. 2.

108 Dr Nigel Preston, CSIRO, *Official Committee Hansard*, Canberra, 15 September 2015, p. 23.

109 Mr Bruce Elliot, GBRMPA, *Official Committee Hansard*, Canberra, 15 September 2015, p. 23.

> allows some of our pests and other things to survive much more frequently and it gives bigger algal blooms, and some of those algal blooms can be toxic.[110]

3.72 The CSIRO, however, disputed the contention that aquaculture waste could be resuspended as marine snow and impact the GBR stating:

> So our observations … are that … beyond that two-kilometre zone you could not detect the presence of material on the reef. So the contention that it somehow gets resuspended and forms biological flocks and could reach coral reefs or seagrasses is not supported by the research in the real environments that we did over those seven years.[111]

3.73 In relation to the overall impact of aquaculture on the GBR the CSIRO stated that 'there have been no adverse environmental impacts on the GBR from the discharge of prawn farms for 30 years.'[112] This view was supported by JCU, which stated:

> Amongst the scientific community, the CSIRO and the universities, there is a very strong consensus that it is very, very, very, very difficult to find any impact of aquaculture on the Great Barrier Reef.[113]

Planning for Aquaculture

3.74 The CSIRO has identified that the Northern Territory, Queensland and Western Australia each have over 500 000 hectares of land that is potentially suitable for pond aquaculture development. The CSIRO also states that a 'lack of clarity in the zoning of this land means that investment in it for aquaculture purposes poses a high risk.'[114]

3.75 Several stakeholders highlighted that land and sea tenure issues in Northern Australia can create difficulties for aquaculture proponents to find suitable sites for farms. These issues included land tenure arrangements on State, Commonwealth, and Aboriginal and Torres Strait

110 Ms Sheriden Morris, RRRC, *Official Committee Hansard*, Cairns, 24 August 2015, p. 3.

111 Dr Nigel Preston, CSIRO, *Official Committee Hansard*, Canberra, 15 September 2015, p. 23.

112 Dr Nigel Preston, CSIRO, *Official Committee Hansard*, Canberra, 15 September 2015, p. 23.

113 Prof Rocky de Nys, JCU, *Official Committee Hansard*, Townsville, 26 August 2015, p. 6.

114 CSIRO, *Submission 17*, p. 3.

Islander owned land; and competition for land from growing urban areas, and sea and port areas from the oil and gas industries.[115]

3.76 As previously discussed, developing new aquaculture projects has proven difficult in environmentally sensitive areas such as in or adjacent to the GBR.

3.77 The greater use of zoning and spatial planning was identified as a potential means of stimulating growth in the aquaculture industry while minimising any negative impacts of development. The use of planning and zoning in the aquaculture sector was supported by representatives of the aquaculture industry,[116] regulators,[117] government agencies,[118] research institutes,[119] and environmental organisations.[120]

3.78 Issues relating to undertaking research to build up the baseline data needed to inform spatial planning and the implementation of development zones are further discussed below.

Development Zones

3.79 Aquaculture development zones aim to streamline approval processes and reduce the risk for potential investors by identifying suitable sites and providing clear and predictable regulatory requirements for setting up aquaculture operations.[121]

3.80 The use of marine aquaculture development zones is well established in South Australia and Tasmania, each of which have approximately 11 000 hectares of leasable development zone area.[122] The Western Australian Government has provided funding of $1.85 million for the establishment of two development zones; one in the Kimberley and one in the Abrolhos Islands region of the Mid West Coast of Western Australia.[123] No terrestrial aquaculture development zones have been created in these states.[124]

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115 NTDPIF, *Submission 13*, p. 3; Aquaculture Council of Western Australia, *Submission 8*, p. 4; Mr Chris Mitchell, Executive Officer, Regional Development Australia and Councillor, Shire of Broome, *Official Committee Hansard*, Broome, , 9 June 2015, p. 3; Mr Patrick Moase, General Manager, Clipper Pearls, *Official Committee Hansard*, Broome, 9 June 2015, p. 14.

116 Mr John Moloney, Pacific Reef, *Official Committee Hansard*, Brisbane, 27 August 2015, p. 30.

117 GBRMPA, *Submission 12*, p. 2.

118 Department of Agriculture (DoA), *Submission 11*, p. 4.

119 CSIRO, *Submission 17*, p. 3.

120 Pew Charitable Trusts, *Submission 24*, p. 2.

121 QCA, *Exhibit 1: Draft Report Aquaculture Regulation in Queensland*, July 2014, p. 37.

122 QCA, *Exhibit 1: Draft Report Aquaculture Regulation in Queensland*, July 2014, pp 20, 22.

123 WADF, *Submission 23*, p. 1.

124 QCA, *Exhibit 1: Draft Report Aquaculture Regulation in Queensland*, July 2014, p. 19.

3.81 Prior to the implementation of a development zone, state government agencies will undertake an environmental impact assessment and work with the Commonwealth Government to obtain EPBC Act approval if necessary.[125] BMT Oceanica stated that under normal approval processes many proponents, especially smaller businesses, did not have the knowledge or budget to undertake environmental impact assessments and this increased delays and uncertainty. In comparison, development zones required less specialist knowledge from proponents, were less costly, and provided greater certainty for investors.[126]

3.82 Pacific Reef stated that when governments considered potential sites for development zones it was critical that they considered 'not just the … environmental or regulatory factors, but also biological and economic factors'.[127]

Kimberley Aquaculture Development Zone

3.83 In August 2014, the Western Australia Government established the Kimberley Aquaculture Development Zone (KADZ) in the Cone Bay region of the Kimberley. The KADZ is Western Australia's, and Northern Australia's, first aquaculture zone. The KADZ encompasses an area of almost 2000 hectares and permits up to 20 000 tonnes of finfish production annually.[128]

3.84 Marine Produce Australia's (MPA) barramundi farm at Cone Bay is located within the KADZ. The MPA started farming barramundi in Cone Bay in 2004, originally with a permit to produce 1000 tonnes per annum. The MPA successfully petitioned for an extension of the permit to 2000 tonnes per year in 2012. Discussions with the WA Government in relation to further expansion provided the impetus for the creation of the KADZ with a 20 000 tonne limit and the potential for multiple operators. The MPA currently has a permit for 7000 tonnes of barramundi per annum.[129]

3.85 The Western Australian Office of the Environmental Protection Authority (EPA) supported the development of aquaculture zones such as the KADZ stating that they were of benefit to the 'agency, … the environment, and I

125 QCA, *Exhibit 1: Draft Report Aquaculture Regulation in Queensland*, July 2014, pp 20, 22.

126 Mr Mark Bailey, Co-Managing Director, BMT Oceanica, *Official Committee Hansard*, Perth, 11 June 2015, pp 9-10.

127 Pacific Reef, *Submission 6*, p. 2.

128 WADF, 'Frequently asked questions – Kimberley Aquaculture Development Zone', http://www.fish.wa.gov.au/Fishing-and Aquaculture/Aquaculture/Aquaculture%20Zones/Pages/Frequently-asked-questions-KADZ.aspx Accessed 30 October 2015.

129 Dr Desiree Allen, Managing Director, Marine Produce Australia Ltd (MPA), *Official Committee Hansard*, Perth 11 June 2015, pp 50-51.

think they benefit proponents and de-risk projects'.[130] The EPA added that in the development of the zone the WA Government went through:

> … a site selection process. You are essentially deciding if there are any fatal flaws for that activity occurring in that area … So it was not a particular company, it was a state government proponent … It is a very streamlined process. There is no sort of de novo assessment. The primary assessment has been undertaken at a strategic level, and the subsequent one, so long as it fits within those criteria, should be relatively straightforward. That is the intent of strategic assessments of strategic proposals. Basically a new proponent can come along and … they have to get a licence through the Department of Fisheries [to] occupy a site within that, so long as they meet those criteria.[131]

3.86 The process for approving leases to potential proponents was yet to be announced at the time of the Committee's public hearings in Broome and Perth and several stakeholders expressed confusion surrounding the process of approving leases within the KADZ.[132] Since that time, the WA Government has released its guidelines for the approvals processes to be used in all aquaculture development zones. Potential proponents will be required to apply to the WADF for both a license to operate and a physical lease. The process used to assess the license will 'generally predominate and consequentially be used to determine the outcome of the process.' [133]

3.87 Assessment of license applications will consider issues including: the proponent's previous aquaculture experience; business viability; employment and economic benefits; and environmental and biosecurity risks. Leases will be assessed by the Minister for Fisheries using similar criteria but also considering whether the proponent will make, or has made, effective use of the lease site. If multiple proponents are applying for the same lease area their applications will be assessed competitively.[134]

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130 Dr Ray Masini, Manager Marine Ecosystems Branch, Office of the Environmental Protection Authority (EPA), *Official Committee Hansard*, Perth, 11 June 2015, p. 6.

131 Dr Ray Masini, EPA, *Official Committee Hansard*, Perth, 11 June 2015, p. 3.

132 Mr Stephen Gash, Chief Executive Officer, Shire of Derby/West Kimberley, *Official Committee Hansard*, Broome, 9 June 2015, pp 3-4; Mr Steven Gill, General Manager, Maxima Opportunity, *Official Committee Hansard*, Perth 11 June 2015, p. 45.

133 WADF, *Aquaculture Development Zones in Western Australia: Policy principles relating to considerations for aquaculture licenses and leases*, September 2015, p. 3.

134 WADF, *Aquaculture Development Zones in Western Australia: Policy principles relating to considerations for aquaculture licenses and leases*, September 2015, pp 4-6.

Development Zones in the Northern Territory

3.88 The NTDPIF 'has long recognised that planning for both land-based and marine aquaculture is a key factor supporting the future long-term sustainable development of the aquaculture industry.'[135]

3.89 The NTDPIF is planning to analyse the availability of resources to support aquaculture businesses in the regions surrounding Darwin and Nhulunbuy, with a long term objective of establishing aquaculture zones in these regions.[136]

Development Zones in Queensland

3.90 The greater use of planning to identify suitable aquaculture sites in the GBR region was supported by both regulators and industry stakeholders. The GBRMPA recommended that any expansion of aquaculture in the GBR should be underpinned by planning that includes:

- A review of the ecosystem health and sustainability science as it applies to the aquaculture industry in the Great Barrier Reef Region;
- Development of assessment guidelines to determine the assimilative capacity of waterways in the Great Barrier Reef Region to accept the discharge of aquaculture wastewaters (particularly sediment and nutrient loads); and
- A site selection process for the location of new aquaculture facilities in the Great Barrier Reef Region based on the assimilative capacity of the receiving waterways.[137]

3.91 These objectives were supported by the APFA[138] and Pacific Reef, which in response to the GBRMPA objectives stated:

> There is an urgent need for this to be done rigorously and transparently. The CSIRO Marine and Atmospheric Research department already has a coastal environmental modelling team. An adaptation of their existing modelling work could deliver these outcomes that we require.[139]

3.92 Pacific Reef's support was due, in part, to its perception that in the absence of evidence on assimilative capacity regulators tended to assume it was already exceeded.[140] Pacific Reef stated that the GBRMPA's three requirements would form the basis of:

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135 NTDPIF, *Submission 13*, p. 5.

136 NTDPIF, *Submission 13*, p. 5.

137 GBRMPA, *Submission 12*, p. 2.

138 APFA, *Submission 10*, p. 3.

139 Mr John Moloney, Pacific Reef, *Official Committee Hansard*, Brisbane, 27 August 2015, p. 30.

140 Mr John Moloney, Pacific Reef, *Official Committee Hansard*, Brisbane, 27 August 2015, p. 30.

> … a good framework around which to manage our industry. Currently they do not have that framework. It is left in the hands of individual bureaucrats that try to basically create their own framework each time.[141]

3.93 The GBRMPA suggested that developing a spatial planning framework for aquaculture should involve industry and all relevant government agencies. The spatial planning framework should identify areas, potentially including development zones, where specific activities have been pre-analysed for risk and approvals can be expedited.[142]

3.94 The GBRMPA also recommended that the spatial planning framework be based in legislation and able to harmonise the impacts of existing relevant Commonwealth and Queensland legislation.[143]

3.95 The CSIRO highlighted the success of Gold Coast City Council in sustainably expanding its prawn farming industry and suggested this had been based on the use of a spatial planning framework to support the selection of appropriate sites for aquaculture developments.[144]

3.96 The Queensland Competition Authority's (QCA) draft recommendations from its review of aquaculture regulation included a recommendation for the state government to implement development zones enabling 450 hectares of aquaculture operations within two years. The QCA emphasised that the Queensland Department of Agriculture, Fisheries and Forestry has already undertaken preliminary investigations into suitable areas for aquaculture and that there were also approved but unused sites that could allow for the 'early identification of development areas'.[145]

3.97 The QCA recommended that development applications for projects within the aquaculture zones should be assessed using a planning code which would consider: impacts on groundwater; permitted species; nutrient and sediment discharge limits; offsets; location of intake and discharge structures; the impact of construction on acid sulphate soils, vegetation, and threatened species; operational restrictions relating to biosecurity, and impacts on local residents.[146]

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141 Mr John Moloney, Pacific Reef, *Official Committee Hansard*, Brisbane, 27 August 2015, p. 30.

142 Dr Russell Reichelt, GBRMPA, *Official Committee Hansard*, Canberra, 10 November 2015, pp 5, 7.

143 Dr Russell Reichelt, GBRMPA, *Official Committee Hansard*, Canberra, 10 November 2015, p. 7.

144 CSIRO, *Submission 17,* p. 5.

145 QCA, *Exhibit 1: Draft Report Aquaculture Regulation in Queensland*, July 2014, p. ix.

146 QCA, *Exhibit 1: Draft Report Aquaculture Regulation in Queensland*, July 2014, p. ix.

Other Regulatory Issues

Convention on the International Trade in Endangered Species

3.98 Trade in endangered species is regulated using the Convention on the International Trade in Endangered Species (CITES).[147] The DoE stated that species listed under CITES always required a CITES export permit because 'the primary aim of CITES was to ensure that international trade in wild flora and fauna is legal, sustainable and traceable and does not threaten species' survival.'[148]

3.99 Hartley's Creek Crocodile Farming Company (Hartley's) reported that the time taken to get CITES export permits from the Australian Government was having a detrimental impact on its business. Hartley's stated that despite the application for an export permit being completed online, the government had eight weeks to process the form. Hartley's tanned some of its skins overseas and brought them back to Australia for manufacture. Hartley's explained that the eight week wait for processing occurred in both the exporting and importing stages.[149]

3.100 Hartley's also reported that the eight week wait for export permits applied to single manufactured items and that this time lag was acting as a barrier to it selling its goods online.[150]

3.101 Conversely, Koorana Crocodile Farm (Koorana) did not consider CITES permits to be a problem stating that 'with the Australian multi-use permits I can go home and write out a permit tomorrow, just on the computer, and that is approved and ready to go'. Koorana added that it supported CITES as a 'very important aspect of international regulation'.[151]

3.102 Both Hartley's and Koorana stated they tanned their crocodile skins overseas due to a lack of suitable tanneries in Australia. Both companies noted that they paid import duties on the skins as they came back into Australia despite retaining ownership of the skins during the whole process. Koorana stated that the addition of GST and the import duty made its tanned skins 'non-competitive on the international market'.[152]

147 In Australia it is also regulated via the EPBC Act.

148 Department of the Environment, *Submission 21*, p. 3.

149 Mrs Angela Freeman, Co-Owner, Hartley's Creek Crocodile Farming Company (Hartley's), *Official Committee Hansard,* Cairns 24 August 2015, p. 12.

150 Mrs Angela Freeman, Hartley's, *Official Committee Hansard*, Cairns, 24 August 2015, p. 12.

151 Mr John Lever, Owner, Koorana Crocodile Farm (Koorana), *Official Committee Hansard*, Brisbane, 27 August 2015, p. 26.

152 Mr John Lever, Koorana, *Official Committee Hansard*, Brisbane, 27 August 2015, p. 27.

Crocodile Egg Harvesting

3.103 Crocodile numbers in the NT declined to about 3000 in the 1960s and 1970s, but since that time a combined program of conservation and commercialisation had seen numbers recover to around 100 000.[153] The collection of crocodile eggs from the wild for use in farming has been an important element in the successful conservation and commercialisation of crocodiles in the NT. Wildlife Management International explained the link between the egg collection and the conservation of the species, stating:

> The landowners all know that the eggs are valuable, how many eggs they have and that we can collect something like 50 000 or 60 000. It is an asset. There are still problems with crocs but the public see them as a commercial asset. They see them generating real money for people who do not have many other sources. So it has worked—our population has recovered—but we had to change the paradigm. We see this with predators and conservation all the time. The efforts made to rebuild predator numbers are great, but what are you going to do when you rebuild them? You have got to have a second part of the plan: if the conservation works, how you are then going to consolidate. That is what we did here.[154]

3.104 Crocodile eggs are not able to be collected from the wild in either Queensland or Western Australia. Queensland crocodile farmers reported that there is little research justifying the ban on egg collection. Koorana stated that the numbers of crocodiles and eggs was unknown because 'there has never been a proper survey done', although they believed there was currently a researcher working for the state government undertaking research in Cape York.[155]

3.105 Queensland crocodile farmers believed that eggs could be collected in Queensland sustainably, noting that less than one per cent of eggs in the wild successfully grow into adult crocodiles with most being destroyed in seasonal floods. Koorana reported that egg collection had not had a detrimental impact on wild crocodile numbers in the NT stating:

> What they found in the Northern Territory is that it does not matter how many eggs you collect, the population in the Northern

153 Mr Michael Burns, Managing Director, Porosus, *Official Committee Hansard*, Darwin 14 July 2015, p. 41; Professor Grahame Webb, Director, Wildlife Management International, *Official Committee Hansard*, Darwin 14 July 2015, p. 39.

154 Professor Grahame Webb, Wildlife Management International, *Official Committee Hansard*, Darwin 14 July 2015, p. 40.

155 Mr John Lever, Koorana, *Official Committee Hansard*, Brisbane, 27 August 2015, p. 24.

> Territory is still going up by 15 per cent a year simply because you never get all of the eggs.[156]

3.106 The ban on crocodile egg collection makes it very difficult for new producers to enter the industry. The rights to collect eggs in the NT are wholly allocated to established farmers with no capacity for new producers. Hartley's described the challenges to entering the industry as 'insurmountable' stating:

> Where are you going to get 30, 40, or 50 breeding pairs of crocodile from? It takes 10 years before the females can even start producing eggs.[157]

A large breeding saltwater crocodile

Aquaculture Licences and Permits

Pearl Licenses

3.107 Clipper Pearls described the cost of lease and licensing fees in the pearl industry as 'exorbitant'.[158] Cygnet Bay Pearls suggested the current environment where the pearl industry in Australia was rapidly declining in value was the perfect time to undertake deregulation of the industry. Cygnet Bay Pearls stated that the potential risk to the industry from deregulation is 'currently minimal and all opportunities to reduce unnecessary cost to the industry need to be implemented to allow the industry to adapt to the current circumstances'.[159]

156 Mr John Lever, Koorana, *Official Committee Hansard*, Brisbane, 27 August 2015, p. 24.

157 Mrs Angela Freeman, Hartley's, *Official Committee Hansard*, Cairns 24 August 2015, p. 13.

158 Clipper Pearls, *Submission 20*, p. 2.

159 Cygnet Bay Pearls, *Submission 27*, p. 6.

Trepang Licenses

3.108 The NT Government issued six licenses for the fishing of trepang in the NT waters. These licenses were all purchased by Tasmanian Seafoods on the open market during the period from the late 1980s until 1993.[160]

3.109 Fishing levels are currently very low (29.5 tonnes in 2013) relative to the peak harvest of 285 tonnes in 1999.[161] The recent low harvest rates were primarily due to the difficulties of attracting divers due to the potential dangers of crocodiles and jellyfish and the competition for labour due to the oil and gas boom.[162]

3.110 Trepang fishing licenses are renewed annually and are not contestable despite the fact that Tasmanian Seafoods is not currently actively using all the licenses.[163]

3.111 From 2012, the NT Government made available three licenses for sea ranching trepang. Sea ranching involves collecting juveniles which are reared in a hatchery and then released into the wild to mature and eventually be harvested.

3.112 Tasmanian Seafoods, Tropical Aquaculture Australia (TAA), and the NTDPIF currently hold one sea ranching license each.[164] TAA stated it had previously approached Tasmanian Seafoods to consider a partnership but Tasmanian Seafoods had declined. TAA had then spent 10 years working towards being granted an aquaculture license, which occurred in 2012.[165] To date TAA has not started commercially operating the license due to the inability to attract financing for the project.[166]

3.113 Tasmanian Seafoods stated that they were not using all the licenses due to concerns about potential overfishing. Trepang move extremely slowly (approximately 400 metres per year) and the ease with which they can be

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160 Mr Chauncey Hammond, Commercial Advisor, Tasmanian Seafoods, *Official Committee Hansard*, Darwin 14 July 2014, p. 53.

161 DoE, 'Northern Territory Trepang Fishery – 2014', May 2014, https://www.environment.gov.au/system/files/pages/03d85b1d-e015-4e61-a278-1bba4c8f54df/files/application-2014-progress-report.pdf Accessed 28 October 2015; NTDPIF, Trepang Fishery Status Report 2012, http://www.nt.gov.au/d/Content/File/p/Fish_Rep/12_FR113_Trepang.pdf Accessed 28 October 2015.

162 Mr Chauncey Hammond, Tasmanian Seafoods, *Official Committee Hansard*, Darwin 14 July 2014, p. 53.

163 Mr Glenn Schipp, Director, Fisheries and Aquaculture, NTDPIF, *Official Committee Hansard*, Darwin, Tuesday, 14 July 2015, pp 4–6.

164 Mr Chauncey Hammond, Tasmanian Seafoods, *Official Committee Hansard*, Darwin 14 July 2014, p. 53; Mr Philip Elsegood, Director, Tropical Aquaculture Australia (TAA), *Official Committee Hansard*, Darwin, 14 July 2015., p. 47.

165 Mr Philip Elsegood, Director, TAA, *Official Committee Hansard*, Darwin, 14 July 2015, pp 47, 51.

166 Mr Philip Elsegood, TAA, *Official Committee Hansard*, Darwin, 14 July 2015, pp 47–51.

caught has previously led to the collapse of trepang fisheries in areas such as the Torres Strait, Papua New Guinea and the Pacific.[167] Tasmanian Seafood stated:

> If we could use all six licences, we would be using them fully … We think that if all six licences were working, there would not be a fishery—because you would actually fish it out: it would be a competitive fishery, which means it would be first in, best dressed; those that got out there and fished the hardest and caught the most. Well, this species is easily exploitable. We have seen that all around the world. So we are actually very much about controlling it and making sure that a sustainable amount is taken out. If we took out more than that, on just a commercial basis, we could probably make a lot of money for one or two years, and that would be it.[168]

3.114 Despite not actively using all of its fishing licenses Tasmanian Seafoods had been investing in research for over ten years. The research focussed on the productivity of the fishery, diving patterns, and the genetic analysis of the wild trepang population in Northern Australia.[169]

Committee members with Mr Grant Leeworthy, Tasmanian Seafoods, at the Darwin Aquaculture Centre inspecting cultured trepang

167 Mr Philip Elsegood, TAA, *Official Committee Hansard*, Darwin, 14 July 2015, pp 49, 50.

168 Mr Chauncey Hammond, Tasmanian Seafoods, *Official Committee Hansard*, Darwin, 14 July 2015, p. 56.

169 Tasmanian Seafoods, *Submission 16*, p. 2.

Biosecurity

3.115 The RRRC stated that part of the driver for greater regulation of the aquaculture industry in the period from 2000 was due to the biosecurity and disease risk, primarily to the industry itself, caused by aquaculture pollution.[170] The CSIRO commented that whilst the intensive nature of aquaculture did pose disease risks that the 'stringent' biosecurity regime reduced these risks and that there were no examples of aquaculture operations causing diseases to spread to adjacent environments.[171]

3.116 The AIMS noted that biosecurity risks were higher for aquaculture operations in Northern Australia than Southern Australia, both due to greater proximity to Asia and due to the increased danger from diseases in tropical climates.[172]

3.117 The DoA stated that one of the biosecurity risks it was attempting to address was the risk of diseases spreading into the food chain through the use of imported prawns as fishing bait.[173] Finfish Enterprise highlighted the ornamental fish trade as a biosecurity risk, describing it as 'poorly regulated' and highlighting that last year a virus had entered Australia through this trade.[174]

3.118 The Australian Barramundi Farmers Association (ABFA) described Australia's relatively low disease levels as a 'competitive edge'.[175] The ABFA reported that the Southeast Asian barramundi industry was affected by serious diseases such as iridovirus, which it described as the aquatic equivalent of foot and mouth disease. Iridovirus could be devastating for the local aquaculture industry and local wild barramundi populations and if the disease entered Australia it would be very difficult to contain.[176]

3.119 Humpty Doo Barramundi expressed concern that not enough was being done to protect Australia's biosecurity. Humpty Doo Barramundi pointed to the recent impact of disease outbreaks in horticultural industries as an example of the risk that poor biosecurity could pose to agricultural

170 Ms Sheriden Morris, RRRC, *Official Committee Hansard*, Cairns, 24 August 2015, p. 1.

171 CSIRO, *Submission 17*, p. 4.

172 AIMS, *Submission 31*, p. 2.

173 Mr Ian Thompson, First Assistant Secretary, DoA, *Official Committee Hansard*, Canberra, 15 September 2015, p. 2.

174 Dr Richard Knuckey, General Manager, Finfish Enterprise, *Official Committee Hansard*, Cairns, 24 August 2014, p. 34

175 Australian Barramundi Farmers Association (ABFA), *Submission 3*, p. 2.

176 Mr Marty Phillips, President, ABFA, *Official Committee Hansard*, Cairns, 24 August 2015, p. 24.

industries and recommended greater investment in inspections and risk assessments.[177]

3.120 Mainstream Aquaculture currently grows out barramundi in Singapore (using Australian fingerlings), processes the fish in Singapore, and then imports fillets back into Australia. Mainstream Aquaculture would like to import whole fish into Australia, for processing in a plant in Darwin, as this would improve the shelf life of its product. Currently, the importation of whole fish is prohibited; however Mainstream Aquaculture has applied to the DoA to have its Singapore premises audited to potentially allow exportation to Australia.[178]

Concluding Comment

3.121 The successful melding of science and technology within the aquaculture industry has the potential to make an extraordinarily valuable contribution to the economy of Northern Australia and, more broadly, the nation.

3.122 The Committee recognises that long-term constraints to aquaculture development are increasingly being resolved by new technology such as algal treatment systems. The Committee, when it visited James Cook University's macroalgae research facility observed the successful application of various algae species to treat waste water and produce a potentially valuable and commercial by-product.

Great Barrier Reef Region Regulatory Framework

3.123 The Committee recognises that the Great Barrier Reef is a significant environmental asset and ensuring its long term health is of central importance to the economy of Northern Queensland and more broadly Australia.

3.124 Reducing nutrient run-off from existing developments is a difficult environmental management challenge for regulators and it is understandable that high standards of environmental management need to be placed on new developments. Nevertheless, the regulation of aquaculture appears to have impeded the development of the industry to a degree not commensurate with its projected impact on the health of the Great Barrier Reef.

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177 Mr Robert Richards, Managing Director, Humpty Doo Barramundi, *Official Committee Hansard*, Darwin, 14 July 2015, pp 35–36.

178 Mr Boris Musa, Managing Director, Mainstream Aquaculture, *Official Committee Hansard*, Townsville, 26 August 2015, pp 38–39.

3.125 Pacific Reef Fisheries had been seeking approval for its proposed Guthalungra prawn farm for over 14 years before receiving approval from the Great Barrier Marine Park Authority in December 2015. Full development approval from the relevant local shire council which is expected by June 2016 will enable the project to proceed.[179] The Committee believes that the example provided by this project has deterred investment in aquaculture in Northern Queensland by demonstrating that meeting environmental requirements is overly onerous and economically unviable.

3.126 The Committee accepts that the zero net discharge condition placed on the Guthalungra project was never intended as a standard to be applied to all new aquaculture developments. Yet the regulatory framework for aquaculture in Northern Queensland remains complex and unclear.

3.127 The Committee is of the view that the most pressing need for the aquaculture industry in Northern Queensland is regulatory clarity.

3.128 The Committee supports the intention of Great Barrier Reef Marine Park Authority to revoke the Great Barrier Reef Marine Park (Aquaculture) Regulations 2000 (Cwlth). These regulations have been not been used for a decade due to the accreditation of Queensland regulations. The potential for them to be 'switched on', however, contributes to regulatory uncertainty.

3.129 The Committee believes that relevant scientific organisations such as the Commonwealth Scientific and Industrial Research Organisation, the Australian Institute of Marine Science, and James Cook University should undertake a review of the science underpinning the environmental impacts of aquaculture. This should expand upon, rather than replace, the previous work undertaken by these organisations and their collaborators in the period from 1995 to 2002. As a matter of course, the review should aim to be comprehensively informed by the science needs of the aquaculture industry and its regulators.

3.130 The Committee acknowledges that if implemented effectively, the use of offsets to compensate for the environmental impacts of developments can provide flexibility for developers while still maintaining environmental outcomes. Currently in the GBR region, however, the policy framework is inadequate and is placing an inordinate burden on proponents. The Committee welcomes the work of the Reef Trust in developing a framework for offsets in the region. The framework should be intuitive and transparent for prospective developers. It is essential for business planning that developers are able to predict the quantity of offsets required, their costs, and the method of implementing them.

179 Pacific Reef, *Submission 6.1* , p. 1.

Planning for Aquaculture

3.131 The Committee is heartened by the degree to which there is common ground amongst stakeholders as to how to resolve the development impasse occurring in Northern Queensland. Greater collaboration between industry, regulators, and the scientific community should be encouraged. The Australian Prawn Farmers Association's proposed Stewardship Action Plan is one example of such collaboration. The Commonwealth and Queensland Governments will need to play a key role in facilitating this collaboration.

3.132 The greater use of planning mechanisms, including development zones, is supported by almost all stakeholders. In the Great Barrier Reef region, key criteria for identifying aquaculture zones should include the assimilative capacity of nearby waterways. By identifying waterways with assimilative capacity it will be possible for aquaculture projects to discharge nutrients at levels that are necessary for economic viability but also minimise any impacts on the environment. The criteria for aquaculture zones should also include economic criteria such as infrastructure and workforce availability.

3.133 The Committee supports the draft recommendation of the Queensland Competition Authority that identifying 450 hectare aquaculture zones within two years is achievable.

3.134 The Western Australian Government is moving forward with developing aquaculture development zones. The Northern Territory Government too is moving in this direction by undertaking an initial survey of infrastructure and services with the long term objective of implementing aquaculture zones in the Darwin and Nhulunbuy regions.

3.135 The Committee believes that the capacity of emerging technologies to address the environmental concerns related to aquaculture should be considered when assessing viable locations to implement aquaculture development zones.

Other Regulatory Issues

3.136 The ban on crocodile egg harvesting in Queensland is an impediment to the entrance of new farms into the Queensland crocodile industry. The number of crocodile eggs in Queensland, and whether there is a sufficient supply to enable sustainable harvesting, is unknown. The Committee believes a survey should be undertaken to assess crocodile egg numbers and determine the sustainability of possible crocodile egg harvesting.

3.137 The Committee supports the development of an Aboriginal and Torres Strait Islander managed trepang industry. Consideration should be given to the process for allocating aquaculture licenses for trepang and also to

the level of government support which could assist the development of the industry.

State Government Engagement

3.138 The Committee is disappointed that the Queensland and Western Australia Governments did not appear at the Committee's public hearings. The Committee would have valued the opportunity to discuss with the Western Australian Government its insights into the challenges encountered in implementing aquaculture development zones. The Committee is keenly interested in the issue of aquaculture developments in the GBR region and it was unfortunate that a key stakeholder such as the Queensland Government was unable to contribute to the Inquiry.

Recommendations

Recommendation 2

3.139 **The Committee recommends that the Department of the Environment, in collaboration with the Queensland Government, fund a program to review and expand the science relating to the environmental impact of aquaculture in areas adjacent to the Great Barrier Reef. The review should include research organisations with recognised expertise in this area including, but not limited to: the Commonwealth Scientific and Industrial Research Organisation, the Australian Institute of Marine Science, and James Cook University.**

The research should be an examination of:

- **the capacity of new technologies and management techniques to treat water to a standard that effectively eliminates nutrient discharge into the surrounding ecosystem;**
- **the capacity of different ecosystems to absorb and assimilate any residual nutrient discharges; and**
- **the relative environmental impacts of aquaculture farming of different species, and using different farming techniques (e.g. land-based, sea cage, ranching, recirculating systems).**

Recommendation 3

3.140 **The Committee recommends that the Department of the Environment and the Great Barrier Reef Marine Park Authority support the Queensland Government in determining the need for and the positioning of special aquaculture development zones. These zones should be identified using criteria, considering:**

- **the capacity of new technological developments to address nutrient discharge;**
- **the ability of nearby waterways to assimilate nutrient discharges to ensure that extra nutrients do not reach the Great Barrier Reef; and**
- **economic considerations including access to necessary infrastructure and labour force, and the biological suitability of sites for targeted aquaculture species.**

Recommendation 4

3.141 **The Committee recommends that the Great Barrier Reef Marine Park Authority, in accordance with the planned actions outlined in its Regulatory Plan 2014-2015, revoke the Great Barrier Reef Marine Park (Aquaculture) Regulations 2000 (Cwlth).**

Recommendation 5

3.142 **The Committee recommends that the Department of the Environment ensures the framework for developing offsets in the Great Barrier Reef is comprehensive, transparent and accessible for potential aquaculture investors. The framework should allow potential investors to accurately estimate:**

- **the quantity of offsets required;**
- **the cost of the required offsets; and**
- **how the offsets will be implemented.**

Recommendation 6

3.143 **The Committee recommends that the Queensland Government conduct a survey of crocodile egg numbers in Northern Queensland to determine the sustainability of crocodile egg harvesting.**

4

Developing the Aquaculture Industry in Northern Australia

Introduction

4.1 The Northern Territory Department of Primary Industry and Fisheries (NTDPIF) lists the key advantages for large-scale aquaculture production in the Northern Territory (NT) as:

- Largely undeveloped coastline with minimal competition by other users, such as industries, urban coastal growth and recreational users of the coastline and seas.
- Pristine waters offering clean and green product branding.
- Proximity to Asia, with its rapidly growing wealthy middle class.
- Higher average seawater temperatures offering substantial production cost savings through significantly reduced production times. …
- Broad support and engagement by Aboriginal and Torres Strait Islander coastal communities for fisheries-based economic development and employment opportunities.[1]

4.2 The Pearl Producers Association (PPA) added to this list, noting that:

- Many of the Northern Australian waterways are sheltered and punctuated with islands and inlets suitable for aquaculture operations.
- … The waters are also characterised by mega-tidal fluctuations [which] mean that carrying capacity is high and likelihood of reduction of ecosystem structure and function is low.

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1 Northern Territory Department of Primary Industry and Fisheries (NTDPIF), *Submission 13*, p. 3.

- There are a large number of native/endemic species that have the capacity to be developed in an aquaculture context.[2]

4.3 Despite these advantages Northern Australia, unlike South Australia and Tasmania, has been slow to develop its aquaculture potential.[3]

Financing and Other Industry Assistance

Business Challenges in Northern Australia

4.4 The Finfish Group (Finfish) identified several challenges facing businesses operating and expanding in Northern Australia, including:

- Significant construction costs of infrastructure
- Insufficient regional support services
- Very high electricity costs
- High freight costs due to significant trucking distances …[4]

4.5 Charles Darwin University (CDU) described how increases in power costs caused a major barramundi farm to be closed. The CDU identified transport and labour costs as two other factors:

> The logistics of bringing food up here is another one—you have to double your price pretty much. We all know food is probably 30 per cent of your costs, and the other cost is labour.[5]

4.6 The BMT Oceanica commented that the start-up costs could 'be prohibitive' which may deter potential new entrants.[6] Finfish, which took over a Queensland Government facility, emphasised the importance of intellectual property and aquaculture brood stock:

> The [intellectual property] certainly rests with the people, the excellent team that we have at the breeding facility, but the brood stock is a very valuable component of the work … without that, obviously, the guys have nothing to work with. That takes a long time to acquire and it is one of the significant barriers to entry for anyone else entering the system …[7]

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2 Pearl Producers Association (PPA), *Submission 26*, p. 4.

3 PPA, *Submission 26*, p. 7.

4 The Finfish Group (Finfish), *Submission 35*, p. 7.

5 Mr Chadd Mumme, Horticulture and Aquaculture for Primary Industries, Charles Darwin University (CDU), *Official Committee Hansard,* Darwin 14 July 2015, p. 15.

6 Dr Glenn Shiell, Associate Principal, BMT Oceanica, *Official Committee Hansard,* Perth 11 June 2015, p. 11.

7 Mr Peter Kay, Director, Sustainable Development Corporation, *Official Committee Hansard,* Cairns 24 August 2015, p. 32.

4.7 Clipper Pearls stated that very few companies offered insurance on aquaculture species and that those that did made access to claims 'very difficult':

> Most insurers offer total or first loss cover only policies, and the deductibles are so large, as too are the premiums, that companies would risk major cash-flow shortages purely to insure their stock below true market value (or well below investment value).[8]

4.8 Humpty Doo Barramundi raised the tax treatment for its operations which only allowed depreciation for its ponds over 20 years and for its sheds over 50 years. Farmed barramundi, which is held for about two years in its ponds before sale:

> … is treated as profit, even though it might be 15 or 18 months away from being sold. … the change in value in stock from one financial year to the next is treated as profit whether we have sold them or not.[9]

4.9 Humpty Doo Barramundi acknowledged that the tax treatment ceased to be a problem once the business stopped growing, but the treatment was 'putting brakes on growth.'[10]

Importance of Financial Investment

4.10 Indian Ocean Fresh Australia (IOFA) stated there was a need to encourage global and domestic investment in Australian aquaculture. There appeared to be an issue with domestic superannuation funds investing in the industry because it was easier to get foreign super funds to invest in Australian agribusiness.[11]

4.11 The Department of Foreign Affairs and Trade (DFAT) noted that foreign investment can 'assist in commercialising Australian innovation and opening distribution channels into global markets.'[12] The Seafarms Group (Seafarms) agreed, emphasising the value of linking such investment to 'supply contracts or off-take agreements.'[13]

4.12 Austrade advised that there had been a 'very strong uptake and interest from Chinese companies' following initiatives such as Australia Week in

8 Clipper Pearls, *Submission 20*, p. 2.

9 Mr Robert Richards, Managing Director, Humpty Doo Barramundi, *Official Committee Hansard,* Darwin 14 July 2015, p. 35.

10 Mr Robert Richards, Humpty Doo Barramundi, *Official Committee Hansard,* Darwin 14 July 2015, p. 35.

11 Mrs Erica Starling, Director, Indian Ocean Fresh Australia (IOFA), *Official Committee Hansard,* Perth 11 June 2015, p. 33.

12 Department of Foreign Affairs and Trade (DFAT), *Submission 36*, p. 1.

13 Seafarms Group (Seafarms), *Submission 4*, p. 6.

China.[14] The Australian Prawn Farmers Association (APFA) reported it was receiving:

> … at least an inquiry a week over the last couple of months for investors and potential investors through Austrade. Austrade have Japanese investors wanting to come in. Different countries are still wanting to come into Australia because they can see our clean, green potential and the ability to provide food to feed their own people.[15]

4.13 Seafarms agreed that overseas people were 'very keen to be involved' in aquaculture developments in Australia, but international investors needed the approvals in place before they saw projects as 'investable'.[16]

Ability to Attract Capital

4.14 The Queensland Crayfish Farmers Association (QCFA) stated that the biggest impediment to expanding the red claw crayfish industry was overcoming the reputation previously gained by the sector. There had been ill-advised and underfinanced unsuccessful farms and the industry was seen as a poor investment by financial institutions.[17]

4.15 Humpty Doo Barramundi also noted the reluctance of banks to lend to new enterprises because such a company did not have the collateral, unless the bank was prepared to consider the aquaculture farm itself as having collateral value.[18]

4.16 The Western Australia Department of Fisheries (WADF) stated that economies of scale were needed to attract investors to aquaculture projects in the Kimberley Region:

> Given the high-cost environment prevailing in the region, and across Northern WA generally, a large production level is required to provide an economy of scale that warrants the level of investment needed for such operations.[19]

4.17 Maxima Opportunity supported this view.[20]

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14 Ms Jane Madden, General Manager, Austrade, *Official Committee Hansard,* Canberra 15 September 2015, p. 12.

15 Ms Helen Jenkins, Executive Officer, Australian Prawn Farmers Association (APFA), *Official Committee Hansard,* Brisbane 27 August 2015, p. 14.

16 Dr Chris Mitchell, Executive Director, Seafarms, *Official Committee Hansard,* Brisbane 27 August 2015, p. 18.

17 Queensland Crayfish Farmers Association (QCFA), *Submission 1.1*, p. 1.

18 Mr Robert Richards, Humpty Doo Barramundi, *Official Committee Hansard,* Darwin 14 July 2015, p. 35.

19 Western Australia Department of Fisheries (WADF), *Submission 23*, p. 2.

20 Maxima Opportunity, *Submission 22*, p. 4.

4.18 Marine Projects Australia (MPA), which recently had its barramundi production licence increased to 7000 tonnes, said that production even at this volume was insufficient to attract international investment:

> With 7000 tonnes, when we look at Norwegian investors and Chinese investors they say: 'You're way too small. We're not coming in.'[21]

4.19 Tropical Aquaculture Australia (TAA) provided a similar example in the NT. The TAA was seeking funds to establish a trepang hatchery in Arnhem Land:

> We need $6 million over the first three years, and we will be producing by the end of year three. The trouble is that, for the venture capitalists, it is just too small. The venture capitalists say, 'Get it up to $15 million or $20 million and it is worth us doing it—you're too small.'[22]

4.20 The Commonwealth Scientific and Industrial Research Organisation (CSIRO) suggested that potential investors faced a 'Catch-22' because they did not have the required regulatory certainty to invest in new aquaculture development projects and the lack of projects meant that regulatory requirements had yet to be developed.[23]

4.21 Mainstream Aquaculture considered the barramundi industry had an opportunity to become 'a very significant industry', but needed to consolidate:

> … to raise institutional capital, because aquaculture is a capital-intensive business. We are probably 20 years behind the salmon industry in our development, but I think we have the attributes in place now: we have the breeding program in place, we have a number of very competent operators and we have a very significant market opportunity that we can operate within.[24]

Government Support

4.22 The Aquaculture Council of Western Australia (ACWA) reported the view of some of its members that there continued to be a 'lack of incentive

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21 Dr Desiree Allen, Managing Director, Marine Produce Australia (MPA), *Official Committee Hansard,* Perth 11 June 2015, p. 51.

22 Mr Philip Elsegood, Director, Tropical Aquaculture Australia (TAA), *Official Committee Hansard,* Darwin 14 July 2015, p. 48.

23 Commonwealth Scientific and Industrial Research Organisation (CSIRO), *Submission 17*, p. 3.

24 Mr Boris Musa, Managing Director, Mainstream Agriculture, *Official Committee Hansard,* Townsville 26 August 2015, p. 38.

provided by government' to overcome the challenges of operating in remote north WA:

> Incentives for new industry are very important and without them the burden falls fully onto the operators, who are already having to deal with significant risk and uncertainty inherent in an aquaculture operation.[25]

4.23 Finfish also advocated a greater role for government in supporting businesses which were based on innovation,[26] and IOFA considered that government had a role in de-risking projects at the early stage 'in order to encourage commercial investment.'[27]

4.24 The ACWA stated that hatcheries were very important for aquaculture, but it was difficult for one entity to establish a hatchery. Also, hatcheries were not needed all year round.[28] The ACWA called for government support to set up a multi-species hatchery in the northern area:

> It is just spreading that risk. It is not an inexpensive thing to build a hatchery and there are obviously inherent risks in the first two to three years. That is probably where the government support might come in because if there was a failure for one particular batch and it was solely based around barramundi, that particular hatchery could go under.[29]

4.25 The QCFA also called for government support through provision of concessional loans 'to companies or individuals having a genuine desire to enter' the freshwater crayfish aquaculture sector.[30]

4.26 Seafarms, which is seeking to establish Project Sea Dragon, a 100 000 tonnes prawn farming operation in Northern Australia, stated that the investment needed was ultimately $1.45 billion which included a 'substantial amount of up-front infrastructure investment.' Seafarms was 'talking to the government about the concessional loan scheme.'[31]

4.27 The WADF highlighted Project Sea Dragon which included a hatchery, grow out ponds, feed mill, processing plant, and export facilities as

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25 Aquaculture Council of Western Australia (ACWA), *Submission 8*, p. 5.

26 Mr Peter Halley, Director, Sustainable Development Corporation, *Official Committee Hansard,* Cairns 24 August 2015, p. 29.

27 Mrs Erica Starling, IOFA, *Official Committee Hansard,* Perth 11 June 2015, p. 31.

28 Ms Tina Thorne, Executive Officer, ACWA, *Official Committee Hansard,* Perth 11 June 2015, p. 15.

29 Mr Stephen Davies, Vice-Chairman, ACWA, *Official Committee Hansard,* Perth 11 June 2015, p. 16.

30 QCFA, *Submission 1.1*, p. 3.

31 Dr Chris Mitchell, Seafarms, *Official Committee Hansard,* Brisbane 27 August 2015, p. 18.

indicating 'the scale and level of integration needed for successful commercial aquaculture'. The WADF added:

> To improve the commercial viability of developing large-scale aquaculture projects in Northern WA, the State or Federal government could assist through the approval of grants or subsidy schemes. These schemes could include providing short-term assistance for the establishment of the industry or through continuing assistance in the form of tax relief …[32]

4.28 The NTDPIF did not support governments actively seeking to attract projects, but instead suggested they wait for an approach from business:

> … the types of investors we tend to attract by actively touting government support are those that are likely marginal at best … Governments are not necessarily very good at picking winners in this regard. Instead, I believe it is better to make sure the approvals and government support processes are in place so that when a serious investor comes knocking they can be offered appropriate support and assistance.[33]

Strategic Leadership

Industry

4.29 IOFA provided a model for industry-led developments:

> You need to look for an industry leader to champion any project. If industry is not leading the way on something and seeking to improve or adopt new technology, is it something that the government should be funding? …
>
> The government can ensure commercialisation pathways are sound in terms of IP protection and IP-sharing arrangements. …
>
> … you need industry having significant investment in the project, and government needs to provide solid governance to provide comfort and accountability to the community at large and to taxpayers.[34]
>
> … government should consider programs where industry actually make the application for the infrastructure and bring the government parties along with them.[35]

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32 WADF, *Submission 23*, p. 3.

33 Mr Glenn Schipp, Director, Fisheries and Aquaculture, NTDPIF, *Official Committee Hansard,* Darwin 14 July 2015, p. 1.

34 Ms Erica Starling, IOFA, *Official Committee Hansard,* Perth 11 June 2015, p. 31.

35 Ms Erica Starling, IOFA, *Official Committee Hansard,* Perth 11 June 2015, p. 34.

Government

4.30 The DFAT stated that, at the Federal level, there is a 'proactive international investment attraction campaign' to provide information about Northern Australia's investment potential. The campaign centres on a Northern Australia Investment Forum held in November 2015 and 'hosted by Austrade in collaboration with the Northern Territory, Queensland and Western Australian governments.'[36]

4.31 Further, the Department of Agriculture (DoA) commented that it was leading the development of a national aquaculture strategy and 'undertaking consultations with industry players, the states and anyone else who wishes to make a submission or talk to us.' The strategy would be completed either by late 2015 or early 2016.[37]

4.32 At the State level, WADF stated that the WA Government:

> … has provided $1.85 million for the development of investment-ready aquaculture zones in the Kimberley and Mid-West regions; it has also committed funds for finfish aquaculture pilot projects and for suitable aquaculture enterprises to seek third-party sustainability assessment.[38]

4.33 The Australian Institute of Marine Science (AIMS) commented that the current approval process overwhelms many proposed aquaculture ventures at an early stage. The AIMS suggested that there be formed a 'high-level, public-private task force to take concepts for aquaculture in Northern Australia through to compelling proposals.'[39]

Skills and Training

4.34 There are two large-scale aquaculture training programs in Australia: at the James Cook University (JCU): which focuses on tropical species; and at the University of Tasmania which focuses on temperate species, including salmon.[40] At JCU there are courses at the undergraduate and postgraduate levels.[41]

4.35 Charles Darwin University (CDU) stated that since the early 1990s it has been teaching and training in the field of aquaculture and had trained

36 DFAT, *Submission 36*, p. 1.

37 Mr Ian Thompson, First Assistant Secretary, Department of Agriculture (DoA), *Official Committee Hansard,* Canberra 15 September 2015, p. 1.

38 WADF, *Submission 23*, p. 1.

39 Australian Institute of Marine Science (AIMS), *Submission 31*, p. 5.

40 Prof. Dean Jerry, Head of Aquaculture and Fisheries, James Cook University (JCU), *Official Committee Hansard,* Townsville 26 August 2015, p. 11.

41 JCU, https://www.jcu.edu.au/search?query=aquaculture&collection=jcua-courses Accessed 4 November 2015.

aquaculture technicians and farm hands for local and interstate demands.[42] In 2015, the CDU offered aquaculture courses at the certificate level.[43] The CDU was also developing an aquaculture training program to assist traditional owners in their aquaculture enterprises.[44]

4.36 The CDU added that training qualifications were 'quite flexible' and could be amended to meet industry needs. The CDU could 'put on extra qualifications or [could] change the units' that were offered.[45] Graduating aquaculture students from CDU went to South Australia or Tasmania.[46]

4.37 The Kimberley Training Institute (KTI) offers courses in aquaculture at the certificate and diploma levels.[47] The KTI has also introduced training in aquaponics for which a 'reasonably large number of clients' were interested.[48]

4.38 The KTI commented that 'direct employment in aquaculture, particularly in the north-west, has been very low.' Unfortunately, people who were interested in employment in aquaculture industry went elsewhere, to Queensland or to Tasmania.[49] KTI added that there were multiple streams that arose from its training and which enabled people to enter marine science support pathways such as marine park planning, marine park rangers, fisheries, and fisheries officers.[50]

4.39 The Australian Barramundi Farmers Association (ABFA) stated that most regional and remote areas have skills and labour shortages, including technical and operational staff, which was 'critical to sustainable and profitable aquaculture ventures.'[51]

4.40 The MPA considered the shortage of available local staff and the need to hire from outside the local area, as well as a skills shortage, was a

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42 CDU, *Submission 34*, p. 1.

43 CDU, http://stapps.cdu.edu.au/f?p=100:30:4415838718815279::NO Accessed 4 November 2015.

44 CDU, *Submission 34*, p. 2.

45 Mrs Michelle Lewis, School of Primary Industries, Charles Darwin University (CDU), *Official Committee Hansard,* Darwin 14 July 2015, p. 18.

46 Mr Chadd Mumme, CDU, *Official Committee Hansard,* Darwin 14 July 2015, p. 12.

47 Kimberley Training Institute (KTI), http://kti.wa.edu.au/courses/search/?StudyOptions=&CampusLocations=&IsShortCourse=&Term=aquaculture&CourseCategory=&pageNumber=1&itemsPerPage=21 Accessed 4 November 2015.

48 Mr Jeffrey Cooper, Portfolio Manager, KTI, *Official Committee Hansard,* Broome 10 June 2015, p. 2.

49 Mr Jeffrey Cooper, KTI, *Official Committee Hansard,* Broome 10 June 2015, p. 2.

50 Mr Jeffrey Cooper, KTI, *Official Committee Hansard,* Broome 10 June 2015, p. 4.

51 Australian Barramundi Farmers Association (ABFA), *Submission 3*, p. 2.

contributing factor affecting development of the aquaculture industry in Northern Australia.[52]

4.41 The PPA also commented that there was a lack of incentive for workers to undertake aquaculture training, and this included a lack of training opportunities for local Aboriginal and Torres Strait Islander people. Consequently, there was a 'heavy reliance on overseas workers, to meet skills shortages.'[53]

4.42 The IOFA suggested that training providers should align their services to industry needs and added that aquaculture students were being trained in WA 'for no jobs, and the skills that they are learning are totally irrelevant to what we actually need as an industry.'[54]

4.43 The JCU stated that skill shortages were not unique to Australia and there was 'a global shortage of well-trained tropical aquaculture workers'. There was also a 'worldwide shortage of veterinarians who have been suitably trained to diagnose and treat disease in tropical aquaculture animals.' Responding to industry demand:

> JCU [was] in the process of modifying its aquaculture curricula to incorporate more hands-on, industry-embedded training as well as to deliver short training courses so that the developing aquaculture industry doesn't face a skills shortage in the near future.[55]

4.44 Seafarms indicated that Project Sea Dragon would require a 'very significant training task' and it was having 'early discussions with training providers':

> One of the interesting things about aquaculture in this proposal is that the variety of jobs is much greater and more surprising than people imagine. At the less skilled end, you have people working on farms who might be just cleaning screens—really farm labourers. … At the top end, we will employ geneticists, veterinarians et cetera—people with PhDs and postgraduate qualifications—and everything in between.[56]

Educational Exports

4.45 The JCU identified opportunities for up-skilling overseas aquaculture staff, particularly from China:

52 MPA, *Submission 18*, p. 1.

53 PPA, *Submission 26*, p. 8.

54 Mrs Erica Starling, IOFA, *Official Committee Hansard,* Perth 11 June 2015, p. 32.

55 JCU, *Submission 14, Attachment A*, p. 4.

56 Dr Chris Mitchell, Seafarms, *Official Committee Hansard,* Brisbane 27 August 2015, p. 17.

> From a knowledge economy perspective, there is significant demand for edu-tourism opportunities in aquaculture from Asian investment brokers keen to facilitate access for Asian university students to high-quality Australian short-course training in aquaculture.[57]

4.46 The KTI also saw opportunities for training international students. The KTI stated that about 5 to 10 percent of its vocational training students were from overseas and added:

> They typically take the training, go back to their country and establish multimillion dollar businesses, so they obviously learn a lot.[58]

Aboriginal and Torres Strait Islander Community Involvement

4.47 The AIMS observed that 'sea country' was 'an important aspect of [Aboriginal and Torres Strait Islander] culture' and that [Aboriginal and Torres Strait Islander] people have an interest in opportunities and impacts affecting sea country. The AIMS continued, noting that 'successful and sustainable [Aboriginal and Torres Strait Islander] operations have to date proved difficult to achieve.' This was due to many factors, including poor project design and a 'failure to engage effectively with the local community in which they were established.' The AIMS recommended that, before a project was considered for an Aboriginal and Torres Strait Islander community, there should be the standard business case and rigorous adherence to a series of prerequisites:

- The community has been engaged and want the project.
- Elders from the community are involved or informed, and scientists/extension officers implementing a project will spend time in the community, not just fly in and out.
- Strong and effective local leadership will be established to take charge of the project.
- The project/farm species is suitable for the local conditions and community lifestyle …
- If the preceding conditions are met and a project initiated, the community is involved from the outset, collecting data, setting up experiments, and having experience of all stages, so that if it

57 JCU, *Submission 14 Attachment A*, p. 4.

58 Mr Jeffrey Cooper, KTI, *Official Committee Hansard,* Broome 10 June 2015, p. 2.

> succeeds they know how to do it … and they have ownership of the project.[59]

4.48 The DoA stated that Aboriginal and Torres Strait Islander communities had expressed 'a strong interest in participating in aquaculture.' The Federal Government was engaged with:

> … [Aboriginal and Torres Strait Islander] communities and groups through the Indigenous Reference Group of the Fisheries Research and Development Corporation (FRDC) which focuses on research and development to assist Aboriginal and Torres Strait Islander people derive greater benefits through fishing, both traditional and commercial.[60]

4.49 The WADF, while acknowledging that native title could potentially constrain access to land tenure, commented that partnerships with traditional owners could 'reduce the risk of native title, support project development and support the well-being of the local [Aboriginal and Torres Strait Islander] community'.[61]

4.50 The Pew Charitable Trusts (Pew) supported aquaculture as a way to broaden Aboriginal and Torres Strait Islander community development beyond the ranger programs:

> … there needs to be other industries, and people are branching into things like tourism. … tourism and rangers are not necessarily going to be enough for communities. That is part of the reason that we are supportive of aquaculture as a possible industry because, done rightly, it can be quite a low-impact and positive industry and one that [Aboriginal and Torres Strait Islander] people would probably want to work in.[62]

4.51 The NTDPIF stated that its Aboriginal and Torres Strait Islander aquaculture programs had 'established small foundational fisheries and aquaculture programs' which had the potential to become commercial Aboriginal and Torres Strait Islander fisheries ventures. The department was seeking investment for developing Aboriginal and Torres Strait Islander micro-fisheries 'to provide seafood into local markets thus improving local food security and nutrition, employment and business capacity development.'[63]

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59 AIMS, *Submission 31*, p. 3.

60 DoA, *Submission 11*, p. 6.

61 WADF, *Submission 23*, p. 5.

62 Mr Tim Nicol, Kimberley Manager, Pew Charitable Trusts (Pew), *Committee Hansard,* Perth 11 June 2015, pp 25–26.

63 NTDPIF, *Submission 13*, p. 5, 6.

4.52 Cygnet Bay Pearls observed that traditional owners were 'capable of engaging with business and creating opportunities.'[64] The local Bardi-Jawi traditional owners had provided written agreement for feasibility research into developing an edible rock oyster industry in the Kimberley. This would result in commercial opportunities for the traditional owners and significant employment.[65]

4.53 Tasmanian Seafoods reported that it had cooperated with the Aboriginal Land Council on Groote Eylandt to develop a trepang ranching enterprise:

> … trial stocking of juveniles included the community of Umbakumba in the process of assessing wild populations, monitoring seeded juveniles, the presence of crocodiles and the harvesting and initial processing of the product. … the harvesters were trained and were happily engaged in the project and finally paid with the community benefiting from the harvests.[66]

4.54 Crocodile farming in the NT is based on egg collection from wild crocodiles living on Aboriginal and Torres Strait Islander land. Porosus described how farming was changing with increasing commercial involvement of Aboriginal and Torres Strait Islander people:

> … they collect the eggs themselves, they incubate them, they hatch and they grow them. My best estimate is that by the end of the year [the crocodiles] will be about 80 centimetres or around that mark. They are getting $200 an animal instead of $25 for an egg. It is working really well. …
>
> We guarantee that all healthy crocs are bought at $2 or $2.50 a centimetre. …
>
> Baby crocs do not eat a lot, of course. But it is basically cleaning, feeding and grading. So it is about a work culture. It is developing a work ethic. It is building up the capacities.[67]

4.55 The Ranger group supplying Porosus used the income to buy ranger equipment. Porosus stated that after the first year, the mortality rate of the crocodiles had dropped to 'probably sub-six [per cent], which any farm would be happy with, let alone a remote community.'[68] An additional

64 Mr James Brown, Cygnet Bay Pearls, *Official Committee Hansard,* Broome 9 June 2015, p. 11.

65 Cygnet Bay Pearls, *Submission 27*, p. 14.

66 Tasmanian Seafoods, *Submission 16*, p. 2.

67 Mr Michael Burns, Managing Director, Porosus, *Official Committee Hansard,* Darwin 14 July 2015, pp 37, 38.

68 Mr Michael Burns, Porosus, *Official Committee Hansard,* Darwin 14 July 2015, p. 38.

benefit was that nutrient rich waste water from the crocodile pens could be used to grow vegetables.[69]

4.56 Porosus predicted that in 10 years 'there would be eight or 10 regional satellite crocodile farms on Aboriginal communities' supplying the main grow-out farms which were 'very demanding on feed and labour.'[70]

Research

4.57 The AIMS stated that Australia had 'the potential research base through its universities and publicly funded research agencies … to support the expansion of aquaculture in Australia's northern regions.' The AIMS added:

> However, on the whole, the scale and resourcing of Australia's research efforts lags well behind that of other countries (e.g. Denmark, Norway, Canada, Chile and Israel, and increasingly Asian countries, such as Japan and Korea) … Many of these nations have leading research institutes devoted exclusively to aquaculture.[71]

4.58 Maxima Opportunity stated that research and development in Australia's relatively young aquaculture industry, such as barramundi, would 'provide far greater productivity gains [per dollar spent] than investment in more mature industries where many of the efficiency gains from selective breeding have already been realised.'[72]

4.59 The Aquaculture Association of Queensland (AAQ) commented that 'new industries and technologies have substantial lead times from an initial concept to full development' and required 'deep pockets and a long-term commitment far greater than the election and budget cycles.' The AAQ provided the example of the silver perch industry which had received research support for the 1990s and into the early 2000s. Support subsequently declined and currently there is no research in Australia.[73]

69 Mr Michael Burns, Porosus, *Official Committee Hansard,* Darwin 14 July 2015, p. 39.

70 Mr Michael Burns, Porosus, *Official Committee Hansard,* Darwin 14 July 2015, pp 37, 39.

71 AIMS, *Submission 31*, p. 4.

72 Maxima Opportunity, *Submission 22*, p. 4.

73 Mr Robert Bartley, President, Aquaculture Association of Queensland (AAQ), *Official Committee Hansard,* Brisbane 27 August 2015, p. 9.

4.60 The APFA stated that its association funded research through a compulsory levy, but that small industries would find it difficult to fund research.[74]

Areas for Research

Genetic Improvement

4.61 Improved genetics can deliver more robust stock which can be harvested more easily, a faster growing rate, and better feed conversion rates.[75] The CSIRO stated that 'breed and feed technologies have demonstrated tripling of production of seafood protein by area'.[76]

4.62 The DoA observed, on the other hand, that there were 'limited opportunities for the application of domesticated lines of tiger prawns and banana prawns in Northern Australia due to the small number of farms.' For barramundi, selective breeding for improved growth under commercial conditions has been limited by the small scale of the industry.[77]

4.63 Clipper Pearls advised that it had invested over $3 million into the genetic improvement of pearl oysters and has had the opportunity to commercialise this research.[78]

4.64 Project Sea Dragon aimed to use wild caught tiger prawns to form the basis of a domesticated population. These prawns would be selectively bred at a hatchery near Darwin before being moved to a brood stock maturation centre. Prawn offspring would then be transferred to grow-out ponds and later harvested for market. [79]

4.65 The ACWA commented that a long time was needed to domesticate a marine finfish 'to the stage where it will actually produce and have the right feed conversion ratio to produce in the time frame' needed to be economical.[80] The MPA described this process for barramundi:

> … a breeding program takes a lot of work, a lot of money and it really probably needs to be a commercial enterprise. …
>
> You need a lot of animals. Barramundi are males for the first two years of their lives and then they become female. So, in order to

74 Ms Helen Jenkins, APFA, *Official Committee Hansard,* Brisbane 27 August 2015, p. 10.

75 ABFA, *Submission 3*, p. 2; Seafarms, *Submission 4*, p. 4.

76 CSIRO, *Submission 17*, p. 3.

77 DoA, *Submission 11*, p. 3.

78 Mr Patrick Moase, General Manager, Clipper Pearls, *Official Committee Hansard,* Broome 9 June, p. 14.

79 Dr Chris Mitchell, *Official Committee Hansard,* Brisbane 27 August 2015, pp 16–17.

80 Ms Tina Thorne, ACWA, *Official Committee Hansard,* Perth 11 June 2015, p. 20.

> stop genetic inbreeding as you go through the next 30 years of your breeding program, you have to start with a lot of animals, which requires a lot of space, and a lot of copies of those animals. You have to continually have males coming in, because two years later they are females, so you need new stock. [81]

4.66 The MPA added that in permanent single sex animals such as kingfish, selective breeding was easier:

> … kingfish are born male and female, so you can start your breeding program and keep those animals throughout the entirety of their life as breed stock, whereas [with barramundi] if you have a great male, two years later he becomes a great female …[82]

Feed Technology

4.67 Pew Charitable Trusts advocated for research into high quality feedstocks because this would prevent reliance on increased fishing effort for feedstock or increase the value of by-catch from existing fisheries.[83]

4.68 The CDU stated that certain pilchard mackerel species provided the source of protein and oil in feedstock. There was a limit to the amount of vegetable matter which could be used:

> They do get a bit of protein sourced from soy, lupins and all that. They might get three, four or five per cent of the protein, but you still have to get at least 40 per cent protein for your feed [from fish sources] because these are carnivore fish. As soon as [vegetable protein] went up over a few different levels, the fish were just dying …[84]

4.69 The KTI observed that fish which were fed meal with a high lupin component tasted 'a bit different' from fish which had a high fish meal component.[85]

4.70 Humpty Doo Barramundi stated that the goal of fish feed producers globally was to reduce the proportion of fish in the food because they wanted to use the lowest cost combination of inputs without affecting feed

81 Dr Desiree Allen, MPA, *Official Committee Hansard,* Perth 11 June 2015, p. 53.

82 Dr Desiree Allen, MPA, *Official Committee Hansard,* Perth 11 June 2015, p. 54.

83 Pew, *Submission 24*, p. 2.

84 Mr Chadd Mumme, CDU, *Official Committee Hansard,* Darwin 14 July 2015, p. 16.

85 Mr Jeffrey Cooper, KTI, *Official Committee Hansard,* Broome 10 June 2015, p. 8.

performance.[86] The MPA supported feed companies seeking alternatives for fish oil and fish meal.[87]

4.71 The APFA highlighted CSIRO's Novacq prawn food:

> Novacq will revolutionise prawn feeding and globally demand is expected to be enormous as prawn feed has traditionally been based on fish meal which is not sustainable long-term and is more expensive to use.[88]

4.72 Novacq contains aquacultured marine microorganisms instead of fish meal and oil.[89]

Pests and Diseases

4.73 Disease is the biggest risk to aquaculture. The JCU stated that 40 per cent of global aquaculture production is lost to disease.[90]

4.74 Cygnet Bay Pearls called for research into oyster oedema disease which has severely affected the oyster industry in the Kimberley.[91] The disease was discovered in 2006 and had:

> … caused the closure of vast farming areas such as Exmouth Gulf, Montebello Islands and most of the Kimberley coast with farming activity migrating from sheltered bay areas to more exposed open sites which display less symptoms of the disease.[92]

4.75 Cygnet Bay Pearls stated it had found the disease to be almost 100 per cent fatal to juvenile oysters produced in its hatcheries and had sub-lethal effects on the larger oysters used for pearl cultivation. The disease reduced the growth rate of the oyster and the growth and quality of the pearls.[93]

4.76 Hatchery closures in northern WA meant that hatchery-based research projects designed to enhance stock and pearl quality could not continue, nor could there be an intensive breeding program to produce resilient stock.[94]

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86 Mr Bob Richards, Humpty Doo Barramundi, *Official Committee Hansard,* Darwin 14 July 2015, p. 33.

87 Dr Desiree Allen, MPA, *Official Committee Hansard,* Perth 11 June 2015, p. 53.

88 APFA, *Submission 10*, p. 1.

89 Gizmag, *New "fishless" feeds could make aquaculture more sustainable* http://www.gizmag.com/fishless-fish-feed/28615/ Accessed 8 November 2015.

90 Prof Dean Jerry, JCU, *Official Committee Hansard,* Townsville 26 August 2015, p. 2.

91 Cygnet Bay Pearls, *Submission 27*, p. 12.

92 Cygnet Bay Pearls, *Submission 27*, p. 5.

93 Cygnet Bay Pearls, *Submission 27*, p. 6.

94 Cygnet Bay Pearls, *Submission 27*, p. 11.

Deputy Chair inspecting cultured pearls at the public hearing in Broome

4.77 Finfish raised the need for research into viral nervous necrosis which was a 'huge problem for grouper' throughout its life. The disease also affected barramundi, but only early in its life span. Finding a treatment or vaccine for the disease was critical to Finfish's 'longer term viability.'[95]

4.78 The need for access to timely disease and pest diagnosis facilities is discussed below when the Committee reviews the infrastructure required to support aquaculture in Northern Australia.

Seismic Testing

4.79 The PPA drew attention to potential conflict between the pearl oyster industry and the energy exploration industry in the Kimberley:

> … in recent years the whole of the northern bioregion pearling area has been broadly under siege from oil and gas exploration—seismic exploration in particular.[96] While for the most part it has been located out in deeper water … In December last year there

95 Dr Richard Knuckey, Finfish, *Official Committee Hansard,* Cairns 24 August 2015, p. 31.

96 Seismic surveys use low-frequency, high energy, pulsed sound. AIMS, *Submission 31.1*, p. 3.

> was an application by one company to survey the entire Eighty Mile Beach area. …
>
> Eighty Mile Beach is the last wild pearl oyster fishery of its type in the world, and without it we could not maintain the pearling industry in Australia. …
>
> … when a seismic array goes over the water column its ecosystem effects are quite substantial. So, compared with its direct effects on shell or animals, which can swim away and might be okay, for things like water particulate, which oysters feed on, and diatoms and what not, in the water, from 500 metres each side of the array this particulate dies and falls out of the water column within 30 minutes or so. This is based on acoustic backscatter analysis. [97]

4.80 In 2007, AIMS was part of a consortium of researchers contracted by Woodside Energy to monitor the effects of seismic surveys at Scott Reef. The AIMS stated that prior to that time 'there was limited scientifically robust data concerning the potential impacts of underwater noise from seismic surveys on tropical reef communities, and particularly on site-attached fish.' The survey found that there were 'minimal or no detectable effects.' The AIMS, however, stated that the findings 'may not be directly translatable to the seismic surveys of concern by the pearl industry.'[98]

4.81 Pew Charitable Trusts provided a scientific summary on the issue of the impacts of underwater noise prepared by the secretariat of the Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas. This review reported that, while there were adverse effects on the eggs and larvae of marine fish and avoidance behaviour shown by adult fish, the few quantitative studies on marine invertebrates[99] had produced mixed results. The authors had 'concluded that the lack of robust scientific evidence for the effects of seismic surveys on marine invertebrates meant no clear conclusions could be made.' [100]

Research Funding

4.82 Finfish observed that it was difficult for the small aquaculture industry in Northern Australia to compete for the limited research funding which was available Australia-wide. The traditional avenue of funding was through

97 Mr Aaron Irving, PPA, *Official Committee Hansard,* Darwin 14 July 2015, p. 20.

98 AIMS, *Submission 31.1*, p. 3.

99 Mainly crustaceans and cephalopods.

100 19th ASCOBANS Advisory Committee Meeting, *CBD Scientific Synthesis on the Impacts of Underwater Noise on Marine and Coastal Biodiversity and Habitats,* http://www.ascobans.org/sites/default/files/document/AC19_4-16_CBD_SBSTTA16_SynthesisUnderwaterNoise_1.pdf p. 49. Accessed 9 November 2015.

cooperative research centres (CRCs), but that funding became thinly spread because once the research topics were announced, 'everyone from down south will also be interested in trying to support the research topics, so it can end up being too diverted.'[101]

4.83 Finfish added that Fisheries Research and Development Corporation (FRDC) funding was more specific, but the FRDC historically channelled its funding through CRCs. Finfish concluded:

> At some time, there may be a call or a need to have a research fund designated for northern research if we really want to bring forward aquaculture in this region. The FRDC has often talked about a northern node—but it has never eventuated—where they can fund projects specific to the region.[102]

4.84 GFB Fisheries criticised the Australian Government for spending 'more money funding research and innovation to assist barramundi farmers in Vietnam over recent years than it has in Australia.'[103] Cygnet Bay Pearls also criticised research grants being given to companies which operated overseas. Cygnet Bay Pearls provided the example of an Australian pearling company which operated in Indonesia and had research co-funded by JCU:

> Their industry leading research has been continuously co-funded by the Australian government in collaboration with [JCU]. Additionally, the Australian centre of excellence for pearl science that has been established at James Cook is largely unavailable to the Australian producers due to confidentially agreements between the university and its major industry partner. …
>
> … any Australia government research funding should be focused on research to recover the Australian industry.[104]

4.85 Since 2004, the JCU has collaborated with Perth-based Atlas South Sea Pearl in three genetic research projects using grants from the ARC Linkage Grant scheme. JCU stated that the three projects had resulted in 'a significant national benefit to Australia.' The research had resulted in:

- 19 peer-reviewed scientific articles, with more to be delivered;
- four PhD and two MSc graduates now working in aquaculture; and
- 'DNA pedigree marker suites' used by the industry to determine the parentage of hatchery offspring.[105]

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101 Dr Richard Knuckey, Finfish, *Official Committee Hansard,* Cairns 24 August 2015, p. 31.

102 Dr Richard Knuckey, Finfish, *Official Committee Hansard,* Cairns 24 August 2015, p. 31.

103 GFP Fisheries, *Submission 29*, p. 2.

104 Cygnet Bay Pearls, *Submission 27*, p. 12.

4.86 The JCU contrasted this to other pearl research projects:

> The outputs and national benefit from the JCU/Atlas collaboration stands in stark contrast to publicly funded grants provided to other pearling companies, where there has been no transparency in terms of the public value realised and no information shared publicly.[106]

4.87 Cygnet Bay Pearls recommended the establishment of an Australian Pearling Industry Recovery Research Task Force that could 'focus research funding on projects that will benefit the recovery of the entire industry rather than just individual companies.'[107]

4.88 Cygnet Bay Pearls stated that 'one company directly controls enough of the licences to unanimously represent the majority of [the] industry' and suggested that this company would 'only support research projects that benefit their business aspirations rather than the fundamental requirements of a prosperous holistic Australian industry.'[108]

4.89 Cygnet Bay Pearls provided as an example, a research proposal submitted to the Fisheries Research and Development Corporation (FRDC) for an investigation into the incidence of oyster oedema disease. The research comprised:

> …an environmental monitoring program alongside Cygnet Bay Pearls stock improvement breeding program, with the objective of identifying environmental triggers for the disease.[109]

4.90 Cygnet Bay Pearls stated that the application had failed because 'it did not have the 'majority' of industry support.' Cygnet Bay Pearls added that in reality 'it had the entire industry's support except for [one company].'[110]

4.91 The CSIRO described the process which had occurred when the oyster oedema disease research proposal had been submitted to the FRDC and stated:

> It is a two-stage process. First you submit an expression of interest and then, if you are successful, you are invited to develop a full proposal. We were not successful, so we did not get to full proposal stage. …
>
> There were several points to the feedback that we got. The major one appeared to be that they preferred investigations to be in

105 JCU, *Submission 14.1*, p. 1.

106 JCU, *Submission 14.1*, p. 1.

107 Cygnet Bay Pearls, *Submission 27*, p. 12.

108 Cygnet Bay Pearls, *Submission 27*, p. 11.

109 Cygnet Bay Pearls, *Submission 27*, p. 11.

110 Cygnet Bay Pearls, *Submission 27*, p. 11.

> developing a diagnostics to identify the disease. … There are methods that they have been investing in for some years, about trying to identify diagnostic tools. We felt that the environmental work could go alongside and parallel to complement the work, but that was not supported.[111]

Research Centres

4.92 The NTDPIF drew attention to the Darwin Aquaculture Centre which conducted industry-led research and development, and offered business support services. The Centre supported '[Aboriginal and Torres Strait Islander] communities to develop culturally and socially suitable sea farming ventures and businesses that deliver both economic and social benefits.'[112]

4.93 The AIMS commented that while Northern Australia had the capability and capacity 'to buttress the development of tropical aquaculture', it could be said that 'the efforts are fragmented and uncoordinated.' The AIMS suggested focus would be provided by a Northern Australia Aquaculture Institute:

> … a partnership of government agencies, research providers and industry. … if headquartered in Darwin, it could form around NT Fisheries (ie Darwin Aquaculture Centre), AIMS and [CDU], drawing on institutions further afield as required.[113]

4.94 The AIMS added that such an institute would deliver research expertise and training and could provide outreach to Indonesia and Timor Leste.[114]

4.95 The JCU put forward its case stating that northern Queensland had 'a globally significant community of expertise.' The university was:

> … recognised internationally as the world's leading institution for coral reef and tropical aquaculture research, home to the [ARC's] Centre of Excellence for Integrated Coral Reef Science … Industrial Transformation Research Hub for Advanced Prawn Breeding and Genomics, the Centre for Sustainable Tropical Fisheries and Aquaculture and Australia's top rated tourism research.[115]

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111 Dr Matt Vanderklift, Research Group Leader, Oceans and Atmosphere Flagship, CSIRO, *Official Committee Hansard,* Perth 11 June 2015, pp 57–58.

112 NTDPIF, *Submission 13*, p. 3.

113 AIMS, *Submission 31*, p. 4.

114 AIMS, *Submission 31*, p. 4.

115 JCU, *Submission 14 Attachment A*, p. 2.

4.96 The JCU stated that the intention of an aquaculture hub was that it would be a shared facility, exploiting 'interactions between industry and R&D providers, not just the university.' Other R&D providers had expressed a strong interest and meetings had been held with Queensland Parliamentary representatives.[116] The JCU saw 'Townsville as the global hub for tropical marine sciences, tourism and aquaculture commercialisation, drawing tourists, researchers and industry from around the country and the world.'[117]

4.97 The WADF did not support establishing a research institute in northern WA. The effectiveness of such institutes was determined by 'the long-term commitment of major private and public infrastructure funding and the ability to attract high calibre researchers.' The WADF concluded that 'it would be more appropriate to continue relationships with existing internationally recognised research organisations.'[118]

4.98 The WA Government's Kimberley Conservation and Science Strategy includes the Kimberley Marine Research Project. This project is coordinated by the West Australian Marine Science Institute (WAMSI).[119] The WAMSI is an 'unincorporated joint venture' which includes the WADF, the Office of the EPA, WA Department of State Development, CSIRO, AIMS, and the universities in Western Australia.[120]

4.99 Cygnet Bay Pearls stated that WAMSI had, through the Kimberley Marine Research Project:

> … delivered a research network of on-ground participation between every stakeholder … including the traditional owners, the ranger groups, private enterprise, government agencies and academia …
>
> When the WAMSI investment winds up over the next couple of years, that network could easily be utilised … As far as economic activity in the area, I think that the [network] would attract international funding if it was packaged up right …[121]

116 Prof Rocky de Nys, Professor Aquaculture, JCU, *Official Committee Hansard,* Townsville 26 August 2015, p. 3.

117 JCU, *Submission 14 Attachment A*, p. 2.

118 WADF, *Submission 23*, pp 4–5.

119 Cygnet Bay Pearls, *Submission 27*, p. 4.

120 Dr Ray Masini, Manager Marine Ecosystems Branch, Office of the Environmental Protection Authority, *Committee Hansard,* Perth 11 June 2015, p. 2.

121 Mr James Brown, Cygnet Bay Pearls, *Official Committee Hansard,* Broome 9 June 2015, p. 12.

Reducing Environmental Impacts

4.100 Concerns about new aquaculture developments have centred on the environmental impacts of nutrient discharges. These concerns have been largely eliminated by advances in technology.

4.101 The AIMS stated that there has been considerable research into the environmental impacts of aquaculture operations, but that only a small number of studies have involved tropical projects. The AIMS suggested that the location of projects could assist with assimilating wastes:

> … sea-cage culture of finfish in a well-flushed inlet with fringing mangroves would be preferable to an almost land-locked lagoon with sandy shores and a floor of seagrass. Similar considerations apply to siting discharge streams from aquaculture installations on adjoining coastal lands …[122]

4.102 The AIMS cautioned that secondary effects from contaminants such as anti-foulant chemicals on sea cages and the blanket use of antibiotics 'might be more consequential to the receiving environment than primary waste from excess food and faeces.'[123] The AIMS concluded that closed system land-based operations could be sustained if there was a zero discharge requirement, but that the economic penalty was usually too steep.[124]

4.103 The MPA, which has a sea cage barramundi farm at Cone Bay, commented that its operation experienced flushing tides of 10-12 metres.[125] The BMT Oceanica commented that there would, however, always be an impact beneath the sea cage from feeding the fish.[126]

4.104 The WA Office of the Environmental Protection Authority (EPA) stated that the Cone Bay operation required environmental monitoring and a management program, a reporting schedule and a set of environmental criteria that needed to be met. The EPA 'would assess compliance and audit the compliance reports.'[127] When environmental concerns were triggered, responses could include reducing stocking density, reducing feed rates, or moving the sea cages.[128]

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122 AIMS, *Submission 31*, p. 2.

123 AIMS, *Submission 31*, p. 3.

124 AIMS, *Submission 31*, p. 3.

125 MPA, *Submission 18*, p. 1.

126 Mr Mark Bailey, BMT Oceanica, *Official Committee Hansard,* Perth 11 June 2015, p. 12.

127 Dr Ray Masini, Manager Marine Ecosystems Branch, Office of the Environmental Protection Authority (EPA), *Official Committee Hansard,* Perth 11 June 2015, p. 4.

128 Dr Ray Masini, EPA, *Official Committee Hansard,* Perth 11 June 2015, p. 7.

4.105 The DoA commented that the expansion of the aquaculture industry provided opportunities to commercialise innovations for managing water required to meet legislated requirements.[129]

4.106 The JCU provided the example of its algal effluent treatment technology which was used at the prawn farm operated by Pacific Reef. The discharge water from the prawn farm was in fact cleaner than the input water.[130] JCU stated that this allowed an extra 30 hectares of production.[131]

Experimental macroalgae production at James Cook University

4.107 Seafarms stated that its Project Sea Dragon was based inland so did not involve mangrove clearing and would use high levels of water recirculation. No antibiotics would be used in its grow out ponds. In fact, the issue was preventing disease entering its production system because the initial brood stock would be sourced from wild prawns and 'there are populations of wild prawns that already carry disease within them and we are aiming to screen those out from the process we use.'[132]

4.108 A closed system is used by Humpty Doo Barramundi:

> … we have created artificial wetlands, so the water comes out of our ponds and goes through a snaky kind of a wetland and then

129 DoA, *Submission 11*, p. 3.

130 JCU, *Submission 14, Attachment A*, p. 3.

131 Prof Rocky de Nys, JCU, *Official Committee Hansard,* Townsville 26 August 2015, p. 3.

132 Dr Chris Mitchell, Executive Director, Seafarms Group (Seafarms), *Official Committee Hansard,* Brisbane 27 August 2015, p. 16.

> we pump it back into the system again … We have to do a certain amount of active management of the wetland but it works well.[133]

4.109 Crocodile farms can also use closed systems. Hartley's Creek Crocodile Farming Company described its closed system:

> … very little of our water is discharged. The only time any of our water would be discharged is during flood events … From the crocodile pens … [it] goes through an ozone filtration process and then we go through a series of three environmental ponds. Those ponds are all set up at various levels. We have fish and various other natural processes in those ponds, and then it goes through these huge sand filters, which are very wide, and that gradually permeates each level, and you end up with potable water at the end.[134]

Spatial Planning and Baseline Data

4.110 The BMT Oceanica highlighted the challenges faced by proponents developing an environmental impact statement (EIS) in Northern Australia. As well as the increased costs due to distances and logistics, the BMT Oceanica highlighted that northern environments are:

> … often poorly studied and the level of work required by a proponent to demonstrate an understanding of their operating environment and potential impacts can be significant.[135]

4.111 Seafarms reported that environmental assessments in tropical regions needed at least one year of studies across the wet-dry climate cycle. Seafarms added that the cost of doing the environmental approvals would be 'millions of dollars' and that 'it only becomes worth putting that risk and capital in play if you have a large enough project'.[136] The BMT Oceanica supported this view that the environmental science requirements for operating in remote Northern Australia was beyond the budget and capabilities of smaller project proponents.[137]

4.112 Obtaining greater baseline data on environmental and economic conditions for selected regions of Northern Australia could reduce the costs of environmental assessment for project developers and would also

133 Mr Bob Richards, Humpty Doo Barramundi, *Official Committee Hansard,* Darwin 14 July 2015, p. 32.

134 Mrs Angela Freeman, Co-Owner, Hartley's Creek Crocodile Farming Company, *Official Committee Hansard,* Cairns 24 August 2015, p. 9.

135 BMT Oceanica, *Submission 25*, p. 1.

136 Dr Chris Mitchell, Seafarms, *Official Committee Hansard*, Brisbane, 27 August 2015 p. 20.

137 Mr Mark Bailey, Co-Managing Director, BMT Oceanica, *Official Committee Hansard*, Perth, 11 June 2015, p. 9.

be a necessary step in the development of aquaculture zones. The AIMS outlined the role and value of baseline data, stating:

> One of the key factors constraining the expansion of the aquaculture industry in Northern Australia is the lack of robust, baseline data on the suitability of areas for aquaculture. This data requirement generally encompasses information such as currents, productivity (at the base of the food web), critical habitats, keystone biota etc, and is important to assessing not just the economic but environmental benefits and risks of location.
>
> … Once a regional assessment is made, it can provide the means for an operator of a proposed aquaculture lease or facility to combine with research providers to estimate carrying capacity or assimilation capacity of the location chosen for the activity. Nutrient budgeting (especially of nitrogen and phosphorus) and water quality/ecological modelling are particularly important elements in this context in establishing environmental capacity and the sustainability of aquaculture ventures.[138]

4.113 The AIMS has worked with CSIRO and Geoscience Australia to test the feasibility of developing baseline data for Northern Australia. The AIMS noted, however, that 'vast expanses [of Northern Australia] remain virtually uncharted in spite of the growing need and demand for such information', but that developing baseline data was potentially costly.[139] The AIMS suggested that decision makers should identify priority regions to study and that these regions should be simultaneously assessed for multiple industries.[140,141]

4.114 The NTDPIF noted that there was a lack of this information land and water resources in the NT and it had discussed with CSIRO the development of an inventory. Unfortunately, the proposal had not received support within the CSIRO.[142]

4.115 The CSIRO stated that a spatial planning framework should include: 'environmental and social values; species; production systems; market demand; and surrounding uses of on-shore, nearshore and offshore regions.'[143] The CSIRO added that 'the outputs from a spatial planning

138 AIMS, *Submission 31*, pp 1, 2.

139 AIMS, *Submission 31*, p. 2.

140 For example in coastal areas consideration could be given to: fisheries, aquaculture, resource extraction, conservation, ecotourism, Indigenous Protected Areas, ports and navigation.

141 AIMS, *Submission 31*, p. 2.

142 Mr Glenn Schipp, NTDPIF, *Official Committee Hansard*, Darwin, Tuesday 14 July 2015, p. 7.

143 CSIRO, *Submission 17,* p. 5.

framework would provide a rigorous basis for establishing aquaculture zones along the Queensland, NT and WA coast.'[144]

Infrastructure

4.116 The Committee, in the final report of its previous inquiry, *Pivot North: Inquiry into the Development of Northern Australia* recommended that the Commonwealth Government implement a '20 year strategy for the staged development of capital infrastructure in Northern Australia'. This should include the provision of all-year road access to most parts of Northern Australia by road and an increase in the capacity of ports in Northern Australia.[145]

4.117 The ABFA stated that without the provision of appropriate infrastructure, growth, the aquaculture industry will be limited. Aquaculture's infrastructure needs include public or multi-user facilities such as all-weather roads, power and water supplies as well as infrastructure aimed specifically at the aquaculture industry such as hatcheries, nursery and feed mills.[146]

4.118 The ACWA stated that 'aquaculture does not stand alone as an industry. There is a supply chain that has to support it, so growing the aquaculture industry means growing the supply chain'.[147] This view was supported by Clipper Pearls which stated that:

> … supply chains are critical to any development of the north … When one industry struggles to exist, the domino effect is catastrophic throughout the supply chain—evidenced clearly by the downturn in the mining industry in WA.[148]

4.119 The KTI suggested that it was necessary to develop hubs of supporting infrastructure accessible to major aquaculture developments such as the Kimberley Aquaculture Development Zone (KADZ) and Project Sea Dragon. The KTI stated that there was little infrastructure to support current and prospective proponents in the KADZ and that infrastructure planning and development needed to be facilitated by government.[149]

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144 CSIRO, *Submission 17,* p. 5.

145 Joint Select Committee on Northern Australia, *Pivot North: Inquiry into the Development of Northern Australia*, September 2014, Canberra, p. 182.

146 ABFA, *Submission 3*, p.2.

147 ACWA, *Submission 8*, p. 6.

148 Clipper Pearls, *Submission 20*, pp 1-2.

149 Mr Jeffrey Cooper, KTI, *Official Committee Hansard*, Broome, 10 June 2015, p. 5.

Infrastructure Facilitating Distribution

Roads

4.120 Seafarms stated that sealing the road from Kununurra to Legune Station is the key piece of infrastructure required for the development of Project Sea Dragon. Seafarms described the condition of the road:

> The road is sealed to within 7.7 kilometres of the [Northern Territory] border. It then goes to a tyre-tearing kind of scoria and then there is a formed dirt road that has two river crossings. It is currently impassable in the wet.[150]

4.121 The NTDPIF reported that the NT Government had applied for Commonwealth assistance to upgrade the road to Legune Station to all-weather status. The NTDPIF commented that this road would also service the projected Ord Stage 3 agricultural development.[151]

4.122 The NTDPIF also nominated the road to Nhulunbuy as a priority piece of transport infrastructure. The NTDPIF stated that even if making a year-round road was not possible that upgrades to the major river crossings along the road would be valuable.[152]

Ports

4.123 The Shire of Derby/West Kimberley reported feedback it had received from aquaculture businesses indicating that there was a critical need for access to reliable port berthing and nearby warehouse facilities. The Shire of Derby/West Kimberly also highlighted the difficulties that start-up aquaculture operators faced in competing with established oil and gas providers for limited portside real estate.[153]

4.124 The MPA stated that the Derby wharf in its current state of development would probably be sufficient for its needs up to a production rate of around 3000 or 4000 tonnes per annum (it currently produces 800 tonnes per annum). The MPA reported that the Shire of Derby/West Kimberley had been very supportive in developing the Derby Wharf to suit MPA's needs but that they 'probably could use some help'.[154] The MPA supported the incremental but long-term development of infrastructure to support the KADZ stating:

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150 Dr Chris Mitchell, Seafarms Group, *Official Committee Hansard*, Brisbane, 27 August 2015, p. 21.

151 NTDPIF, *Submission 13*, p. 1.

152 Mr Glenn Schipp, Director, Fisheries and Aquaculture, NTDPIF, *Official Committee Hansard*, Darwin, 14 July 2015, p. 7.

153 Shire of Derby/West Kimberley, *Submission 15*, p. 1.

154 Dr Desiree Allen, MPA, *Official Committee Hansard*, Perth, 11 June 2015, p. 54.

> We think of this as an incremental development. It is all well and good to talk about 20 000 tonnes; it is very exciting and everyone gets very enthusiastic, but it is not happening tomorrow. We would like to see government stick with us for the long haul. Two years from now, talk to us again. Four years from now, talk to us again. Help us grow and project realistically. Not have us all say, 'We need all of this stuff right now, quick, quick, quick,' and then have it sit there, unused.[155]

4.125 If the KADZ is to reach its full production quota of 20 000 tonnes per annum substantial port development will be required. This could take place through expansion of the existing port facilities at Derby or through the development of new port facilities on the Dampier Peninsula. Maxima Opportunity suggested that an infrastructure needs analysis should be undertaken to assess the relative value of potential options. Maxima Opportunity, whilst not discounting Derby as a viable option, stated that the Dampier Peninsula was significantly closer to the KADZ and that from a branding perspective it may not be preferable to using port facilities heavily used for resource exports.[156]

4.126 Maxima Opportunity also highlighted that at full capacity the KADZ would require movement of 30 000 tonnes of feed into the zone and 20 000 tonnes of fish out of the zone per annum. Maxima Opportunity also suggested that an infrastructure needs analysis was necessary as current infrastructure was unlikely to be able to accommodate these movements.[157]

Disease Laboratories

4.127 A range of stakeholders were concerned with the lack of aquatic disease diagnosis and management facilities in Northern Australia. The DoA stated that there was only one significant animal health laboratory in Northern Australia (at Berrimah, NT) and further stated that 'effective disease management in aquaculture systems is critically reliant on rapid diagnosis and availability of local specialist knowledge.'[158]

4.128 The JCU described the decision to close the Queensland Government's disease testing facility at Oonoonba, Townsville as 'crushingly naïve', noting that the majority of the state's agricultural testing had been

155 Dr Desiree Allen, MPA, *Official Committee Hansard*, Perth, 11 June 2015, p. 54.

156 Mr John Hutton, Managing Director, Maxima Opportunity, *Official Committee Hansard*, Perth, 11 June 2015, p. 46.

157 Mr John Hutton, Maxima Opportunity, *Official Committee Hansard*, Perth, 11 June 2015, pp 45-46.

158 DoA, *Submission 11*, p. 5.

conducted from the Oonoonba laboratory. Aquaculture operators were now required to send samples to a laboratory in southern Queensland, but this laboratory was struggling to meet demand for testing resulting in delays. Aquaculture operators would generally aim to limit the spread of a disease by beginning treatment within 24 hours of diagnosis,[159] but under the current arrangements it is commonly taking two weeks to receive the results of testing.[160]

4.129 The JCU also reported that it had discussed locating a state government owned biosecurity facility on the JCU campus with the Queensland Government. The JCU had spent several million dollars preparing a site, but the facility had been cancelled. The site was still available, building a facility to replace the functions of the Oonoonba laboratory would cost in the vicinity of $20 million.[161]

4.130 The DoA highlighted that the *Agricultural Competitiveness White Paper* contains plans to expand Australia's agricultural disease diagnostic and analysis capacity. The DoA also stated, however, that while it was 'pretty clear there is a gap in Northern Australia in terms of laboratory facilities' that their high cost meant that it was unlikely that a laboratory could be operated in each region of Northern Australia. [162]

4.131 Seafarms reported that it will develop its own laboratories for Project Sea Dragon, stating:

> Really, you need a very quick turnaround: if something seems not to be working properly, you want to do your testing and get a test result back the same day—and that service basically does not really exist in Australia.[163]

Northern Australia Infrastructure Facility

4.132 In May 2015 the Commonwealth Government announced the Northern Australia Infrastructure Facility (NAIF) a $5 Billion concessional loan scheme for public infrastructure projects in Northern Australia. A public consultation paper outlining the criteria for eligibility for loans under the NAIF was released on 9 November 2015. Legislation enabling the NAIF is

159 Mr Robert Bartley, AAQ, *Official Committee Hansard*, Brisbane, 27 August 2015, p. 9.

160 Dr Richard Knuckey, Finfish, *Official Committee Hansard*, Cairns, 24 August 2015, p. 34.

161 Professor Chris Cocklin, Senior Deputy Vice Chancellor, JCU, *Official Committee Hansard*, Townsville, 26 August 2015, pp 11–13.

162 Mr Ian Thompson, First Assistant Secretary, DoA, *Official Committee Hansard*, Canberra, 15 September 2015, pp 2–3.

163 Dr Chris Mitchell, Seafarms, *Official Committee Hansard*, Brisbane, 27 August 2015, pp 20–21.

expected to be introduced to Parliament in the first quarter of 2016 with the first loans able to be drawn down in July 2016.[164]

4.133 The draft criteria for the NAIF includes:

- that that project will enhance economic infrastructure and provide significant public benefit for northern Australia;
- that the project is unlikely to proceed without NAIF funding;
- that Commonwealth funding will not amount to more than 50% of total funding; and
- that the loan is able to be repaid.[165]

Industry Capital Requirements

4.134 In many cases aquaculture operators in remote locations are importing crucial inputs such as food, juvenile stock, and ice, from Southern Australia at substantial cost. The KADZ is an especially remote area and may be particularly susceptible to industry expansion being impeded by transport costs.

4.135 Several witnesses highlighted the need for supporting infrastructure that could reduce the transport costs to and from the KADZ. Maxima Opportunity, stated that the 'biggest challenge for operators in the KADZ will be the lack of pre and post farm gate infrastructure'.[166] The WADF and MPA both nominated a commercial hatchery, feed mills, and fish processing facilities as their key priorities for supporting infrastructure.[167]

4.136 The Challenger Institute of Technology (Challenger) described the lack of suitable hatchery and nursery facilities in northern Western Australia as an issue that will 'restrict the rapid expansion of [the aquaculture] industry'. Highlighting the difficulties faced by operators in the KADZ, Challenger stated that it had previously raised juveniles for MPA and that the delivery of these juveniles required a 27 hour non-stop truck journey followed by a 6 hour boat journey.[168]

4.137 The MPA reported that, in partnership with KTI and Challenger, it had attempted to gain approximately $2 to $3 million in government funding

164 Department of Industry, Innovation and Science (DIIS), *Northern Australia Infrastructure Facility: Consultation Paper*, November 2015, p. 6.

165 DIIS, *Northern Australia Infrastructure Facility: Consultation Paper*, November 2015, p. 4.

166 Maxima Opportunity, *Submission 22*, p. 2.

167 MPA, *Submission 18*, p. 1; WADF, *Submission 23*, p. 3.

168 Challenger Institute of Technology, *Submission 5*, p. 1.

to transform an unused facility at Mumbannar near Broome into a hatchery, however this had been unsuccessful.[169]

4.138 As noted above, the ACWA suggested that hatcheries were an example of infrastructure where government assistance would be particularly beneficial. The NTDPIF reported that it had previously operated a commercial hatchery to supply the former barramundi farm on the Tiwi Islands with juvenile stock.[170]

4.139 The ACWA suggested that having an aquaculture feed mill in Northern WA would be 'extremely valuable to the industry' but recognised that it would be a very capital intensive operation.[171] Humpty Doo Barramundi estimated that a feed mill would probably need to generate 100 000 tonnes per annum of food to be viable and that local waste materials, from both animal and vegetable farming, could be used to generate feed.[172]

Marketing

4.140 The DoA stated that 'Australia's strength is in producing safe, sustainable, high quality and high-value products such as oysters, salmon, tuna and prawns'.[173] Austrade observed that this was a definite advantage for marketing aquaculture products in Asia.[174]

4.141 The DoA suggested that Australian aquaculture products could potentially compete in export markets as premium products but that it would be essential that they capitalise 'on Australia's clean, green, sustainable production methods'.[175] Central to the ability to capitalise on these methods was the 'availability of independent certification services, support and capacity within the Australian Government to certify disease and food safety status'.[176]

4.142 The PPA reported that the WA Government was supporting aquaculture and fisheries business receiving independent third party product

169 Dr Desiree Allen, MPA, *Official Committee Hansard,* Perth 11 June 2015, p. 53.

170 Mr Glenn Schipp, NTDPIF, *Official Committee Hansard*, Darwin 14 July 2015, p. 3.

171 Ms Tina Thorne, Executive Officer, ACWA, *Official Committee Hansard*, Perth, 11 June 2015, p. 20.

172 Mr Robert Richards, Managing Director, Humpty Doo Barramundi, *Official Committee Hansard*, Darwin, 14 July 2015, p. 33.

173 DoA, *Submission 11*, p. 2.

174 Mr David Watson, Senior Investment Specialist, Investment Division, Austrade, *Official Committee Hansard*, Canberra, 15 September 2015, p. 12.

175 DoA, *Submission 11*, p. 6.

176 DoA, *Submission 11*, p. 6.

certifications.[177] The PPA also stated that it was investigating Maritime Stewardship Council (MSC) certification for the pearl industry suggesting that the certification would mean that:

> … every single pearl that bears the MSC label as a certified sustainable Australian South Sea Pearl can have its provenance verified to be from Australia … [and] says that it is demonstrably sustainable and has fantastic environmental credentials that exceed global best practice.[178]

4.143 Cygnet Bay Pearls highlighted the potential of linking marketing and tourism opportunities. Cygnet Bay Pearls reported that its business plan involved greater vertical integration where it sold direct to customers, and incorporated tourism and dining experiences into its pearl farming operations.[179]

4.144 Cygnet Bay Pearls recommended the creation of a 'Broome Pearl Region' modelled on the successful Margaret River Wine Region and envisioned multiple pearl farms offering tourism facilities. A customer could 'purchase their pearl earrings from one farm and a matching pendant from another, purchasing pickled pearl meat to send home at one and eat fresh pearl meat pasta at another.'[180] The benefit of a pearl region would be that it would:

> … raise awareness and demand for our industry and its product both domestically and internationally whilst offering an entirely new layer of attraction and appeal to the tourism industry of Broome and the Kimberley.[181]

Country of Origin Labelling

4.145 In 2006, country of origin labelling (CoOL) was introduced into Australia for all seafood sold through the retail sector.[182] Food that is made for immediate consumption, including in dining establishments such as restaurants, cafes, and clubs, is exempt from CoOL.[183]

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177 PPA, *Submission 26*, p. 9.

178 Mr Aaron Irving, Executive Officer, PPA, *Official Committee Hansard*, Darwin, 14 July 2015, p. 24.

179 Cygnet Bay Pearls, *Submission 27*, pp. 6-7.

180 Cygnet Bay Pearls, *Submission 27*, p. 7.

181 Cygnet Bay Pearls, *Submission 27*, p. 7.

182 Mr Robert Fish, Chair, Northern Territory Seafood Council, *Official Committee Hansard*, Brisbane, 27 August 2015, p. 1.

183 Food Standards Australia New Zealand, 'Country-of-origin labelling' December 2013, http://www.foodstandards.gov.au/consumer/labelling/coo/Pages/default.aspx Accessed 26 October 2015.

4.146 In 2008, the Northern Territory removed the food service industry's exemption from CoOL. Currently all seafood sold in the NT, including in restaurants and other dining outlets, is required to identify whether the product originates in Australia or is imported.[184]

4.147 In December 2014 the Australian Senate Rural and Regional Affairs and Transport References Committee (RRATRC) completed an inquiry into 'current requirements for labelling of seafood and seafood products'. The RRATRC recommended that:

> … the exemption regarding country of origin labelling under Standard 1.2.11 of the Australia New Zealand Food Standards Code for cooked or pre-prepared seafood sold by the food services sector be removed, subject to a transition period of no more than 12 months.[185]

4.148 The species *Lates calcarifer,* known overseas as Asian Sea Bass, must be sold in Australia as 'barramundi' regardless of where it was produced. The ABFA reported that this created confusion for consumers stating:

> The issues regarding the omission of CoOL are compounded when iconic species are involved, such as barramundi, as to both Australians and international tourists, barramundi means Australian.[186]

4.149 The GFB Fisheries recommended that the term 'barramundi' 'should be recognised for its strong provenance and reserved for fish caught or wholly grown in Australia'.[187] Mainstream Aquaculture, however, suggested that this would be difficult stating:

> 'Barramundi' is an [Aboriginal and Torres Strait Islander] name for 'large-scale river fish' and that name was initially bestowed on a species of fish we have in Northern Australia, called saratoga. It was never actually bestowed on what we now know as barramundi. I think legislating to call barramundi—if I can use that name—that originates from South-East Asia [as] 'Asian sea bass' is going to be difficult from an industry perspective.[188]

184 Mr Robert Fish, NTSC, *Official Committee Hansard*, Brisbane, 27 August 2015, p. 1.

185 Rural and Regional Affairs and Transport References Committee (RRATRC), *Current requirements for labelling of seafood and seafood products*, Australian Senate, Canberra, December 2014, p. 28.

186 ABFA, *Submission 3.1*, p. 1.

187 GFB Fisheries, *Submission 29*, p. 1.

188 Mr Boris Musa, Mainstream Aquaculture, *Official Committee Hansard*, Townsville, 26 August 2015, p. 34.

Benefits for Producers

4.150 There was widespread agreement amongst aquaculture producers that removing the exemption from CoOL for the food service industry would stimulate growth in the industry. The primary benefit for domestic producers is that CoOL would increase their ability to compete with imported products that generally have lower production costs. For this reason the Northern Territory Seafood Council (NTSC) nominated CoOL as its 'key issue' stating:

> It will not matter how much we limit the cost of getting into the business if we cannot sell into [the food services] sector. There is no way we can compete on price; no-one is ever going to claim that we can. Once the labels are there, we do not need to.[189]

4.151 Humpty Doo Barramundi supported this view:

> The reality is, we have high costs of production; we cannot compete on cost of production at this stage in the industry's maturity. And we are being encouraged to use brand Australia, and export et cetera—but we cannot differentiate our product in our own market. Clearly, the consumers want it. And I think it is fair to the producers—because we carry the burdens that we do—that we should be allowed to differentiate.[190]

4.152 The NTSC, ABFA and APFA all highlighted that, since the introduction of CoOL in the retail sector, the seafood industry had made significant investment in improving traceability and labelling throughout the supply chain.[191] In the food services sector, however, this investment was not benefitting producers or restaurant customers as the seafood is labelled 'to the back door of the restaurant, and then somewhere between the back door and the menu it gets lost.'[192]

4.153 The ABFA stated that a side-effect of the absence of CoOL was that any marketing undertaken for barramundi could, unintentionally, also be promoting imported barramundi.[193] The NTSC also noted this issue reporting that since the introduction of CoOL in the Northern Territory its

189 Mr Robert Fish, NTSC, *Official Committee Hansard*, Brisbane, 27 August 2015, p. 3.

190 Mr Robert Richards, Managing Director, Humpty Doo Barramundi, *Official Committee Hansard*, Darwin, 14 July 2015, p. 29.

191 Mr Robert Fish, NTSC, *Official Committee Hansard*, Brisbane, 27 August 2015, p. 3; Mr Marty Phillips, ABFA, *Official Committee Hansard*, Cairns, 24 August 2015, p. 25; Ms Helen Jenkins, Executive Officer, APFA, *Official Committee Hansard*, Brisbane, 27 August 2015, p. 13.

192 Ms Helen Jenkins, APFA, *Official Committee Hansard*, Brisbane, 27 August 2015, p. 13.

193 Mr Marty Phillips, ABFA, *Official Committee Hansard*, Cairns, 24 August 2015, p. 22.

members had been much more willing to commit funds to marketing campaigns.[194]

4.154 Mainstream Aquaculture, which sells both barramundi grown in Australia and barramundi grown in Singapore, supported CoOL and was a 'big believer in having an informed consumer'.[195] When asked about how its barramundi grown in Singapore was labelled, Mainstream Aquaculture replied:

> We supply large distributors who then supply wholesalers who then supply the hospitality industry. So do we know what the restaurateur is doing with respect to his menu? Unfortunately we do not. We would like to. We would like them to be obliged to put 'Product of Singapore' on there.[196]

Country of Origin Labelling for Pearls

4.155 Despite not being subject to the same legislative framework as seafood CoOL was also a significant issue for pearl producers. Cygnet Bay Pearls stated that instituting CoOL was, in the short to medium term, 'definitely the highest priority to ensure continued activity and investment in the [pearl] industry.'[197] The introduction of hatchery technology overseas and the impacts of disease in the Australian industry had removed the Australian pearl industry's key competitive advantages over low-cost overseas producers. Given this, Cygnet Bay Pearls highlighted the increased importance of CoOL stating:

> There is one last niche available to the Australian industry—the premium consumers are prepared to pay for the provenance of an Australian pearl. If the Australian producers could realise that premium, the competitive advantage could insulate us from other 'low cost' SE Asian producers in perpetuity. The last few producers are actively pursuing this strategy, however in the absence of effective tools to enforce that differentiation at point of sale our efforts are in isolation and virtually impossible to achieve.[198]

4.156 The main impediment to Australian pearl businesses benefitting from the premium consumers are willing to pay for their product is the practice of

194 Mr Robert Fish, NTSC, *Official Committee Hansard*, Brisbane, 27 August 2015, p. 5.

195 Mr Boris Musa, Mainstream Aquaculture, *Official Committee Hansard*, Townsville, 26 August 2015, p. 34.

196 Mr Boris Musa, Mainstream Aquaculture, *Committee Hansard*, Townsville, 26 August 2015, p. 39.

197 Cygnet Bay Pearls, *Submission 27*, p. 9.

198 Cygnet Bay Pearls, *Submission 27*, p. 8.

imported pearls being misleadingly marketed as Australian pearls. Cygnet Bay Pearls stated:

> … misleading sales techniques leveraging off our industry's provenance are widespread across domestic retail, domestic wholesale and international wholesale markets … Whilst these sales techniques are deceptive and immoral the fact that our Australian pearl brand is falsely utilised in this way reinforces the intrinsic value our industry's product has which is currently not being utilised to drive investment and value back into our production companies.[199]

Benefits for Consumers

4.157 The NTSC reported that the wholesale price of imported barramundi was about half the price of Australian barramundi and that this translated to about a $2 to $3 difference per serving. Barramundi is often the most expensive dish on a menu despite most commonly being made with imported fish. The NTSC suggested this was only possible because customers assumed the barramundi was an Australian product. This enabled food service industries to take the $2 to $3 differential as profit rather than passing the lower cost on to customers.[200] The NTSC estimated this 'hidden gain' could be worth over a billion dollars to the food service industry and suggested this was coming at a direct cost to consumers and Australian producers.[201]

4.158 The GFB Fisheries also emphasised the role of CoOL could play in protecting consumers by providing them with more accurate information stating it was an issue 'about truth in labelling. It is about honesty. It is about not ripping off consumers.'[202]

4.159 For consumers the benefits of CoOL are not only that it should help ensure they are charged the appropriate price for seafood but also that it should help them make more informed purchase choices. Humpty Doo Barramundi highlighted the benefits of helping consumers make informed choices by noting the wide variety of reasons people may have a preference for purchasing Australian seafood stating:

> I think that Australians want to buy Australian product for a range of different reasons. Some will do it to support Australian small businesses and Australian jobs; some may be concerned about

199 Cygnet Bay Pearls, *Submission 27*, p. 9.

200 Mr Robert Fish, NTSC, *Official Committee Hansard*, Brisbane, 27 August 2015, pp 2, 4.

201 NTSC, *Submission 32*, p. 2.

202 Dr Kenneth Chapman, GFB Fisheries, *Official Committee Hansard*, Cairns, 24 August 2015, p. 17.

> food safety issues; some may be concerned about eating quality issues; some may be concerned about other issues, such as the sustainability of the resource, whether slave labour is being used, whether there is malachite green in the production …[203]

The Northern Territory Experience

4.160 The RRATRC inquiry into seafood labelling found that the experience of instituting CoOL in the food services industry in the Northern Territory had been predominantly positive. Many customers had been initially surprised to discover that products such as barramundi were not always Australian and the change had increased customer knowledge of the provenance of seafood products. Customers had also shown a willingness to pay a premium to purchase local products.[204]

4.161 Despite initial reservations, representatives of the food service industries had also reported experiencing benefits from the introduction of CoOL in the Northern Territory. The proprietor of Deck Bar, The Arch Rival and Nirvana told the RRATRC Inquiry that:

> I can tell you that our initial reaction, like most, would have just been that it was one more damn regulation we had to follow… We got over it fairly quickly when the customers started to ask these questions. They wanted to know where their product came from, they wanted to know if it was local or if it was imported and they would show … with where they spent their money … what they wanted.[205]

Concluding Comment

4.162 Northern Australia offers unique features which provide an opportunity to expand aquaculture. These are: a pristine environment, suitable growing conditions, suitable species, and a population willing to be involved in aquaculture.

4.163 Aquaculture is set to expand in Western Australia and the Northern Territory and possibly in Queensland, and this will increase the need for a

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203 Mr Robert Richards, Humpty Doo Barramundi, *Official Committee Hansard*, Darwin, 14 July 2015, p. 30.

204 RRATRC, *Current requirements for labelling of seafood and seafood products*, Australian Senate, Canberra, December 2014, p. 14.

205 Mr Jason Hanna, Owner of Deck Bar, The Arch Rival and Nirvana, in RRATRC, *Current requirements for labelling of seafood and seafood products*, Australian Senate, Canberra, December 2014, p. 15.

skilled workforce. Training institutes will need to provide industry focused courses to train employees to meet the anticipated demand from expanding aquaculture ventures.

4.164 Opportunities exist for increasing aquaculture related research of relevance to Northern Australia. The Committee has seen first hand the impact of oyster oedema disease on the pearl oyster industry. There should be an increased research effort to identify the causative agent and the remedial action which can be taken. The effect of seismic testing on non-mobile species such as oysters is also of concern.

4.165 The Committee received evidence that the Fisheries Research and Development Corporation has considered a 'northern node' for funnelling research into Northern Australian issues, but with no outcome. The Committee believes that introducing such a node would provide an avenue for funding research relevant to Northern Australia.

4.166 The JCU is increasingly becoming a hub for aquaculture research and training for Northern Australia and the Committee encourages this development.

4.167 The Committee is concerned with evidence that the outcomes of publicly funded research may not be being disclosed. The Committee considers that, as a matter of principle, disclosure through published papers should be the norm, unless dictated by exceptional circumstances.

4.168 Aboriginal and Torres Strait Islander communities comprise a large proportion of the population of Northern Australia and it is important to involve them in aquaculture enterprises. The Committee draws attention to the principles developed by AIMS and considers this should be a template for involving Aboriginal and Torres Strait Islander communities in aquaculture. The Committee is encouraged by the positive example of engagement with Aboriginal and Torres Strait Islander people demonstrated by industries involved in crocodile farming and trepang ranching.

4.169 The Committee is confident aquaculture companies are taking steps to reduce their environmental impact and comply with environmental regulatory requirements. Adversely affecting the environment is not in the best interests of an industry which benefits from a 'clean green' marketing image.

4.170 In its previous report, *Pivot North*, the Committee recognised the need for significant infrastructure investment in Northern Australia. There is a need to develop infrastructure to assist the development of aquaculture in the Kimberley to service the Kimberley Aquaculture Development Zone and in the Northern Territory to service the proposed Project Sea Dragon. Such infrastructure would benefit other industries and assist in further

developing Northern Australia. Other aquaculture development zones should be assisted by infrastructure developments when they are near to being declared.

4.171 Pests and diseases are an ongoing risk to aquaculture and rapid diagnosis is essential to addressing outbreaks. There is a lack of pest and disease diagnosis facilities in Northern Australia and in particular in North Queensland. Siting such a facility on a university campus would enable access to a broad range of scientific expertise which could be harnessed to serve other primary industries.

4.172 Other infrastructure such as hatcheries, feed mills and fish processing facilities will be needed as the aquaculture industry expands in Northern Australia. Developing these facilities should be led by industry demand. The Northern Australia Infrastructure Facility may be an appropriate avenue for providing funding because it involves a long term industry commitment.

4.173 Over 60 per cent of seafood consumed in Australia is imported and this offers a great opportunity for import substitution. An obstacle is the exemption from country of origin labelling requirements for food prepared for immediate consumption, including in dining establishments such as restaurants, cafes, and clubs.

4.174 This is not the case in the Northern Territory. Removing the country of origin labelling exemption in the rest of Australia would provide an important stimulus to the aquaculture industry in Northern Australia.

4.175 The Committee believes the evidence supporting the removal of this exemption is compelling, and in particular the evidence from Northern Territory food outlets. Consumers should know where the food they eat is produced so that they can make informed choices.

4.176 The Committee supports the recommendation of the Senate Rural and Regional Affairs and Transport References Committee that the exemption for country of origin labelling under Standard 1.2.11 of the Australia New Zealand Food Standards Code for cooked or pre-prepared seafood sold by the food services sector be removed.

4.177 Consideration should also be given to introducing country of origin labelling for aquaculture products such as pearls so that consumers are not misled as to their origin. This country of origin labelling could be extended to include crocodile teeth because Australia imports significant numbers of crocodile teeth from Papua New Guinea. Although the Committee has not received evidence on this issue, retailers might be allowing purchasers to believe imported crocodile teeth are an Australian product.

Recommendations

Recommendation 7

4.178 **The Committee recommends that the Fisheries Research and Development Corporation should consider introducing a 'northern node' as an avenue for providing funding research relevant to Northern Australia.**

Recommendation 8

4.179 **The Committee recommends that the Australian Government provide funding assistance for developing road and port infrastructure to service the Kimberley Aquaculture Development Zone and Project Sea Dragon subject to establishing a positive cost-benefit analysis.**

Recommendation 9

4.180 **The Committee strongly recommends that the Australian Government provide funding assistance for the establishment of a pest and disease diagnosis facility in Northern Queensland.**

Recommendation 10

4.181 **The Committee recommends that the Australian Government, through COAG, remove the exemption from country of origin labelling requirements under Standard 1.2.11 of the Australia New Zealand Food Standards Code for cooked or pre-prepared seafood sold by the food services industry.**

Recommendation 11

4.182 **The Committee recommends that the Department of Industry reports within 12 months on the feasibility of introducing country of origin labelling for aquaculture products such as pearls and crocodile teeth.**

Hon Warren Entsch MP
Chair

2 February 2016

A

Appendix A – Submissions and Exhibits

1 Queensland Crayfish Farmers Association Inc.

1.1 Queensland Crayfish Farmers Association Inc.

1.2 Queensland Crayfish Farmers Association Inc.

2 Amateur Fishermen's Association of the Northern Territory Inc.

3 Australian Barramundi Farmers Association

3.1 Australian Barramundi Farmers Association

4 Seafarms Group Ltd

5 Challenger Institute of Technology

6 Pacific Reef Fisheries (Australia) Pty Ltd

6.1 Pacific Reef Fisheries (Australia) Pty Ltd

7 The Shire of Broome

7.1 The Shire of Broome

8 Aquaculture Council of WA

9 Burdekin Shire Council

10 Australian Prawn Farmers Association

11 Australian Government Department of Agriculture

12 Great Barrier Reef Marine Park Authority

12.1 Great Barrier Reef Marine Park Authority

13 Department of Primary Industry and Fisheries Northern Territory

13.1 Department of Primary Industry and Fisheries Northern Territory

14 James Cook University

14.1 James Cook University

15 The Shire of Derby West Kimberley

16 Tasmanian Seafoods Pty Ltd

17 CSIRO

18 Marine Produce Australia

19 Mr Kenneth A Robinson

19.1 Mr Kenneth A Robinson

20 Clipper Pearls Pty Ltd

21 Australian Government Department of Environment

22 Aarli Mayi Aquaculture Project

22.1 Aarli Mayi Aquaculture Project

23 Western Australian Department of Fisheries

24 The PEW Charitable Trusts

24.1 The PEW Charitable Trusts

25 BMT Oceanica Pty Ltd

26 Pearl Producers Association

27 Cygnet Bay Pearls

28 Mr Graeme Watt

29 GFB Fisheries

30 Australian Lawyers Alliance

31 Australian Institute of Marine Science (AIMS)

31.1 Australian Institute of Marine Science (AIMS)

32 Northern Territory Seafood Council

33 PTT Exploration and Production (PTTEP)

34 Charles Darwin University

35 Finfish

36 Department of Foreign Affairs and Trade

36.1 Department of Foreign Affairs and Trade

Exhibits

1. Queensland Competition Authority

Draft Report: Aquaculture Regulation in Queensland, July 2014

2. Environmental Protection Authority

Report and recommendations of the Environmental Protection Authority: Kimberley Aquaculture Development Zone, Minister for Fisheries, February 2014.

a) Environmental Assessment Guidelines: Environmental Assessment Guideline for Protecting the Quality of Western Australia's Marine Environment, Environmental Protection Authority Western Australia, March 2015.

b) Media Release: Zoning provides future security for aquaculture, Friday 16 December 2011, Department of Fisheries WA

3 The PEW Charitable Trusts

The Modern Outback: Nature, people and the future of remote Australia

4 Aquaculture Council of Western Australia

Report to the Minister for Fisheries on the Review of Legislative Arrangements in the Aquaculture Industry in Western Australia, September 2003, by Anna Ciffolilli.

a) Determining the need for a Multi-species Mollusc Hatchery in Western Australia, ACWA Study Report by RMB Aqua, July 2014.

5 Pearl Producers Association

Figure and Article: Initial Bilby 2D survey design [EP application 23 December 2014]

6 Charles Darwin University, Qualification descriptors from for the 3 VET aquaculture qualifications Charles Darwin University:

SFI20111 Certificate II in Aquaculture

a) SFI30111 Certificate III in Aquaculture

b) SFI40111 Certificate IV in Aquaculture

7 Department of Primary Industry and Fisheries Northern Territory

Fishery Status Reports 2012, Fishery Report No. 113, July 2014

8 Mr Bob Richards

Skretting Australia: Annual sustainability report 2014

9 Ridley Corporation Limited

What we put in our barramundi feed.

a) Sustainability Procurement Policy for Marine products, December 2013

10 Northern Territory Seafood Council

Menus from Nick's Seafood and from the Wok restaurants

11 Koorana Crocodile Farm

Koorana Crocodile Farm, Crocodile Training Course

a) Crocodile Awareness, a course conducted by John Lever for those who need to know

12 Great Barrier Reef Marine Park Authority

Approval and conditions for Guthalungra Prawn Farm

a) Article: A synthesis of dominant ecological processes in intensive shrimp ponds and adjacent coastal environments in NE Australia, 2003

b) Fisheries Research and Development Corporation Project 97/212: Quantifying and Predicting the Impact of Prawn Effluent on the Assimilative Capacity of

Coastal Waterways and Aquaculture CRC Ltd Project E1: Pond and Effluent Management.

c) Article: Modelling and Visualizing the Fate of Shrimp Pond Effluent in a Mangrove-fringed Tidal Creek, 1999

13 James Cook University

Concept Proposal – September 2015, Australian tropical biosecurity network

14 Hartley's Crocodile Adventures

Letter from the Hon Dr Steven Miles MP Chief of Staff to Mrs Angela Freeman, Hartley s Crocodile Adventures.

15 Austrade

Australian Trade Commission (Austrade), Northern Australia: Emerging opportunities in an advanced economy, Australian Government, May 2015, Sydney

16 Department of the Environment

Department of Sustainability, Environment, Water Population and Communities, Environmental Protection and Biodiversity Conservation Act 1999: Environmental Offsets Policy, Canberra, October 2012.

a) Department of the Environment, EPBC Act referral guidelines for the Outstanding Universal Value of the Great Barrier Reef World Heritage Area, Canberra, May 2014.

b) Department of the Environment, Matters of National Environmental Significance: Significant impact guidelines 1.1: Environment Protection and Biodiversity Conservation Act 1999, Canberra, 2013.

17 CSIRO

Burford, M., Jackson, C., Trott, L., McKinnon, D., Preston, N., 'Review of the Guthalungra Aquaculture Facility (Pacific Reef Fisheries (Bowen) Pty Ltd), Guthalungra, Queensland', 9 May 2008

B

Appendix B – Hearings and Witnesses

Tuesday, 9 June 2015 – Broome, WA

Broome and Derby Regional Shire Councils

Mr Stephen Gash, Chief Executive Officer, Shire of Derby/West Kimberley

Mrs Elsia Archer, Shire President, Shire of Derby/West Kimberley

Broome Chamber of Commerce and Industry

Ms Rhondda Chappell, President

Cygnet Bay Pearls and Clipper Pearls Pty Ltd

Mr James Brown, General Manager, Cygnet Bay Pearls

Mr Patrick Moase, General Manager, Clipper Pearls Pty Ltd

Kimberley Aboriginal Aquaculture Corporation (Derby)

Mr Charles Prouse, Board Member

Wednesday, 10 June 2015 – Broome, WA

Kimberley Training Institute, Aquaculture Centre

Mr Jeffrey Cooper, Portfolio Manager

Thursday, 11 June 2015 – Perth, WA

Environment Protection Authority

Dr Ray Masini, Manager, Marine Ecosystems Branch

BMT Oceanica

Mr Mark Bailey, Co- Managing Director

Dr Glenn Shiell, Associate Principal

Aquaculture Council of WA

Ms Tina Thorne, Executive Officer

Mr Stephen Davies, Vice Chairman

Pew Charitable Trusts

Mr Tim Nicol, Kimberley Manager

Indian Ocean Fresh

Ms Erica Starling, Managing Director

Mr Graeme Watt

Maxima Opportunity on behalf of Aarli Mayi Pty Ltd Aquaculture Project

Mr John Hutton, Managing Director

Mr Steven Gill, General Manager

Marine Produce Australia Pty Ltd

Dr Desiree Allen, Managing Director

Commonwealth Scientific and Industrial Research Organisation

Dr Mat Vanderklift, Research Group Leader, Oceans and Atmosphere Flagship

Tuesday, 14 July 2015 – Darwin, NT

Northern Territory Department of Primary Industry and Fisheries

Mr Glenn Schipp, Director, Fisheries and Aquaculture

Charles Darwin University

Mr Chadd Mumme, A/g Team Leader of Horticulture and Aquaculture for Primary Industries

Mrs Michelle Lewis, Educational Program Manager – School of Primary Industries

Pearl Producers Association

Mr Aaron Irving, Executive Officer

Humpty Doo Barramundi

Mr Robert Richards, Managing Director

Crocodylus Park and Crocodile Farms NT

Professor Graham Webb, Director, Wildlife Management International Pty Ltd. (Crocodylus Park)

Mr Michael Burns, Managing Director, Porosus Pty Ltd (Crocodile Farms NT)

Tropical Aquaculture Australia

Mr Phil Elsegood, Director

Tasmanian Seafoods

Mr Grant Leeworthy, Fisheries Research Manager

Mr Chauncey Hammond, Commercial Advisor

Mr Luke Turner, Aquaculture Manager

Mr Kenneth Robinson and Mr John Robinson

Amateur Fishermen's' Association of the Northern Territory

Mr Tristan Sloan, Executive Officer

Monday, 24 August 2015 – Cairns, Qld

Reef and Rainforest Research Centre

Ms Sheriden Morris, Managing Director

Hartley's Crocodile Adventures

Mrs Angela Freeman, Co-owner

GFB Fisheries

Dr Kenneth Chapman, Director

Australian Barramundi Farmers Association

Mr Marty Phillips, President

Finfish Enterprise

Mr Alan Wigan, Chief Executive Officer and Shareholder

Mr Peter Hay, Director and Shareholder

Dr Richard Knuckey, General Manager

Wednesday, 26 August 2015 – Townsville, Qld

James Cook University

Professor Christopher Cocklin, Senior Deputy Vice Chancellor

Professor Dean Jerry, Head of Aquaculture and Fisheries

Professor Rocky De Nys, Aquaculture Department

Australian Institute of Marine Science

Mr David Mead, Chief Operating Officer

Great Barrier Reef Marine Park Authority

Mr Bruce Elliot, General Manager, Biodiversity Conservation and Sustainable Use

Mr Leigh Gray, Manager, Water Quality

Queensland Crayfish Farmers Association

Mr John Stevenson, President

Mainstream Aquaculture

Mr Boris Musa, Managing Director

Thursday, 27 August 2015 – Brisbane, Qld

Northern Territory Seafood Council

Mr Robert Fish, Chair

Australian Prawn Farmers Association and Aquaculture Association of Queensland Inc.

Ms Helen Jenkins, Executive Officer, Australian Prawn Farmers Association

Mr Robert Bartley, President, Aquaculture Association of Queensland

Seafarms Group

Dr Chris Mitchell, Executive Director

Koorana

Mr John Lever

Pacific Reef Fisheries

Mr John Moloney, General Manager

Tuesday, 15 September 2015 – Canberra

Department of Agriculture

Mr Ian Thompson, First Assistant Secretary

Mr Gordon Neil, Assistant Secretary

Department of Foreign Affairs and Trade/Austrade

Ms Tegan Brink, Assistant Secretary, Goods and Investment Branch, Office of Trade Negotiations, DFAT

Mr Peter Roberts, Assistant Secretary, North Asia Goods Branch, Free Trade Agreement Division, DFAT

Mr Chris Tinning, Assistant Secretary, Economic Advocacy and Analysis Branch, Trade Investment and Economic Diplomacy Division, DFAT

Mr David Watson, Senior Investment Specialist, Investment Division, Austrade

Ms Jane Madden, General Manager, Investment Division, Austrade

Department of the Environment

Mr Dean Knudson, First Assistant Secretary, Environment Standards Division

Mr James Tregurtha, Assistant Secretary, Environment Standards Division

Ms Rachel Parry, Assistant Secretary, Reef Branch

Mr Shane Gaddes, Assistant Secretary, Environment Standards Division

Commonwealth Scientific and Industrial Research Organisation

Dr Nigel Preston, Research Director, Aquaculture

Dr Peter Stone, Research Director, Land and Water

Tuesday, 13 October 2015 – Canberra

Mars Petcare

Ms Lisa Maguire, Director, Corporate Affairs

Ms Penny Campbell, Senior Commercial Manager, Asia Pacific

Tuesday, 10 November 2015 – Canberra

Great Barrier Reef Marine Park Authority

Dr Russell Reichelt, Chairman and Chief Executive