Aquaculture and Wild Catch Industry Reference Committee

IRC Skills Forecast and Proposed Schedule of Work

2019–2022

Prepared on behalf of the Aquaculture and Wild Catch Industry Reference Committee for the Australian Industry Skills Committee (AISC)

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Purpose

The Industry Reference Committee (IRC) Skills Forecast and Proposed Schedule of Work identifies proposed Vocational Education and Training (VET) training package development work necessary to meet the needs of industry and sets out the evidence of that need. The Australian Industry and Skills Committee (AISC) consider this information in prioritising and commissioning training package development work.

The IRC annual review of the Skills Forecast and Proposed Schedule of Work allows the identification of priority projects and provides the likely timing of training package development work over the next four years.

The Skills Forecast and Proposed Schedule of Work needs to provide the AISC with sufficient information on each project to consider:

- What work is to be commissioned;
- Clear evidence of employer and industry need;
- Alignment to Ministers' Priorities (see Appendix).

The Skills Forecast and Proposed Schedule of Work is to be developed in line with:

- Standards for Training Packages 2012;
- Training Package Products Policy;
- Training Package Development and Endorsement Process Policy.

This Skills Forecast presents the latest industry intelligence and resulting schedule of work for priority industry skills areas of the Aquaculture and Wild Catch IRC.

This document is not intended to identify and address every challenge faced across all industry sectors; it identifies and addresses the issues, challenges and opportunities that industry has identified as 'priority' with regards to skills for this stage of the schedule and acts as a resource and reference for industry and associated skills, learning and accreditation bodies seeking to act upon them.

Additional detailed data and information concerning industry skills needs across all sectors covered by the Aquaculture and Wild Catch IRC, including information from previous Skills Forecasts, can be found on the Skills Impact website www.skillsimpact.com.au and is available to Industry, RTO and consumers in line with Ministerial priorities.

Method & Structure

This Skills Forecast and Proposed Schedule of Work was developed through research of national and industry data sources, and ongoing input from IRC members and key stakeholders.

IRC members undertake consultation with industry, and guide consultation processes undertaken on their behalf throughout each year. Consultation may include personal meetings, conference attendance, organised workshops, surveys, project feedback collection and unsolicited contributions sent to the SSO.

The Skills Forecast structure is guided by the Australian Industry Skills Commissions (AISC), which requires the following to be included:

- **Sector overview:** Brief description of the industry and industry sub-sectors, the Training Package, and current challenges and opportunities.
- **Employment & Skills Outlook:** Overview of the data, strategies and policies relevant to the industry.
- **Key Changes and Proposed Responses:** identifying the drivers for change from industry (e.g. occupations, technology, emerging markets), regulation, and nationally important policies, and proposed responses including the impact on stakeholders.
- **Consultation Undertaken:** Information on the consultation previously undertaken to support the proposed responses, including issues and sensitivities raised.
- **Proposed Schedule of Work:** The current proposed schedule of work over the next four-year period as modified from previous plans as a result of consultations and the need to meet changing priorities
- **Project Details:** details of proposed projects proposed for approval of the AISC to be undertaken in 2019 – 2020.

Administrative Information

Name of applicable Industry Reference Committees (IRCs): Aquaculture and Wild Catch

Name of applicable Skills Service Organisation (SSO): Skills Impact

This IRC Skills Forecast and Proposed Schedule of Work 2019–2022 has been produced with the assistance of funding provided by the Commonwealth Government through the Department of Education and Training.

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EXECUTIVE SUMMARY

The Aquaculture and Wild Catch (AWC) Industry Reference Committee (IRC) is currently overseeing the finalisation of projects that will produce the most significant update of the national *Seafood Industry Training Package* in almost a decade. The update involved extensive industry consultation and input into all of the accredited qualifications and units of competency to better support modern job outcomes in the industry, which in some sectors, have changed considerably.

Once approved and implemented, the updated Training Package will need to be taught for a period prior to further review and identification of new skills, competencies and job functions.

The *AWC IRC* has been instrumental in researching and identifying industry stakeholders for consultation during 2018-2019 to complete current priority projects and identify new priority areas for the 2019-2022 period.

Key drivers for identifying priorities include:

- Consultation with industry by IRC members and Skills Impact (under the guidance of the IRC), including public consultations on the projects currently under development and targeted consultation for this Skills Forecast;
- Government Policy, as outlined in the *2017 National Aquaculture Strategy*, which seeks to double the value of Australia's aquaculture industry by 2027. This strategy is supported in material respects within the scope of the AISC/IRC by Federal, State and NT Governments;
- The findings and recommendations of the 2016 *Productivity Commission Inquiry Report* on *Marine Fisheries and Aquaculture*;
- Research undertaken under the guidance of the IRC, including industry intelligence research;
- Consultations with vocational skills, learning and accreditation experts with knowledge of the aquaculture and wild fishery sectors, including RTOs and industry trainers.

A key finding during the current projects was the significant economic contribution, international recognition and job growth opportunities within the growing crocodile farming sector in northern Australia. The IRC identified that two units of competency that were proposed for deletion should be maintained, and that skills gaps addressing crocodile management, behaviour and egg harvesting are priority areas going forward.

Further, industry has identified 'distant (remote) operations' in aquaculture, wild catch, fishing and fisheries compliance as a priority area. Rapid technological change is driving or contributing to productivity, catch sustainability, environmental control, stock and habitat welfare, and biosecurity. The increasing capacity of large businesses and the decreasing cost of specialised technology is leading to broader uptake, which is redefining workplace tasks. Distant operations (including remote control centres) also have the capacity to be established in Indigenous and rural communities, helping to meet government priorities in these areas relating to local economies, employment, and training opportunities.

The IRC acknowledges the importance of Indigenous involvement in the development of all aspects of the aquaculture and wild catch industries. This includes the potential for commercial fishing using customary methods and the development of enterprises, partnerships or agreements for fishing within areas covered by Indigenous Land/Sea Titles and Claims. The IRC recommends an initial project to fully understand the scope of the opportunities, the skills and competency requirements, the best methods of development working with Indigenous communities, and the potential for the SFI or other training packages to support job outcomes.

The IRC remains concerned about the barriers to training that limit uptake and believes opportunities may exist with the increasing investment in aquaculture to encourage enrolments. The IRC are also monitoring changes to Country of Origin Labelling. These issues may form the basis of future projects.

Proposed Schedule of Work 2019–2022

2019-2020	**Project 1: Crocodile Farming** Development of new qualifications in crocodile farming to support an emerging sector of the Australian economy, which is showing growth in export earnings and becoming a significant factor influencing labour markets and the economies of remote areas in the Northern Territory, Western Australia and Queensland. **Project 2: Skills for Future Fishtech & Aquabotics in real-time, distant operations** Review identified Units of Competency to ensure that the skills required for an emerging way of working, real-time distant operations, are incorporated into existing units or covered by new units. The project does not include the review of qualifications but may result in the development of new Skill Sets. The review will include identification of opportunities to import relevant units and Skill Sets from the MAR Maritime Training Package. **Project 3: Indigenous Consultation for future AWC IRC/SFI Projects** Undertake research and consultation to maximise the chances of future AWC projects aimed at taking advantage of new and emerging markets, improving training and job outcomes (particularly in remote areas and Indigenous communities) and improving industry skills in negotiations and partnerships with Indigenous business and community organisations in both industry and training sectors.
2020-2021	**Project 1: Project to be developed based on the initial results of the indigenous Consultation for future AWC IRC/SFI Projects work** A project will be designed to build on the work carried out in the 2019-2020 Project 3: Indigenous Consultation for future AWC IRC/SFI Projects **Project 2: Country of Origin Labelling** During 2019-2020, a project will be scoped to address potential changes and updates in Australian and international Country of Origin Labelling, including updates made to other Training Packages. **Project 3: Barriers to Training** During 2019-2020, a project will be scoped to address barriers to training faced by the Industry, including the lack of RTOs with training on scope and access to training in Indigenous and remote Australian locations. To support the National Aquaculture Strategy and the recommendations of the Productivity Commissions Report, opportunities arising from new infrastructure developments and industry trends will be assessed.
2021-2022	**Project 1: Update of SFI Training package components based on implementation feedback** Enact updates based on feedback from the introduction and roll-out of the 2017-2019 Training package changes. **Project 2: Project to be developed based on the initial results of the Indigenous Consultation for future AWC IRC/SFI Projects work** Development of Training Package components to support training and development opportunities for Indigenous Communities and enterprises.
2022-2023	**Project 1: TBA** Projects to be identified based on feedback from previously completed projects.

Aquaculture and Wild Catch IRC

The Aquaculture and Wild Catch IRC has responsibility for national Training Package qualifications relevant to the seafood industry, which has four main sectors: aquaculture (offshore, inshore and onshore), fishing (commercial), seafood processing and wholesaling, and fisheries compliance.

Aquaculture and Wild Catch qualifications are included in the *SFI Seafood Industry Training Package*.

The Chair of the Aquaculture and Wild Catch (AWC) IRC is Johnathon Davey and the Deputy Chair is Steven Gill.

Table 1: IRC Membership as at January 2019

Name	Organisation or Area of expertise
Brian Jeffriess	National Aquaculture Council
Tom Cosentino	Southern Rock Lobster Ltd
Rory Byrne	Tasmanian Seafood Industry Council
Trudy McGowan	South Australian Oyster Growers Association
Kade Wakefield	Australian Workers' Union (AWU)
Mathew Richardson	Department of Primary Industries - Fisheries NSW (Regulator)
Andrew Tabor	Expert – Aquaculture
Franca Romeo	Expert – Wild Catch Fishing
Helen Jenkins	Expert – Aquaculture (crustaceans)
Johnathon Davey (Chair)	Expert – Wild Catch Fishing
Lisa Terry	Expert – Seafood Processing and Wholesaling
Mark Cody	Expert – Aquaculture
Steven Gill (Deputy Chair)	Expert – Aquaculture

SECTOR OVERVIEW

Introduction

An objective of the 2017 *National Aquaculture Strategy*[1] is to double the value of Australia's aquaculture industry by 2027, a vision supported in material respects (within the scope of the AISC/IRC) by the Federal, State and NT Governments. The training directions and strategies of the aquaculture and wild catch industry are reinforced by the recommendations of the 2017 *Productivity Commission Inquiry Report into Marine Fisheries and Aquaculture* that focus on industry expansion. Together, training and investment are determined as the drivers of industry prosperity and employment.

The Australian seafood industry is incredibly diverse, operating across estuaries, bays, the continental shelf, oceanic waters and on the high seas to catch a wide range of species. With a coastline spanning approximately 60,000km, including a jurisdiction of 14 million square kilometres, Australia's marine environment covers all the world's climatic zones: tropical, sub-tropical, equatorial, temperate, sub-polar and polar (Antarctic zone). This diversity ensures the enduring richness of opportunities for the seafood industry.

Aquaculture and wild catch are significant industries in Australia, with seafood consumption on the rise as consumers increasingly turn to healthier sources of protein. These sectors are significant employers, especially in regional areas, and further support employment across a range of connected industries, including hospitality and retailing, wherein Australia's world-class seafood is sought by residents and tourists alike. Expansion by aquaculture and wild catch businesses also creates revenue for broader industries, such as transport, construction and technology manufacturing.

Table 2: Seafood industry sector performance

Industry (four-digit ANZSIC)	Revenue	Profit	Wages	Exports	Industry Value Added[2]
Aquaculture	$1.7bn	$176.3m	$356.1m	$25.8m	$617.4m
Fishing	$1.7bn	$144.0m	$124.8m	$974.5m	$355.7m
Seafood Processing	$1.4bn	$112.0m	$96.8m	$980.0m	$234.0m
Fish and Seafood Wholesaling	$4.4bn	$146.1m	$259.9m	-	$451.7m
Total	**$9.2bn**	**$578.4m**	**$837.6m**	**$1.98bn**	**$1.66bn**

Source: IBISWorld Industry Wizard

According to Australian Bureau of Statistics (ABS) data, there are approximately 17,000 people working in aquaculture, fishing, and seafood processing, though the Fisheries Research and Development Corporation (FRDC) asserts that industry employment is consistently under-reported[3]. There are a further 2,300[4] to 5,300[5] people employed in the Fish and Seafood Wholesaling industry (see discussion in the

[1] Department of Agriculture and Water Resources, 2017, National Aquaculture Strategy, Canberra.
[2] Industry value added (IVA) is the contribution by businesses in each industry to gross domestic product (GDP). Put another way, IVA records the market value of the goods and services produced by the industry, with the cost of goods and services used in production subtracted from the total.
[3] ABARES, Australian Fisheries Statistics 2010, Canberra, p33
[4] Australian Bureau of Statistics, 2016, Census of Housing and Population
[5] IBISWorld, 2018, F3604 Fish and Seafood Wholesaling in Australia Industry Report

Employment section). The *Productivity Commission Inquiry Report* states that as much as 50 per cent of all Indigenous people aged 15 years and over participate in customary fishing activities.

The *Seafood Industry Training Package* has 24 qualifications, 217 Units of Competency and 14 Skill Sets. There were 5,766 enrolments in qualifications between 2014 and 2017, although there was an 11 per cent decline in uptake across those four years. During this time, there was a significant proportion of Indigenous enrolees and learners in very remote, remote and outer regional areas (see **APPENDIX 1: SFI TRAINING PACKAGE DATA**).

Sector Description

The aquaculture and wild catch sectors are diverse and demanding, with Australia's fishing zone being the third largest globally[6] and covering every climactic condition. Operations in the sector extend from Australian and Antarctic maritime zones across three oceans, the Indian, Pacific and Southern, to inland aquaculture farms and river fishing. The sector is highly regulated across every level, meaning that businesses must adhere to overlapping international, national, state and local compliance legislation. On a socio-economic level, seafood consumption is steadily increasing – with 'prawns on the barbie' a national icon – yet imports make up more than 70 per cent of all seafood consumed in Australia.

The importance of the sector is being highlighted through recent, high-level releases, including:

- The *Australian Government Commonwealth Fisheries Policy Statement* released in September 2017, and supported by an updated Commonwealth Fisheries Harvesting Statement, Policy and Guidelines (released in November 2018);
- The 2016 Joint Select Committee on Northern Australia report, *Scaling up: Inquiry into opportunities for expanding aquaculture in Northern Australia*;
- The 2017 *Productivity Commission Inquiry Report into Marine Fisheries and Aquaculture*;
- The development and approval of the 2017 *National Aquaculture Strategy*;
- The *National Marine Science Plan 2015 – 2025*, released in August 2015, by the National Marine Science Committee, an advisory body coordinating information-sharing between research institutions, universities, commonwealth and state governments and the broader marine science community;
- CSIRO's extensive work and modelling in the sector, including work across the Asia Pacific in recognition of the complexity of the marine ecosystem, the Australian National Fish Collection, the development of the Atlantis ecosystem Model, the Status of Australian Fish Stocks reports, work on sustaining southern blue fin and albacore tuna, rock lobster, prawns and other species, and development of the scientific toolkit for fisheries management;
- The participation of the Australian Government in six international treaties and agreements establishing regional fisheries management organisations;
- Continuing support for the Australian Fisheries Management Authority and recent legislative change to rename the Indigenous Land Corporation to the Indigenous Land and Sea Corporation, with a responsibility to help Indigenous groups with fishing licences, aquaculture and water allocations.

The aquaculture and wild catch sectors comprise of businesses and agencies that operate in the following sectors:

- Aquaculture (offshore and onshore)

[6] CSIRO, 2015, Research leaves a legacy for Australia's fisheries, viewed February 2019, <https://blogs.csiro.au/ecos/research-leaves-a-legacy-for-australias-fisheries/>

    - Operators farm and breed fish, crustaceans and molluscs
- Wild Catch/Fishing (commercial)
    - Operators generally catch ocean fish and sea life, including finfish, prawns, crustaceans, molluscs, rock lobsters, oysters and pearls
- Seafood processing
    - Companies process and manufacture fish and other seafood. The industry includes businesses that operate vessels that process fish and other seafood (but do not first catch them). It also includes firms that freeze whole finfish, and shell, freeze or bottle oysters
- Seafood wholesaling
    - Operators generally purchase fish and seafood from the aquaculture, fishing and seafood processing industries. Products may be packaged or sold straight to specialist seafood retailers, supermarkets, catering companies, hotels, restaurants and cafes

Additional details on industry sectors can be found on the Skills Impact website www.skillsimpact.com.au

Job roles identified in the current qualifications are:

- Aquaculture Production Hand Assistant
- Aquaculture Leading Hand
- Aquaculture Production Hand
- Aquaculture Business Support Worker
- Aquaculture Maintenance Worker
- Aquaculture Supervisor
- Aquaculture Operations Manager
- Fisheries Operations Manager
- Fisheries Compliance Manager
- Fisheries Compliance Support Worker
- Fisheries Compliance Officer
- Environmental Support Officer (Aquaculture)
- Environmental Management Specialist
- Senior Fisheries Compliance Officer
- Fisher Hand
- Deck Hand
- Senior Deck Hand
- Fishing Master
- Seafood Processing Leading Hand
- Seafood Processing Worker
- Seafood Processing Operation Supervisor
- Seafood Processing Operations Manager
- Seafood Sales and Distribution Salesperson
- Seafood Sales and Distribution Supervisor
- Seafood Sales and Distribution Manager

Emerging job roles gain increasing prominence in the sector as markets develop and challenges and opportunities arise. A priority for the IRC is for roles to support the growing crocodile farming industry, given the challenges of working with one of the world's oldest and most dangerous predators. The increasing utilisation of technology, including the use of Fishtech and Aquabotics in real-time, distant operations is also leading to existing job roles evolving and new roles being created.

Businesses

Despite having the world's third largest fishing zone, Australia's fisheries are small by global standards in terms of production. Many industry operators are under pressure due to Australia's continued reliance upon

seafood imports. Small businesses without the means to compete have been forced to exit the industry. This increases the market share of the leading businesses, with the four largest aquaculture operators accounting for 40 per cent of industry revenue.

As at June 2017, the seafood industry comprised over 7,000 commercial businesses[7] (a 1.3 per cent decrease from June 2016). The majority of industry establishments are small-scale and owner-operated, with around 35 per cent earning less than $50,000 annually[8]. Fishing sector businesses account for 69 per cent of industry businesses (see Table 3).

Table 3: Count of Seafood Industry Businesses

	Business Size			
ANZSIC industry title (four-digit)	**Non-Employing**	**Small: 1-19 Employees**	**Medium: 20-199 Employees**	**Large: 200+ Employees**
Offshore Longline and Rack Aquaculture	357	251	16	0
Offshore Caged Aquaculture	23	11	3	3
Onshore Aquaculture	314	143	18	0
Rock Lobster and Crab Potting	1,104	541	5	0
Prawn Fishing	325	252	3	0
Line Fishing	523	153	5	0
Fish Trawling, Seining and Netting	547	233	11	0
Other Fishing	907	288	11	0
Seafood Processing	79	101	42	0
Fish and Seafood Wholesaling	368	420	68	0
Total	**4,547**	**2,393**	**182**	**3**

Source: 8165.0 Counts of Australian Businesses, including Entries and Exits, Jun 2013 to Jun 2017

When these ABS figures were released, only three businesses were classified as 'large' by virtue of employing over 200 people (specifically within aquaculture and wild catch – not including infrastructure and marine occupations); however, the IRC believes that other major employers have, or have almost, reached this business size. The three 'large' businesses recorded by ABS are all based in Tasmania (Tassal Group, Huon Aquaculture Group and Petuna Aquaculture), and are vertically-integrated, thus have control of their own hatcheries, marine farms, processing and sales operations, and invest heavily in product innovation.

Tassal has recently expanded their operations and interests into other states, announcing the $32 million acquisition of the Fortune Group in September 2018.[9] This purchase expands their salmon-focussed vertical integration by incorporating prawns, which will be farmed in two Queensland locations and one in New South Wales.

Huon are currently planning to commercially farm Yellowtail Kingfish off the Houtman Abrolhos Islands in Western Australia, having recently completed a farming trial offshore in New South Wales.[10]

[7] Australian Bureau of Statistics, 2017, 8165.0 - Counts of Australian Businesses, including Entries and Exits, Jun 2013 to Jun 2017: Businesses by Main State by Industry Class by Employment Size Ranges, June 2016 and June 2017. <*http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8165.0Jun+2013+to+Jun+2017*>. Figures quoted are for those 'Operating at end of financial year'.
[8] IBISWorld Industry Report A0200: Aquaculture in Australia (August 2018), p.18
[9] http://tassalgroup.com.au/wp-content/uploads/sites/2/2018/09/Media-Release-Tassal-completes-Prawn-acquisition.pdf
[10] https://www.huonaqua.com.au/about/truth/western-australia-kingfish-lease/

Stakeholders

Key Stakeholders include:

- National peak industry and employer associations, including the National Aquaculture Council, Seafood industry Association, Commonwealth Fisheries Association and the National Seafood Industry Alliance;
- State and Territory peak industry and employer organisations, including NT Seafood Council, NSW Seafood industry Council, Seafood Industry Victoria, Tasmanian seafood Industry Council, Western Australian Fishing Industry Council, Wildcatch Fisheries SA and Queensland Seafood;
- Peak industry and employer organisations focused on specific stock or industry segments, such as the Australian Barramundi Farmers Association, Australian Prawn Farmer's Association, Australian Council of Prawn Fisheries, Australian Southern Bluefin Tuna Industry Association, Tasmanian Salmonid Growers Association, Oysters Australia, Pearl Producer's Association and the Seafood Industry Marketers Association;
- Employee unions representing workers in aquaculture, wild catch and maritime sectors, including the Maritime Union of Australia and the Australian Workers Union;
- Indigenous organisations with interests in sea claims and aquaculture and wild catch operations, including customary fishing, such as:
    - Land and Sea Councils including the Northern Australia Indigenous Land and Sea Management Alliance, Torres Strait Regional Authority. South West Aboriginal Land and Sea Council, Goldfields Land and Sea Council, Carpentaria Land Council Aboriginal Corporation, North Queensland Land Council, Kimberly Land Council and the Yamatji Marlpa Aboriginal Corporation;
    - Bodies specifically focussing on Indigenous training, education and employment, including the Australian Institute of Aboriginal and Torres Strait Islander Studies, Batchelor Institute of Indigenous Tertiary Education, Australian Indigenous Education Foundation, The Lowitja Institute, Stronger Smarter Institute, AIME (AIME Mentoring), and State and Territory based Aboriginal Education Associations and Consultative Groups, university-based Indigenous education centres, groups and institutes;
    - Bodies working to develop and support Indigenous business, such as the Indigenous Business Australia;
- Key research and development organisations, including the CSIRO, the Fisheries Research and Development Corporation[11], and marine science institutions, including member organisations of the National Marine Science Committee[12];
- Bodies seeking to improve training, education and employment opportunities, such as NCVER, university-based education centres, groups and institutes and the Australian Council for Educational Research;
- Registered Training Organisations (RTOs) with *SFI Training Package* components on scope;
- Federal, State and Territory Government departments, statutory authorities and regulators, including the Australian Fisheries Management Authority and the Australian Maritime Safety Authority, and bodies covering fishing resources and licences, water resources, international and national trade and development, customs, biosecurity and the environment.

[11] http://www.frdc.com.au/
[12] https://www.marinescience.net.au/members/

Industry Challenges and Opportunities

Overview

There are many challenges and opportunities in the aquaculture and wild catch sectors, especially regarding ecological sustainability, which is critical to industry survival. This section focusses on issues relevant to the projects within the **Proposed Schedule of Work 2019–2022**.

The *Productivity Commission Inquiry Report into Marine Fisheries and Aquaculture* provides a broad overview of challenges and opportunities in the sector from a regulatory and productivity perspective (see Figure 1, over the page). It made 33 recommendations on regulatory and productivity barriers and improvements, covering: access to fisheries resources; commercial fishing; recreational fishing; Indigenous fishing; fisheries across jurisdictions; environmental management; and downstream processes.

Identifying it as a priority area in the *Pivot North* report[13], in 2016 the Joint Select Committee on Northern Australia held an inquiry into opportunities for expanding aquaculture in Northern Australia. While identifying numerous opportunities and challenges, the Committee found that "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."[14]

The *National Aquaculture Strategy*[15] identifies eight priorities aimed at supporting the sector:

1) Promoting an efficient regulatory framework modelled on established best practice that is transparent and removes unnecessary burden on business.
2) Maximising the benefits of innovation in aquaculture through targeted research, development and extension.
3) Developing and improving market access for Australian aquaculture products domestically and internationally, capitalising on Australia's clean and green image.
4) Understanding and managing the biosecurity risks through a coordinated approach to protect the aquaculture industry and the Australian environment.
5) Improving public perception and understanding of Australian aquaculture as a sustainable industry producing safe and healthy products.
6) Continuing to improve the environmental performance of aquaculture, including identifying opportunities for optimising environmental performance through adoption of cost-effective strategies.
7) Encouraging and promoting investment in Australian aquaculture.
8) Improving training and education for the aquaculture workforce and ensuring future employment needs of the industry are met.

[13] Joint Select Committee on Northern Australia, 2014, Pivot North: Inquiry into the Development of Northern Australia: Final Report, The Parliament of the Commonwealth of Australia
[14] Joint Select Committee on Northern Australia, 2016, Scaling Up: Inquiry into Opportunities for Expanding Aquaculture in Northern Australia, The Parliament of the Commonwealth of Australia, p. ix
[15] Department of Agriculture and Water Resources, 2017, National Aquaculture Strategy, Canberra

Figure 1: Overview of the Productivity Commission Inquiry Report into Marine Fisheries and Aquaculture

Key points

- Following past over-fishing, Australian governments have applied policies that generally have improved sustainability. Only 6 per cent of stocks are today overfished.
- But policy settings are not maximising the value of fisheries to the community. In particular:
  - most commercial fisheries are managed primarily though controls over fishing methods, which can inhibit fishers from introducing more innovative and cost-effective practices
  - understanding of recreational and Indigenous customary fishing activity is limited despite widespread participation and increasing competition for some fish stocks
  - differences between the fishery management techniques adopted by governments add to the costs faced by fishers operating in cross-jurisdictional fisheries and to risks in managing the sustainability of stocks.
- The allocation of access to fisheries should address social and cultural benefits, as well as economic benefits.
- Recreational fishing, long viewed as having a minimal impact on fisheries, is having a material impact on some high-value stocks.
- The better use of existing recreational fishing licensing systems, and the introduction of low-cost licensing in jurisdictions where it is not presently used, would provide the means for gathering evidence to better meet the future needs of recreational fishers and support environmental objectives in the long term.
  - A sound evidence base is not presently available to guide decisions on access and facilities for recreational fishers.
- Prospects for the commercial fishing sector would be improved by governments providing greater certainty on access and the permitted intensity of fishing.
- Governments should adopt individual transferrable quota systems as the default management technique for commercial wild catch fisheries. This will provide greater confidence on stock sustainability, more scope for innovative and efficient fishing practices and facilitate structural adjustment.
- Arrangements between governments for the management of cross-jurisdictional fish stocks should be streamlined to improve their effectiveness and reduce costs. This will require governments to prioritise and dedicate sufficient resources to reform.
- Additional improvements to marine fisheries management include making standards for protected species clearer, streamlining some environmental approvals, delegating more operational decisions to fishery managers and limiting cost recovery to cover only efficient costs.
- Indigenous customary fishing is not clearly recognised or managed in fishery laws. This has resulted in uncertainty over the rights and obligations of customary fishers and tensions between sectors in some high-demand fisheries. Indigenous Australians have limited input into fishery management, and there is little information on customary catch and practices.
  - Clarifying what constitutes Indigenous customary fishing and who is eligible to fish, and incorporating customary catch and practices into fisheries management regimes would help resolve these issues.
- There has been little change in the regulation of aquaculture over the past 10 years but this has generally not impeded the sector's growth. The major producing States have had key best practice regulatory features in place for some time and other States have faced challenges that are predominantly non-regulatory in nature.

Source: Productivity Commission, 2016, Marine Fisheries and Aquaculture, Final Report.

While the Productivity Commission 2016, Marine Fisheries and Aquaculture, Final Report found that regulation is not generally impeding the sector's growth, the IRC strongly advise that in respect to aquaculture, regulation has in fact impaired industry's growth. An example of such hindrance comes from the major employer Seafarms outlined in their submission to the QLD Competition Authority (QCA) draft Report on Aquaculture Regulation in QLD in 2014 that regulation around terrestrial aquaculture development areas (zones), use of the environmental offsets are barriers to investment growth and more widely, key industry associations (ABFA, APFA) along with Seafarms claimed that the GBRMPA is a major source of regulatory barriers contributing to their frustration to look outside of QLD and develop their Sea Dragon Project in Western Australian and Northern Territory as an alternative https://seafarms.com.au/about-project-sea-dragon/

The *Commonwealth Fisheries Harvest Strategy Policy*[16], updated in 2018 after the release of the Productivity Commission report and National Aquaculture Strategy, sets out aims and policies relating to Commonwealth Fisheries, generally including all waters beyond three nautical miles of the coasts of Australia and its territories (although there are many exceptions and areas of joint responsibility).

The principle objective of the Harvest Strategy is the ecologically-sustainable and profitable use of Australia's fish resources, with priority given to ecological sustainability. Under the policy, harvesting strategies must:

- Ensure exploitation of fisheries resources and related activities are conducted in a manner consistent with the principles of ecologically sustainable development, including the exercise of the precautionary principle;
- Maximise net economic returns to the Australian community from management of Australian fisheries—always in the context of maintaining commercial fish stocks at sustainable levels;
- Maintain key commercial fish stocks, on average, at the required target biomass to produce maximum economic yield from the fishery;
- Maintain all commercial fish stocks, including by-product, above a biomass limit where the risk to the stock is regarded as unacceptable, at least 90 per cent of the time;
- Ensure fishing is conducted in a manner that does not lead to overfishing—where overfishing of a stock is identified, action will be taken immediately to cease overfishing;
- Minimise discarding of commercial species as much as possible;
- Be consistent with the *Environment Protection and Biodiversity Conservation Act 1999*[17] and the Guidelines for the Ecologically Sustainable Management of Fisheries (2nd edition)[18].

The *National Marine Science Plan 2015–2025* identifies seven key challenges that will require science, policy and industry to work together:

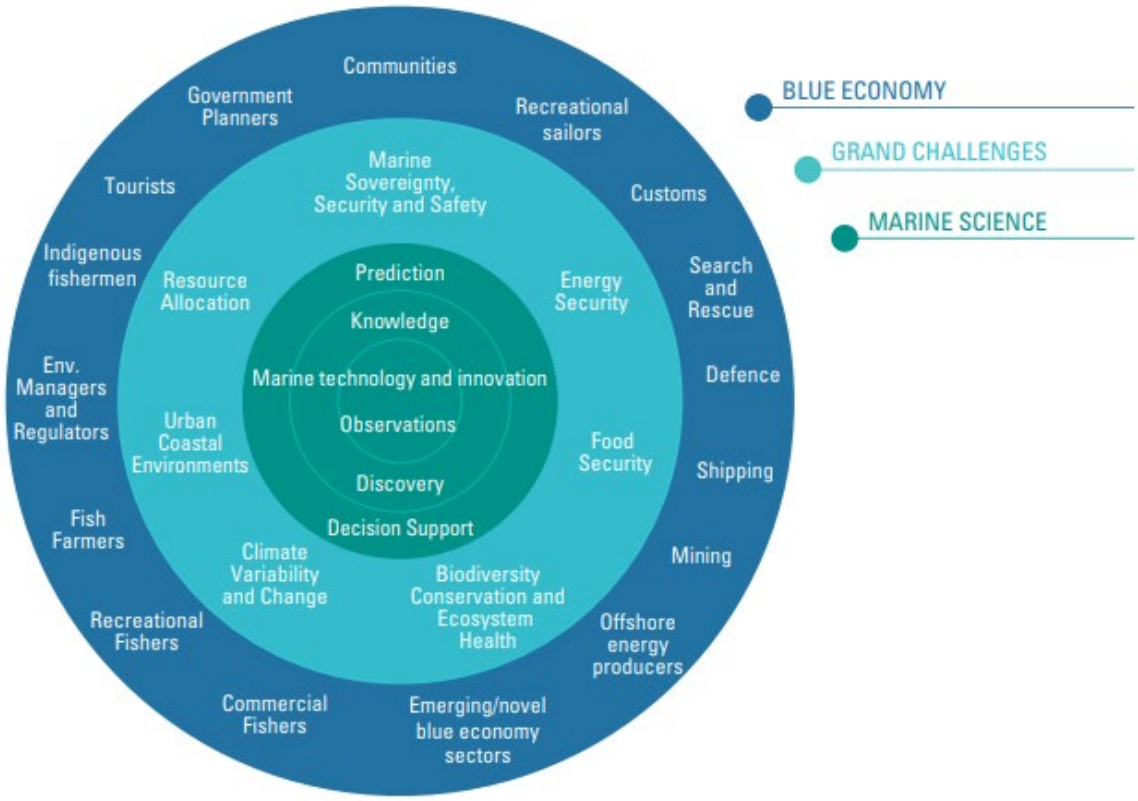
- Maintaining marine sovereignty and security;
- Achieving energy security;
- Ensuring food security;
- Conserving our biodiversity and ecosystem health;
- Creating sustainable urban coastal development;
- Understanding and adapting to climate variability and change;

[16] Department of Agriculture and Water Resources, 2018, http://www.agriculture.gov.au/fisheries/domestic/harvest_strategy_policy
[17] https://www.environment.gov.au/epbc
[18] http://www.environment.gov.au/marine/publications/guidelines-ecologically-sustainable-management-fisheries

- Developing equitable and balanced resource allocation.

The plan identifies the need to develop and promote consistent and cost-effective fishery management strategies across all jurisdictions, including Indigenous and recreational fishing, and data-poor fisheries.

Figure 2: Marine science for a blue economy



Source: National Marine Science Committee, National Marine Science Plan 2015-2025, p.25

Industry forecasts make clear that while there should be many opportunities for the seafood sectors for the foreseeable future the challenges are correspondingly large and diverse.

Sustainable Fisheries Management and Climate

Through its commitment to supporting sustainable fisheries, Australia has become recognised for being among the best marine environment managers globally. Ensuring that key species are monitored and that stocks are fished at a sustainable level, is an industry priority. A 2014 government report[19] found that the Australian catch comprised of 88 per cent from sustainable stocks, 2.1 per cent from transitional/depleting stocks, 4.9 per cent from overfished stocks, and 4.6 per cent from undefined stocks. When compared to a 2005 report[20], which found 29 per cent of Australia's commercial species were overfished or vulnerable to overfishing, this demonstrates industry efforts to move towards sustainability.

[19] Cited in: Commonwealth of Australia, 2015, Aquaculture and Fisheries, p.8
[20] https://blogs.csiro.au/ecos/research-leaves-a-legacy-for-australias-fisheries/

Each of the Australian strategies, polices and reports referred to in this document have highlighted the critical importance and complexities of sustainably managing Australia's fishing and seafood resources. While Australian aquaculture and wild catch is now one of the most sustainable sources of protein, public perceptions of seafood are negatively influenced by stories on overfishing, stock depletion, massive international netting operations, whaling, water impurities and other contaminations. The Productivity Commission and the National Aquaculture strategy both recognise the vulnerability of the industry to the public being misled.

Case Study: A clash of research on Australian Fish Stocks

The aquaculture and wild catch industry welcomed a research paper published in January 2019[21] rejecting claims in a 2018 paper[22] that Australian commercial fish stocks had declined by one third in the decade prior to 2015. The newer paper, authored by a team led by CSIRO Senior Research Scientist Dr. Rich Little, identified flawed methods and factual errors in the 2018 research. Nevertheless, Seafood Industry Australia noted that those initial claims had received widespread coverage and so damaged the reputation of Australia's fisheries management. Seafood Industry Australia CEO, Jane Lovell, is quoted as saying, "Once misinformation is published it is hard to combat, however we are confident the Rich Little paper shows the community and our politicians the truth behind Australia's fisheries management techniques, which are some of the best in the world."[23]

Supporting sustainable fisheries and marine environments has also led to complex regulatory arrangements, licensing issues and quotas that have hampered productivity. Finding the balance between ecologically sustainable and profitable use of Australia's fish resources is difficult, and there are multiple barriers to be addressed as a result. Time and experience will be required, as well as flexible and adaptable approaches to management.

The state of the world's oceans and waterways are changing, and, in consequence, fish stocks and movements are shifting. According to the CSIRO[24], Australia's oceans are experiencing more rapid warming and, therefore, change than other oceans, particularly in Southern waters. Australia has more than 5,000 species of fish, while as many as 80 per cent of species found in southern Australian waters are unique. By monitoring the changing habitats and stock, the CSIRO has developed a model for identifying the sensitivity of species, with more than 100 species affected overall (see Table 4).

The changing environment impacts on both the fish stock and the feed web needed to sustain it. Changes are occurring in the plants and algae that are primary food sources for sea life, but this is difficult to track given the inaccessibility and size of ocean floors and seabeds. Fishers at sea are experiencing decreasing catches due to species migrating to cooler southern waters outside their permit zone.

Unlike land farming, the seafood industry has not been associated with the negative impacts of long-term drought until recently[25]. The effects of drought are, however, being felt across the industry. Despite rainwater being increasingly volatile, aquaculture farmers rely upon it to flush fish food (bugs, beetles and microbes) into the estuaries and so sustain commercial species. High levels of salinity have affected the phytoplankton bloom from which oysters gain sustenance and this has reduced or, in some cases, halted harvest yields. Though these conditions are affecting the production and income of aquaculture farmers,

[21] L.R. Little et al., 2019, Comments on the evidence for the recent claim on the state of Australian fish stocks. Aquatic Conservation: Marine and Freshwater Ecosystems, 29: 329-330, https://doi.org/10.1002/aqc.2992330
[22] G. J. Edgar, T. J. Ward, and R. D. Stuart-Smith, 2018, Rapid declines across Australian fishery stocks indicate global sustainability targets will not be achieved without an expanded network of 'no-fishing' reserves. Aquatic Conservation: Marine and Freshwater Ecosystems,1–14.
[23] https://seafoodindustryaustralia.com.au/2019/01/23/australias-commercial-fish-stocks-sustainable-csiro-paper-highlights-edgar-paper-flaws-rejects-claims-of-rapid-decline/
[24] CSIRO, 2018, Australian fisheries stocks under climate change, p.2
[25] https://seafoodindustryaustralia.com.au/2018/11/01/the-big-dry-hits-our-oceans-how-the-drought-is-impacting-australias-fishing-industry/

there is no recognition or access government subsidy or funding assistance available for industry operators[26].

In consequence of climate changes, the CSIRO believes that all Australian seafood operations will have to display great flexibility and speed in both recognising and adapting to changing fish stocks.[27]

[26] https://www.abc.net.au/news/2018-11-13/fishers-seek-drought-support-to-be-expanded-beyond-the-land/10487830
[27] CSIRO, 2018, Australian fisheries stocks under climate change

Table 4: Sensitivity of Species Targeted by Australian Fisheries

Summary of sensitivity per fishery. Low sensitivity is for those species with a low rating across all 3 factors – abundance, distribution and behaviour. Moderate sensitivity indicates that a species had 1 factor that was scored as being moderately sensitive to climate change. High sensitivity covered both the case where a species was rated as having a factor that was highly sensitive to climate change or they had multiple factors rated as moderately sensitive. Sensitivity does not automatically indicate a likely decline it indicates the potential for change (including possible increases).

Commonwealth Fishery	Low sensitivity	Moderate sensitivity	High sensitivity
Bass Strait Scallop			Scallops: behaviour and distribution
Coral Sea			Coral trout: distribution and abundance
Eastern Tuna and Billfish		Behaviour of all target species	
Northern Prawn			Behaviour and distribution of all target species
South and Eastern Scalefish and Shark	Species already showing shifts (warehou, morwong, redfish, ling) show low sensitivity to further climate driven change	Gemfish: abundance. Trevalla, flatheads, and whiting behaviour.	**All/majority** of properties of squids, sharks, blue grenadier and orange roughy.
Small Pelagics		Behaviour of sardine and blue mackerel	Jack mackerel and red bait behaviour and distribution
Torres Strait			**All** properties of tropical rock lobster
State Fisheries			
New South Wales, Victoria, South Australia		Behaviour of snapper, tuna and some small pelagics.	Many small pelagic, estuarine and invertebrate species (mainly via behaviour and distribution). **All** properties of sharks and blue grenadier.
Queensland		Behaviour of estuarine and shelf fish, as well as Spanish mackerel and billfish.	Behaviour and distribution of all reef fish. **All** properties of the majority of invertebrates and sharks.
Gulf of Carpentaria (Queensland and Northern Territory)	Bream and sharks	Majority of mackerels, estuarine fish and mangrove associated species (due to a mix of factors).	**All/majority** of properties of snappers, emperors and all valuable invertebrate species (prawns, lobster, sandfish).
Northern Territory and Western Australia	Many sharks, estuarine and large pelagic fish	Large sharks: abundance. Behaviour or distribution of fish non-reef shelf fish	**All/majority** of properties of reef associated fish and all invertebrates.
Western Australia		Distribution or behaviour of herring, reef associated predators, some abalone, octopus and sandfish.	**All/majority** of properties of prawns, crabs, many small pelagics, some abalone, oysters, bream and dhufish.

Source: CSIRO, 2018, Australian fisheries stocks under climate change

Working in a Volatile Market

Australia's trade in the fishery and aquaculture sectors is driven by several factors, including its proximity to the growing Asian market and its reputation as a reliable and high-quality supplier of high unit value fishery and aquaculture products. Changing population, income levels, urbanisation trends and preferences in the main export market are also important factors.

Aquaculture, fishing and seafood are often central features of international treaties and trade agreements between Australia and its partners. These agreements contribute to Australia's overall competitiveness in the global market, while also resulting in domestic competition between businesses due to the prevalence of imported products from the expanding aquaculture industries in South-East Asia, particularly prawns from Thailand and fin-fish (basa) from China.

Australian competitiveness is adversely affected by the lack of high-quality infrastructure in many regional or remote areas, including roads, ports, electricity and freight logistics. The seafood industry relies on transporting fresh products to markets quickly and, for international markets, harvesting and freezing products as quickly as possible before export. Given the remoteness of many operations, there are barriers to gaining market access domestically and internationally, including maintaining product quality, achieving the necessary scale of operations, and implementing appropriate logistics to ensure products reach their intended markets.

Aquaculture and wild catch are particularly vulnerable to complex market influences outside of industry control, which can have major impacts on local communities and industry sub-sectors.

Case study: Wild catch barramundi market collapse

The wild-catch barramundi sector, an important sub-sector for numerous Northern Australian communities, is illustrative of industry vulnerability to market and environmental instability. Low breeding rates and the resulting high production costs of wild-caught barramundi led many retailers to turn to *farmed* barramundi, which represents consistent, year-round stock and efficient distribution[28]. Improved wet seasons in 2017 and 2018[29] led to an abundance of wild-caught barramundi yet, because of retailers' reluctance to revert to a more volatile supply, fishers were left with a surplus. Furthermore, this appears only to have affected the rate received by fishers and not retail pricing, where prices have remained stable at around $40 per kilogram despite wild-catch operators receiving as little as $14 per kilogram. In addition, due to their access to an expanding range of species, Australians are increasingly substituting barramundi with other fish being imported from international suppliers.

The seafood industry, as a perishable commodities market, is also vulnerable to exchange rate fluctuations. In global terms, Australia is a relatively small producer and exporter of fishery and aquaculture products, and the prices producers receive are generally set by world markets in foreign currencies. A depreciating Australian dollar generally results in domestic producers receiving a higher export price, while an appreciating Australian dollar results in lower export prices.

Indigenous Fishing and Commercial Opportunities

Aquaculture and wild catch are traditional activities of Indigenous communities, both in the customary and commercial senses. There is evidence of seafood trading and ceremonies involving the sharing of seafood between Indigenous communities, as well as trading in sea products between Australian Indigenous communities and countries to the North and into the Pacific islands prior to settlement.[30]

[28] https://www.abc.net.au/news/2018-05-17/barramundi-industry-collapses-in-nt-fishermen-going-broke/9770022
[29] https://www.abc.net.au/news/rural/2017-03-17/gulf-barramundi-fisherman-expects-best-catch-in-three-years/8363658
[30] Productivity Commission, 2016, Marine Fisheries and Aquaculture, Final Report, p.158

The Productivity Commission Report devotes Chapter 5 to Indigenous Fishing, noting that more than half of all Indigenous people aged over 15 have participated in customary fishing. Among the key points made in the report were:

- There is a need to improve engagement between fisheries managers and Indigenous fishers. There is also scope to increase the application of Indigenous traditional knowledge in fisheries management through Indigenous sea ranger programs and other means;
- To ensure that the customary allocations and any controls over customary fishing activities are culturally sensitive and do not infringe on the rights and interests of native title holders, they need to be developed in collaboration with Indigenous communities;
- Native title determinations have recognised the right of some native title holders to fish for any purpose, including sale, barter and exchange. Consistent with the intent of recognising customary fishing rights, the definition of customary fishing should provide for fishing for such purposes where in accordance with Indigenous laws and customs;
- Native title provides access to fisheries for some groups. Changes in jurisprudence and the slow pace of native title determinations have created uncertainty over the full extent of native title rights and interests. This uncertainty has contributed to customary fishing often being managed by exemption under fisheries laws rather than being recognised (and managed) as a sector in its own right.

The Productivity Commission Report notes that customary fishing benefits both the individual fisher – through the monetary and social value of catching fish, both for consumption and traditional ceremonies – and the wider community, through flow-on expenditure and upholding cultural customs and behaviours.

The IRC has prioritised supporting the foundations for increasing Indigenous involvement in aquaculture and wild catch and is considering projects that may facilitate opportunities in areas such as:

- The development of enterprises, partnerships or agreements for onshore, offshore and intertidal activities within areas covered by Native Land/Sea Titles and Claims;
- The establishment of operations and remote operations centres in Indigenous and isolated communities where establishment may have significant impacts on the economic health and training opportunities for local communities;
- Commercial fishing using customary methods to service markets through Australia and the Asia Pacific area (especially the Pacific Islands) where sea produce has been used in customary celebrations, rites and ceremonies.

Developing the opportunities to create beneficial outcomes faces numerous barriers, including:

- Ensuring Indigenous involvement and 'ownership' of projects to drive the greatest prospects of success;
- Addressing high levels of non-completion of VET qualification training in remote Australian locations and the lack of connection between successful completion of training and employment outcomes;[31]
- Addressing issues over the delivery of training in remote areas, both for Indigenous VET and meeting the needs of industry, especially concerning the lack of RTO availability and delivery;
- The difficulties for industries and Indigenous communities in obtaining the information and skills needed to work together to create commercial and other opportunities;
- Addressing the lack of incentive for Indigenous students to participate in training in very remote areas where there is no labour market.

[31] G. Windley, 2017, Indigenous VET participation, completion and outcomes: change over the past decade, NCVER, Adelaide.

Crocodile Farming

Crocodile farming is an expanding opportunity in the Northern territory, Western Australia and Queensland. The challenges of crocodile farming are unique in that it involves one of the world's oldest and most dangerous predators and, while risks may be minimised, there are potentially fatal consequences for both workers and animals.

There has been significant growth in crocodile farming and associated markets based on crocodile skins, meat, by-products, tourism and conservation. The industry was estimated to contribute more than $50 million to the Northern Territory economy in 2014-2015, with farm-related tourism and retail, egg collection in remote communities, and veterinary services valued at $106.7 million[32]. As recently as December 2018, Queensland enacted legislation to allow the controlled collection of wild eggs, reflecting similar legislation that has been instituted in the Northern Territory since the early 1980s.

The crocodile industry is affected by tight labour markets, and many enterprises operate within remote areas. To sustain its international markets, it is critical that Australia retain its reputation for safe, effective and sustainable crocodile farming operations, especially as there are higher production costs in Australia compared to competitor countries.

There is a need to undertake updated workforce and training analysis, including the development of trade level training.

Fishtech & Aquabotics: real-time, distant operations

There are major procedures and technologies emerging for real-time, distant operations in aquaculture, wild catch, fishing and fisheries compliance. Skills and training are needed for workers using remote control centres, cybernated processes and technologically-enhanced equipment.

Operating on and under-water is distinct from land and air operations. In aquaculture and wild catch, maintenance issues, navigation, contingency planning and data analysis are all different from equivalent practices in other industries. Factoring in issues such as tidal movements, water flows, transition waters (e.g. estuarine and intertidal areas), salt-impacts, protection of water-based environments, equipment contamination, hydrostatic pressure and water quality adds to the complexity.

Expansion in the aquaculture and wild catch industry is leading to technologically-advanced medium- and large-sized enterprises with the capacity to evolve their operations further. With the growing potential and decreasing cost of fishtech and aquabotics, industry operators are expected to increasingly adopt real-time, distant operations and uncrewed vessels and vehicles to enable more efficient monitoring, welfare and biosecurity practices, even in offshore aquaculture and wild catch operations. Many employers are undertaking planning and scoping exercises with a view to introducing these technologies, while some businesses, such as Huon and Tassal in Tasmania, are already using remote centres to control and automate their distant operations. With this rapid rate of technological change, a new generation of leadership is being developed and traditional occupations and roles are evolving. Technology is now undertaking diverse activities previously completed by workers, including diving operations, on-deck vessel work, harvesting, hatchery and sample collections. Updated workforce training is needed to facilitate the transferable and specialised skills required.

Operations often take place in remote areas, both on- and offshore, and it is in the interests of industry to ensure that issues with remote training, RTO delivery and thin markets are addressed. Distant operations can be established in many locations, but the temptation will be to focus on urban areas with access to

[32] Ernst & Young, 2017, Economic Value of the Crocodile Farming Industry to the Northern Territory

industry-ready labour, power supplies and technology channels. An urban concentration of operations could have a devastating impact on local economies, especially for Indigenous communities, and employment opportunities. Conversely, developing infrastructure to undertake real-time, distant operations from non-urban areas would and encourage and create opportunities to expand training and support in those areas. This may lead to further economic development and growth in rural, remote and regional Australian communities.

Biosecurity

Biosecurity is a long-term concern for the aquaculture and wild catch industry. Warming waters foster a range of unwanted pests, diseases and conditions which can have a significant impact on our marine fisheries and aquaculture operations. The greater movement of fish stocks in Australian waters[33] further exacerbates the uncontrolled spread of new diseases and organisms. Harmful algal blooms (HABs) are also increasingly impacting on seafood production, including in Tasmania where they have caused closures of wild harvested seafood businesses, and can directly influence the number of jobs available on a day-to-day basis.[34]

Infectious diseases are continuing to be a significant threat to the profitability of Australia's fisheries and aquaculture industries, particularly for emerging or expanding industry sectors. Increasing importation of seafood and new species will also elevate the risks to the Australian industry. The white spot disease outbreak in QLD in 2016 was devastating and costs ran in to the hundreds of millions for losses in production, government response, control and follow-up measures and industry assistance and reimbursement. The Inspector-General of Biosecurity Review into Uncooked Prawn Imports: effectiveness of biosecurity controls IGB.Final.Report-uncooked-prawn-imports.pdf found that failures in Australia's biosecurity led to the outbreak in the Logan River prawn farms. Systematic rorting of import conditions by major prawn importers evading testing, front line staff reductions in border security and poorly managed communication between Federal and State Agriculture departments all contributed to the import of white spot affected uncooked prawns.

Australia imports 70% of its seafood however, unlike other commodities across agriculture, e.g. raw beef, there is no ban on the import of raw uncooked seafood product that has the potential to carry disease. This poses a significant risk to an industry valued at 3.06 billion in production in 2016-2017 AustFishAquacStats_2017_v1.2.0

For further details about the biosecurity risk in aquaculture and wild catch, please see the Skills Impact website: www.skillsimpact.com.au

Barriers to Training

Industry has undertaken important work to ensure that the training package is relevant and 'fit for purpose'. However, significant challenges exist that impact on the uptake and implementation of industry training, such as:

- Declining and aging work force;
- Attracting and recruiting young people;
- Restrictions on visa programs for skilled migration;
- Limited options for subsidised training;
- Geographical and regional dispersion of businesses;
- Limited access to RTOs;

[33] CSIRO, 2018, Australian fisheries stocks under climate change
[34] Tasmanian Seafood Industry Council, 2017, 5-10 Year Strategic Workforce Profile, p.6

- Competing industries;
- Regulation and licensing implications.

Barriers to training remain an ongoing concern and, during 2019, the IRC will attend to these issues. Consultation will take place with other IRCs experiencing the same or similar issues. Consideration will also be given to developing strategies and working with government and industry bodies to address these additional barriers.

Social Licence and Country of Origin

Industry is also addressing social licence factors, environmental sustainability and Country of Origin Labelling (CoOL) concerns that are driven by consumer expectations. Peak industry bodies are collaborating on strategies to build community trust; for example, through campaigns such as Seafood Industry Australia's 'The Pledge' program, a commitment to be transparent and responsive to issues the community and consumers believe are important. Industry is working tirelessly to present and promote its actions, positions and perspectives in the face of misleading or misrepresented media stories that shape community misconceptions. Building community trust is vital for increasing 'social licence' and promoting the ever-improving quality of industry products, sustainability and legislative compliance.

Country of Origin Labelling[35] (in the hospitality and retail sectors), at local, national and international levels, is gaining prominence due to consumer demand, regulatory change, 'black market'[36] fishing and the growing incidence of food fraud. Country of Origin Labelling ensures consumers can make informed seafood purchasing decisions and, in recognition of the public frequently choosing to 'support our farmers' by buying Australian produce, industry operators are increasingly supporting its application. In August 2015 Senator Xenophon led the Food Standards (Fish Labelling) Bill back in 2015 however it was rejected due to the Commonwealth having limited legislative powers in food regulation. Country of Origin Labelling remains an issue for the industry peak bodies, many who have been lobbying for several years in support. The recent formation of Seafood Industry Australia (SIA) has renewed the calls for County of Origin Labelling to be applied nationally as a key strategic focus, An industry-wide approach has yet to be determined, but Seafood Industry Australia and others are putting forward their recommendations[37].

Offshore Oil & Gas Activity

Seismic testing activities[38] for off-shore oil and gas may be impacting on fish stocks and commercial fishing. Peak seafood industry bodies and the Australian Petroleum Production and Exploration Association (APPEA) signed a Memorandum of Understanding (MoU) in 2014[39] which established principles of cooperation, communication and consultation between industry contributors. However, but there is still a lack of scientific research on the impacts of seismic surveys on marine life. The West Australia Fishing Industry Council (WAFIC) is leading a three-year project funded through the FRDC to assess the effects of oil and gas activities on commercial fishing and commercial fish stocks, but results are not due until late 2020.

[35] https://www.theshout.com.au/australian-hotelier/features-australian-hotelier/call-for-mandatory-country-of-origin-labelling-for-seafood-in-pubs-and-hotels/
[36] https://www.brisbanetimes.com.au/national/queensland/sting-catches-out-black-market-fishing-operation-in-brisbane-20180626-p4znpd.html
[37] https://seafoodindustryaustralia.com.au/country-origin-labelling-policy/
[38] Seismic surveys produce detailed images of local geology to determine the location and size of possible oil and gas reservoirs. Sound waves are bounced off underground rock formations and the waves that reflect back to the surface are captured by recording sensors for later analysis (https://www.appea.com.au/oil-gas-explained/operation/seismic-surveys/).
[39] https://www.appea.com.au/media_release/oil-and-gas-industry-and-commercial-fishers-forge-closer-ties/

Mental Health in Commercial Fishers

A national survey and research conducted in 2017 led by the FRDC and Deakin University revealed significantly higher rates of poor mental health in the fishing industry than that of the general population. Alarmingly, rates of high or very high psychological distress where almost double in comparison, confirming what many in the industry had already suspected. Contributing factors towards concerning statistics were isolation, physical dangers, fluctuating markets, catches and quotas, regulatory changes, job insecurity, red tape and poor public perception. In addition to national and state industry bodies and associations all responding in various ways to put mental health at the forefront to making the industry safer, the Women in Seafood Australasia (WISA) responded to the findings with Project Regard. This project developed a video featuring fishers and their families as mental health ambassadors from around the country, sharing stories of their own challenges and experiences in this area and encourage the necessary conversations to recognise the issue and assist organisations to seek funding options to support services needed.

Seaweed

Adding to its value as a food product, seaweed is being harvested for use in 3D printing for the medical industry. Aquaculture includes plant stocks raised in bodies of water and, within this space, algae hold particular promise for disrupting current technologies and even saving lives. Algae have been used to create an environmentally friendly, inexpensive gel material for printing 3D medical implant devices. The sector has been increasingly implementing integrated multitrophic aquaculture, in which multiple species are included in the aquaculture ecosystem, and the waste products of one element, such as from fish, are used to benefit another part of the system, such as the seaweed and algae.

Increased demand in both feed and medical usage may improve the potential for the farming of seaweed and algae products and may result in new and emerging markets. This development will be monitored by the IRC.

Further, bio-remedial methods are increasing within the industry in recognition of the rapid rise in demand for sustainably farmed seafood. Pacific Biotechnologies (formerly MBD Industries) partnered with James Cook University on large scale R&D bioremediation solutions addressing disease management, environmental and ecological sustainability innovation and algae to clean water solutions and more recently, exporting this technological 'know-how' to Asia. A further example is Tassal trialling the world's first waste collection system. **T**he Tasmanian Environmental Protection Authority (EPA) approved three Tassal pens to be fitted with PVC liners that funnelled solid waste down to a sump from which the waste could to be pumped onto a boat and taken to a waste facility in George Town. The system allows the company to extract fish faeces directly from the pens (preventing seabed degradation) and more than double its pen stocks in Macquarie Harbour. EPA approval for this bio remedial solution means Tassal can double the allowable stock levels from 13 to 28 tonnes per hectare. The Tassal trial is being closely monitored and has already attracted a range of views as to its impact.

Training Package Overview

Almost all the *SFI11 Seafood Industry Training Package* is being reviewed to ensure that it meets industry requirements and training package standards. The IRC expect to approve Cases for Endorsement for the Australian Industry Skills Committee in mid-2019, with updated components relating to aquaculture, fishing operations and biosecurity, seafood post-harvest and fisheries compliance expected to be available to RTOs by the end of the year.

The *SFI11 Training Package* currently has 24 qualifications, 216 Units of Competency and 14 Skill Sets. After the projects to revise the Training package have been completed, it is likely that substantial changes will be made to ensure continuing relevance for industry and encourage increased enrolments.

Qualifications expected to be revised:

- SFI10118 Certificate I in Seafood Industry
- SFI20118 Certificate II in Aquaculture
- SFI20518 Certificate II in Fishing Operations
- SFI20518 Certificate II in Seafood Post Harvest Operations
- SFI20419 Certificate II in Fisheries Compliance Support
- SFI30118 Certificate III in Aquaculture
- SFI30218 Certificate III in Fishing Operations
- SFI30518 Certificate III in Seafood Post Harvest Operations
- SFI30419 Certificate III in Fisheries Compliance
- SFI40118 Certificate IV in Aquaculture
- SFI40518 Certificate IV in Seafood Post Harvest Operations
- SFI40419 Certificate IV in Fisheries Compliance
- SFI50118 Diploma of Aquaculture
- SFI50419 Diploma of Fisheries Compliance

Qualifications expected to be deleted:

- SFI40211 Certificate IV in Fishing Operations
- SFI50211 Diploma of Fishing Operations
- SFI50511 Diploma of Seafood Processing

Skill Sets expected to be revised or created:

- Abalone Diver Environmental Management
- Deckhand Induction
- Environment Management Systems Coordinator
- Fishing Operator
- Fish Processor Induction
- Net Construction and Repair
- Aquatic Biosecurity
- Aquaculture Chemical
- Crocodile Handling and Processing

- Basic – Aquatic Biosecurity

Skill Sets expected to be deleted:

- Extended Fishing Charter Operator
- Fisheries Resource Management Observer
- Industry Leadership – Resource Management Group Membership
- Industry Leadership – Sector Representation
- Industry Leadership – Strategic Development
- Limited Fishing Charter Operator
- Senior Deckhand
- Skipper

For data and analysis on the SFI11 Training Package, please see **APPENDIX 1: SFI TRAINING PACKAGE DATA.**

EMPLOYMENT & SKILLS OUTLOOK

Employment

According to ABS data, there are approximately 17,000 people working in aquaculture, fishing, and seafood processing, though the Fisheries Research and Development Corporation (FRDC) asserts that industry employment is consistently under-reported[40,41].

Table 5: Employment in the seafood industry by sex and labour force status

Industry of Employment (three-digit ANZSIC)	Sex	Full-time	Part-time	Total (Sex)	Total
Aquaculture (020)	Female	1,268	1,006	**2,274**	**8,267**
	Male	5,406	587	**5,993**	
Fishing (041)	Female	465	192	**657**	**5,401**
	Male	3,206	1,538	**4,744**	
Seafood Processing (112)	Female	730	264	**994**	**3,325**
	Male	1,498	833	**2,331**	
Total	**Female**	**2,463**	**1,462**	**3,925**	**16,993**
	Male	**10,110**	**2,958**	**13,068**	

[40] ABARES, Australian Fisheries Statistics 2010, Canberra, p33

[41] The IRC has also provided feedback that the employment figures published in the following report are representative of their broad understanding of industry: Mobsby, D 2018, Australian fisheries and aquaculture statistics 2017, Fisheries Research and Development Corporation project 2018-134, ABARES, Canberra, December. CC BY 4.0.

Source: Australian Bureau of Statistics - 6291.0.55.003 - EQ06 - Employed persons by Industry group of main job (ANZSIC), Sex, State and Territory, November 1984 onwards[42]

Industry also includes fish and seafood wholesaling employees, who are aggregated by ABS with Grocery, Liquor and Tobacco Product Wholesaling (ANZSIC 360) employees. According to the 2016 Census, there were 1,649 people full-time and 721 people part-time[43] in fish and seafood wholesaling, while IBISWorld put current employment in the sector at 5,307 (2018-2019).

The aquaculture and wild catch sectors are a notable and growing source of employment for Indigenous people, who already make up around three per cent of the seafood industry labour force (which is higher than the general participation rate by Indigenous people in the overall labour force). According to the *2016 Census of Population and Housing*, there were around 400 Aboriginal and Torres Strait Islander (Indigenous) employees in aquaculture and wild catch occupations. It is very likely that these results were under-reported, and that the statistics do not include Indigenous customary fishing activities.

It remains a male-dominated industry, with men comprising 77 per cent of the overall labour force, and 80 per cent of full-time employees. The *Women's Industry Network Seafood Community*[44] celebrated 20 years as a national organisation in 2018 and continues to actively encourage the involvement of women in the industry and create a supportive environment for those already employed.

Overall, the ABS projects significant growth in the aquaculture and seafood processing labour forces (see Table 6). Industry analysts further forecast that consumer demand and the implementation of strategies and recommendations by government and industry will lead to accelerating rates of growth. In sectors with notable expansion, for instance Tasmanian salmonid aquaculture, there is likely to be on-going demand for new workers to fill vacated positions. Expansion by large- and medium-sized businesses into new areas will also create significant employment opportunities for locals in regional communities.

The aquaculture industry is supported by a wide range of third party, peripheral and support service providers. Growth within the industry will have knock-on effects for expansion in such areas as regulation, marine police, feed suppliers, transport and logistics. Skills needed in these third-party sectors will grow in addition to workforce expansion and job creation[45].

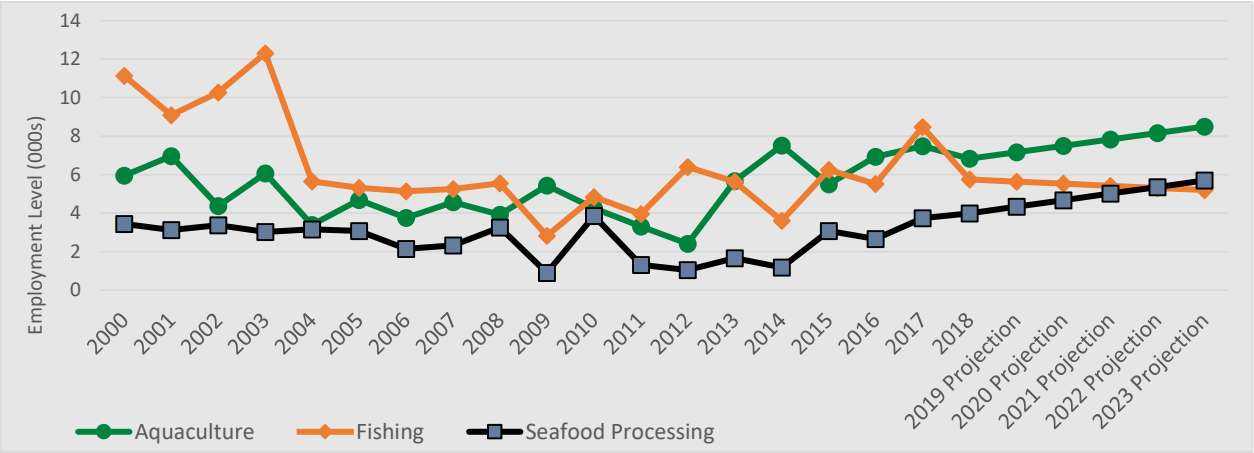
[42] Unlike with the 2016 Census data, this ABS data source does not contain a third labour force status, 'Employed, away from work', to reflect seasonal workers and those with an irregular shift arrangement. As such, these employment figures are averages over four quarters to allow for such fluctuations. Furthermore, the ABS advises caution in using employment statistics at the ANZSIC group level, as quoted here, because estimates may be subject to sampling variability and standard errors too high for most practical purposes.

[43] In an analysis of ABS employment data, The Fisheries Research and Development Corporation (FRDC) state that 'In the Corporation's view, data collected by the ABS are not disaggregated in sufficient detail to be useful for planning and strategic purposes' (in Tasmanian Seafood Industry Council, 2017, *Seafood Industry Workforce Profile*, p.15). The FRDC also assert that employee numbers are under-reported due to some fishing industry activities being attributed to other industries; for example, transport, administration and generalised food processing.

[44] http://winsc.org.au/

[45] Tasmanian Seafood Industry Council, 2017, 5-10 Year Strategic Workforce Profile.

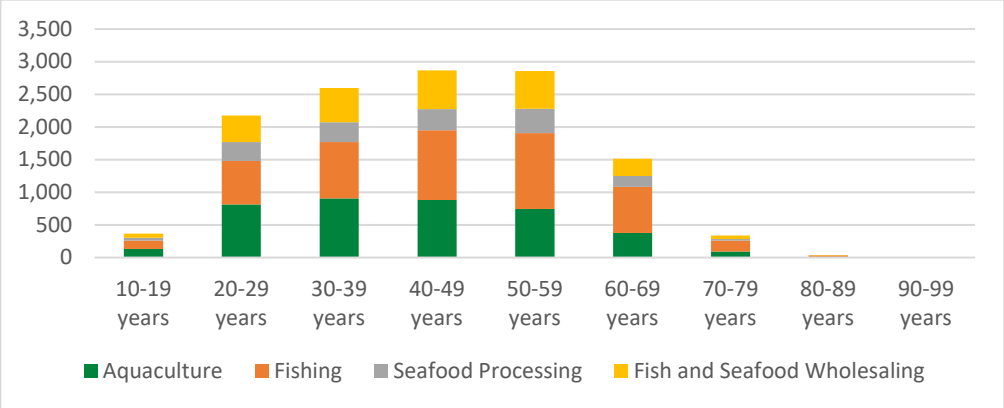
Table 6: Employment Level & Projection to 2023



Source: a) Australian Bureau of Statistics, 6291.0.55.003 - Labour Force, Australia, Detailed, Quarterly, August 2018: EQ06 - Employed persons by Industry group of main job (ANZSIC), Sex, State and Territory, November 1984 onwards (Pivot Table); b) Department of Jobs and Small Business, Labour Market Information Portal, Industry projections – five years to May 2023

The wild catch (fishing) sector, on the other hand, is struggling to fill vacancies. Employee attraction and retention is affected by staff movements within and between businesses, seasonal harvesting patterns, and staff leaving the sector. While aquaculture is employing young Australians, the fishing sector's labour force is aging (see Figure 3). The Tasmanian Seafood Industry Council[46] has identified business rationalisation, the lack of succession planning by fisheries and fewer owners holding an increasing proportion of quotas as contributing to the low attractiveness of entering the industry.

Figure 3: Seafood industry age groups



Source: Census of Population and Housing, 2016, TableBuilder

Current restrictions on working holiday and seasonal worker visa programs for skilled migration also exacerbate industry capacity to fulfil its labour demand. Operators in remote areas often have difficulty attracting experienced Australian staff for seasonal work, relying instead on international workers on temporary visas. At the end of June 2018, there were approximately 150 special visa holders working in the aquaculture and wild catch sectors. Individuals on special visas are obliged to leave the position after

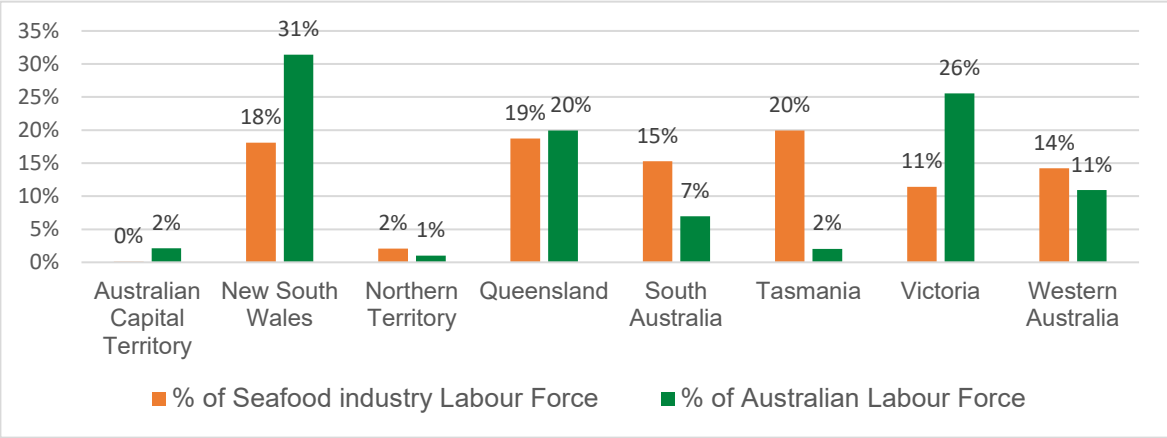
[46] Tasmanian Seafood Industry Council, 2017, 5-10 Year Strategic Workforce Profile

two years, leaving employers dependent on these workers but unable to plan long-term based on their employment.

As aquaculture continues to grow, reliance on overseas labour may increase. There is an industry need to identify the role of overseas labour and assess the ability of current overseas worker schemes to meet future demand. All employee attraction and retention strategies must be examined, and appropriate strategies implemented, including supporting training and assessment of competency. Actions to attract Indigenous and female workers to the industry should be encouraged and may provide an opportunity for RTOs to increase enrolments in *SFI Training Package* qualifications (see also **APPENDIX 1: SFI TRAINING PACKAGE DATA**, which highlights encouraging signs for the next generation of seafood industry workers, with high proportions of enrolees between 15 and 19 years, and located in very remote, remote and outer regional areas).

Changes in aquaculture and wild catch employment can have significant impacts at the local level, and even at State and Territory levels. Tasmania accounts for 20 per cent of seafood industry employees, compared to its two per cent share of the national labour force. South Australia accounts for 15 per cent of seafood industry employees while recording seven per cent of the national labour force, and the Northern Territory has two per cent of the seafood labour force compared to less than one per cent of the national labour force (see Figure 4).

Figure 4: States' Proportions of Seafood Industry and National Labour Forces



Source: Australian Bureau of Statistics 2017, 6291.0.55.003 - Labour Force, Australia, Detailed, Quarterly, August 2018: EQ06 - Employed persons by Industry group of main job (ANZSIC), Sex, State and Territory, November 1984 onwards (Pivot Table)

While the establishment of aquaculture and wild catch businesses in regional, rural and remote areas can benefit those communities, there is a lack of existing infrastructure to encourage these developments. Looking for opportunities to combine infrastructure use across training, education and multiple industries may help to encourage infrastructure investment in these areas.

Skills Outlook

The SFI training Package is presently being updated to meet current skills needs and fill skills gaps in the industry; however, industry development never stops.

The key priority skills identified by the IRC that will require future projects are:

- Development of the crocodile farming market;
- Increased use of FishTech and Aquabotics in operations;
- Development of partnerships with traditional owners for industry operations;
- Potential development of Indigenous enterprises related to aquaculture and wild catch, including customary fishing

Crocodile Farming

There appears to be a need to cover both bush/estuary and farm-based operations to create the best opportunities for the industry.

Skills may include:

- Working safely with crocodiles;
- Safe location and collection of crocodile eggs;
- Management of wild crocodiles in bush/estuary settings;
- Trapping and release of crocodiles;
- Transport of crocodiles and crocodile eggs;
- Incubation and hatchery operations;
- Crocodile feeding and handling;
- Maintaining welfare of crocodiles;
- Processing crocodile skin and meat;
- Crocodile population surveys and nest surveys;
- Indigenous rights and land regulation;
- Legislation and regulation related to crocodiles and safety ;
- Crocodile industry standards and quality control;
- Assessing and rating skin condition.

FishTech and Aquabotics

While FishTech and Aquabotics may be changing many of the ways industry is working, the fundamental basis of safely and sustainably dealing with living entities in water-based environments remains the key industry driver. Technological advancement is allowing for increasingly efficient monitoring, welfare practices and biosecurity activities, even in offshore aquaculture operations. It is also being used to conduct diverse activities previously undertaken by workers manually, including diving operations, on-deck vessel work, harvesting, hatchery and sample collections.

Distant operations create potential complications for fisheries compliance, however, from the enforcement of catch limits for recreational fishers being affected by the growing prevalence of small, remotely-operated fishing units, to shipboard wild catch monitoring operations in open sea, which may be superseded by uncrewed vessels and autonomous vehicles. Training developed and instituted over the next few years will assist the planning and operational adjustments required for compliance purposes.

While some job functions are being replaced by automation, existing occupations are evolving such that employees will be required to apply different sets of skills. Examples of these skills can be found in the current *SFI Training Package*, including:

- Locate, monitor and record fish stock and fishing operations;
- Operate uncrewed or automated vessels in water, marine and estuarine environments;
- Undertake deckhand and other crew work;
- Deploy aquaculture and wild catch equipment;
- Perform underwater work;
- Collect routine fishery management data;
- Collect broodstock, seedstock and fish stock;
- Operate and coordinate hatchery operations;
- Adjust and position fishing gear;
- Feed stock;
- Coordinate feed activities;
- Coordinate stock handling activities;
- Implement, monitor and review stock production;
- Monitor stock and environmental conditions;
- Harvest cultured or held stock;
- Manipulate stock culture environment;
- Maintain stock culture, holding and other farm structures;
- Coordinate construction or installation of stock culture, holding and farm structures;
- Produce and maintain algal and live-feed cultures;
- Plan stock health management;
- Develop and implement a stock health program;
- Collect reliable scientific data and samples;
- Carry out on-farm post-harvest operations;
- Supervise harvest and post-harvest activities;
- Maintain the temperature of seafood;
- Operate vessel deck machinery and lifting appliance;
- Develop and implement an aquaculture breeding strategy;
- Maintain water quality and environmental monitoring;
- Undertake routine maintenance of water supply and disposal systems and structures;
- All aspects of utilising high technology water treatment components from planning to maintenance;
- Oversee and undertake effluent and waste treatment and disposal;
- Implement aquaculture compliance;
- Conduct an investigative audit;
- Coordinate sustainable aquacultural practices;

- Act to prevent interaction with protected species;
- Oversee the control of predators and pests;
- Plan environmentally sustainable aquacultural practices;
- Implement and monitor environmentally sustainable work practices;
- Develop emergency procedures for an aquaculture enterprise;
- Oversee emergency procedures for on-land operations;
- Board vessel at sea.

New skills will also be required to address new and evolving complexities at an operations level. Operating on- and under-water is distinct from land and air operations. Maintenance issues, navigation, contingency planning and data analysis are all different from equivalent practices in other industries. Factoring in issues such as tidal movements, water flows, transition waters (e.g. estuarine and intertidal areas), salt-impacts, protection of water-based environments, equipment contamination, hydrostatic pressure and water quality adds to this complexity.

The AWC IRC is working to ensure that *SFI Training Package* components have the flexibility required to include both new and adaptive skills.

Partnerships with Traditional Owners and Indigenous Enterprise Skills

Legislative and judicial approaches are applied in the identification and recognition of Native Land and Sea Claims under the Australian system, which also utilises Indigenous Land Use Agreements. Specific rights may vary depending on whether claims cover land, intertidal zones, 'sea country', the contiguous zone and the exclusive economic zone. At least one Australian jurisdiction's (South Australia) policies require Indigenous Land Use Agreements in any area where there is a question of traditional fishing rights. The Productivity Commission recommends that Indigenous customary fishing should not be defined and limited by grants of Native Title or claims by specific Indigenous communities, but "should recognise all Indigenous Australians with a connection to sea country and a desire to engage in fishing activities in accordance with customary laws". [47]

[47] Productivity Commission, 2016, Marine Fisheries and Aquaculture, Final Report, p.171

Case Study: The Aarli Mari Aquaculture Project

This joint venture in the Kimberly Aquaculture Development Zone involves three traditional Indigenous custodians of the land, the Dambimangari, Mayla and Bardi Jawi, seeking formal production leases and licences.

The project is culturally significant, and training and education will build on traditionally-based fishing methods (tidal traps, spear fishing) to large-scale modern technology to supply sustainable seafood, supporting self-determination and healthy country and people.

The Aarli Mari project has completed all stages of feasibility and is in the investment capital-raising stage. It will create many business and employment opportunities for the local communities and reduce long-term social disadvantage in the region. The project has the capacity to employ 500 full-time staff on-farm (frm farms hands to high-level executive staff) and a further 1,000 full-time jobs indirectly.

Key to the project reaching this stage has been patiently building long-term relationships and trust, which has required many face-time meetings between the joint venture partners, and the recognition that fly-in, fly-out approaches have failed in the past.

Training is not available, locally or within reasonable travel distances. Nor is there an RTO available to deliver training on-country, which is a more effective method of training but difficult to achieve.

Sourced from Steven Gill, Deputy Chair, AWC IRC

The importance of Indigenous involvement is not only reflected in industry experience and practices but in building better outcomes. Both the *2017 National Aquaculture Strategy* and the *2017 Productivity Commission Inquiry Report into Marine Fisheries and Aquaculture* highlight the mutually beneficial outcomes that can be achieved by improving relations between industry operators and Indigenous communities. The Productivity Commissions found that there is also scope to increase the application of Indigenous traditional knowledge in fisheries management through Indigenous sea ranger programs and other means.

There are also suggestions in both reports that Indigenous commercial operations should be established, potentially in partnerships, and that there may be opportunities to develop commercial customary fishing arrangements. There is also likely a market in Pacific Island areas for fish stock caught, using traditional techniques, for customary and celebratory purposes, which may help to revitalise the traditional trepan trade. The Productivity Commission recommends that, as customary fishing activities are culturally sensitive and must not infringe upon the rights and interests of native title holders, they need to be developed in collaboration with Indigenous communities.[48]

Aquaculture and wild catch is a noteworthy and growing source of employment for Indigenous people, who already make up around three per cent of the seafood labour force (which is higher than the proportion of Indigenous employees in the national labour force). According to the *2016 Census of Population and Housing*, there were around 400 Aboriginal and Torres Strait Islander (Indigenous) employees in aquaculture and wild catch occupations. It is very likely also that the true figures are under-reported as the statistics do not include Indigenous customary fishing activities.

[48] Productivity Commission, 2016, Marine Fisheries and Aquaculture, Final Report, p.171

To meet existing challenges and create new opportunities, industry needs to develop skills at all levels to facilitate relationship-building between current operators (and their employees) and Indigenous organisations, Elders, communities and workers.

The AWC IRC recommends a preliminary project to begin this process and to clearly identify the skills Indigenous people believe are needed across the industry to build future partnerships.

KEY DRIVERS FOR CHANGE AND PROPOSED SOLUTIONS

This section will cover the crocodile farming and distant operations projects proposed for 2019–2020.

Drivers of the proposed research project for Indigenous consultation can be found in the **Industry Challenges and Opportunities** section under the heading 'Indigenous Fishing and Commercial Opportunities', while solutions, impacts and risks are covered in the project proposal detailed in the **PROPOSED PROJECTS** section.

Table 7: Crocodile Farming project

Key Drivers	Proposed Solutions	Stakeholder Impact	Risks of not Proceeding
Providing training for an industry with inherent safety risks currently not serviced by the VET sector Increasing the skilled workforce availability Supporting a developing industry to bring value across Northern Australia Protecting the high quality and reputation of the industry Developing relevant skills to support local and remote economies and Indigenous communities	Develop a qualification and Units of Competency to support crocodile farming Use the opportunity to impart broader skills in handling crocodiles used for farming and other industries, either through qualifications or skill sets	Improved worker safety and farm efficiency Ensure Australia's market reputation for high-value products is maintained Improved economic opportunities for mixed businesses with crocodiles, combining farming, tourism and additional activities Provide formal qualifications for workers in an industry where they are currently unavailable	Inability to address safety risks and increasing injuries as the industry expands Potential for reduced quality of product as industry expands and skilled workers are unavailable Potential for worsening animal welfare concerns as the industry expands Potential damage to Australia's international market reputation

Table 8: Fishtech & Aquabotics: real-time, distant operations project

Key Drivers	Proposed Solutions	Stakeholder Impact	Risks of not Proceeding
Changes in technology which improve safety and efficiency Building the Australian aquaculture and wild catch industry in line with broadly-supported strategies, policies and recommendations	Develop between three and 12 new Units of Competency Review 42 Units of Competency to broaden	Improved ability for industry to flexibly meet consumer demands New skills for workers and increased capacity to undertake	Diminished adaptability and responsiveness of industry, and consequential inability to meet industry growth targets

Enabling smaller operators to introduce new technologies with skilled worker availability Assisting industry in adjusting to changing fish movements and the introduction of new species Maintaining and improving the quality of industry products Ensuring compliance and regulation activities keep up with technological development	current skills to adapt to FishTech and Aquabotics Update the Companion Volume information relating to up to 16 Units of Competency Potentially develop new Skill Sets	new and evolving roles More efficient aquaculture, wild catch and seafood operations Improved capacity for smaller, regional and remote operations to introduce technology and compete in the marketplace Improved worker and consumer (food health) safety	Increasing potential for disease and other biosecurity risks Increasing urban-bias of the industry with resulting impacts on regional, rural and local economies and work opportunities Increasing reliance on non-Australian resident workers, with associated planning uncertainties and issues with attraction and retention

CONSULTATION UNDERTAKEN

There has already been significant consultation throughout 2018-2019 and this is on-going. Each IRC member undertakes consultations and networking with industry stakeholders and organisations, and training organisations.

The AWC IRC has guided and overseen consultations undertaken by Skills Impact both to support the development of this Skills Forecast and to complete current *SFI Training Package* projects. Organisations that have been consulted by Skills Impact include:

- National Aquaculture Council
- Seafood Industry Australia
- Australian Prawns Farmers Association
- Tasmanian Seafood Industry Council
- NT Seafood Council
- NSW Seafood industry Council
- Seafood Industry Victoria
- Western Australian Fishing Industry Council
- Wildcatch Fisheries SA
- Queensland Seafood
- Northern Australia Land and Sea Management Alliance
- Women in Seafood Australia
- Australian Baramundi Farmers Association
- Crocodile Farms Association NT
- Aquaculture Council WA
- Tasmanian Salmonid Growers Association
- Southern Rock Lobster Council
- Australian Southern Bluefin Tuna Industry Association
- Murray Cod Australia
- Pearl Producers Association
- Abalone SA
- Professional Fisherman's Association
- Tassel
- Huon Aquaculture
- Seafarms
- Clamms Seafood
- Petuna Seafood
- Kailis Bros

- Cameron Oysters
- RADAQUA
- Primo Aquaculture
- Maxima Enterprises
- Melbourne Seafood Centre
- Pacific Reef Fisheries
- Gold Coast Barramundi
- Gold Coast Tiger Prawns
- St Vincent Gulf Prawns Association
- Shark Bay Prawn Trawler Operators Association
- Australian Workers Union
- Maritime Union of Australia
- Australian Meat Industry Employees Union
- Clarence Fisherman's Co-Op
- Lakes Entrance Co-Op
- NSW Fishing Industry Training Committee
- Huon Valley Trade Training Centre
- Seafood & Marine Training
- Australian Marine & Fisheries Academy
- Marine & Safety Training NSW
- South Metro TAFE WA
- Melbourne Polytechnic
- Circular Head Christian School
- University of Tasmania
- Charles Darwin University
- Fisheries Research and Development Corporation
- Interdisciplinary Centre for Aquaculture Research
- Animal Health Australia
- State and Territory Training Authorities and Industry Training Advisory Boards
- Federal, State and Territory Government Departments and Agencies

PROPOSED PROJECTS

Project 1: Development of Qualification in Crocodile Farming & Processing

Description

The proposed project is to develop new qualifications in support of crocodile farming. This is an emerging sector of the Australian economy, which is showing export earnings growth and becoming a significant influencer in the labour markets and economies of remote areas in the Northern Territory, Western Australia and Queensland.

Rationale

This submission is founded upon projected industry growth (both within the NT and into WA and Queensland), worker safety requirements and the importance of protecting the Australian industry as a high-quality producer of crocodile skins in an increasingly competitive global market.

This proposal was formed following consultations with the Crocodile Farming Association Northern Territory (Employer Organisation), North Australian Indigenous Land & Sea Management Alliance (NAILSMA), which covers Queensland and Western Australia, Big Gecko Crocodile Research (Charles Darwin University) and Bawinanga Aboriginal Corporation (Land and Sea Rangers). It builds on the *Northern Territory Crocodile Farming Industry Strategic Plan 2015-21*, a joint initiative developed by the Crocodile Farmers Association and the Government, wherein one of the key strategies is to "Support the employment needs of crocodile farming businesses through workforce planning, development and training programs."

Crocodile farming is a growing industry in Northern Australia. Its estimated contribution to the Northern Territory economy more than $50 million in 2014-2015, with value added through activities associated with skins, meat, by-products, tourism and conservation. Australia has an international competitive advantage in producing first grade skins for high-quality fashion products and maintains approximately 60 per cent of global trade market share in crocodile skins, generating more than $25 million through exports in 2013[49]. The industry generates high levels of international investment and AgriFutures Australia has identified that crocodile farming has substantial flow-on benefits to small and isolated rural communities.

The uniqueness of crocodile farming means that training designed for other sectors, such as aquaculture, wild catch fishing, seafood and meat processing, agriculture and conservation, fails to meet the needs of industry. Ernst & Young's report on crocodile farming in the Northern Territory[50] highlights some of its distinctiveness:

> *"[…] it involves farming one of the world's oldest, least understood and most dangerous predators. It requires collecting (or 'ranching') eggs from wild crocodile nests using helicopters to drop in*

[49] Ernst & Young, 2017, Economic Value of the Crocodile Farming Industry to the Northern Territory
[50] Ernst & Young, 2017, Economic Value of the Crocodile Farming Industry to the Northern Territory, p.1

people, or needing to walk through unforgiving and swampy lands. It also then requires careful handling and management to ensure the crocodile eggs and then juvenile crocodiles are hatched then nurtured to minimise stress and protect their skins. Finally, the premium end product, crocodile skins, then often ends up as some of the World's most expensive and sought-after fashion accessories (handbags, shoes, purses and wallets) being worn in the finest establishments throughout the world with key markets in the United States and Europe. [… Crocodile farming]:

- *Combines farming with sustainable management of crocodile populations, other farming activities and public safety*
- *Combines farming with a major tourist industry, which provides one of the key reasons most tourists visit the NT*
- *Plays a key role in advancing species research, sustainable management practices, enhancing product quality and animal welfare*
- *Provides a source of private sector employment for traditional land owners and regional communities."*

The *2017 National Aquaculture Strategy* and the *2017 Productivity Commission Inquiry Report into Marine Fisheries and Aquaculture* highlight the importance of Indigenous involvement in the development of all aspects of the aquaculture and wild catch industries. This may include the potential for commercial fishing using customary methods and the development of enterprises, partnerships or agreements for fishing within areas covered by Indigenous Land/Sea Titles and Claims. The *2017 National Aquaculture Strategy* also identifies Training and Education as a key strategy to achieve the goal of doubling the current value of our aquaculture industry to $2 billion a year by 2027.

Changes in job roles, workplace or industry

The *Northern Territory Crocodile Farming Industry Strategic plan 2015–21* identifies workforce development as a priority. Industry experiences challenges due to enterprises operating within remote areas of Australia with tight labour markets. Territory and State Governments have sought to address safety concerns for these operators by producing resources on working with crocodiles.

The crocodile farming industry has not been supported by nationally-accredited VET training programs. The only known training was a program accredited in the Northern Territory specific to field-based management by Indigenous Rangers[51], and based on the *SFI20104 Certificate II in the Seafood Industry (Aquaculture)*. This program incorporated training in four areas specific to employees in crocodile farming and Indigenous and Park Rangers working with crocodiles:

1) Crocodile population surveys and nest surveys;
2) Egg harvesting and incubation;
3) Control of problem crocodiles and capture of wild crocs;
4) Hatchling maintenance.

There has been significant growth in crocodile farming and markets based on skins, meat, by-products, tourism and conservation. Following Northern Territory legislation that was instituted in the early 1980s, the Queensland Government recently amended laws to allow the controlled collection of wild eggs. There is therefore a need to undertake updated workforce and training analysis, including the development of trade-level training.

[51] The Northern Territory Government is investing $4 million annually into programs for Indigenous Rangers.

A new Agrifutures report[52] focusses on the conditions required for the upward trajectory of the crocodile industry:

> *Meeting customer specifications for skin quality underpins investments in this iconic emerging industry. […] Australian producers have a strong focus on ensuring leather quality and crocodile tanneries can be very selective about the quality of skins they purchase. The challenge for producers is to meet market standards. Thus, understanding more about what threatens final skin quality is paramount.*

The report recommends training for crocodile hygiene regimes. Furthermore, it highlights the range of infrastructure that employees may encounter, and work effectively within, on a commercial crocodile farm:

- Incubator – to incubate eggs if undertaking breeding (or, if permitted, eggs collected from the wild)
- Hatchling shed
- Grower shed
- Hospital shed – for treating sick or injured animals
- Breeder ponds – dedicated ponds for crocodiles to breed if undertaking breeding
- Grow out ponds – secured/ fenced ponds for crocodiles to grow to harvest size
- Abattoir complex – killing, skinning and meat processing
- Skin room – salting, packing and storage
- Machinery shed
- Work shed
- Freezer room – for storage of food supplies
- Chiller room
- Food preparation room
- Water storage tanks, pump houses, pumps and water reticulation – the amount of water required will depend on pond design, for example, concrete or fibreglass ponds use less water than earthen lakes or dams
- Water treatment area – for treatment of effluent water
- Security fencing

Consultations undertaken during 2018 indicate two areas for potential qualifications to be developed. There is a need to cover crocodile farm operations within a qualification, which may involve incubation, hatchery, feeding, breeding, processing and safety. The other qualification would relate to the management of crocodiles, covering egg collection, trapping and release, transport, regulations, Indigenous rights and safety. These two requirements can potentially be covered by a single qualification and the development of Skill Sets; however, there may be benefits to designing separate qualifications to enable greater movement between related occupations. These qualifications would include imported units.

[52] Agrifutures, 2018, Possible chinks in the crocodile armour, p.iii, accessed April 2019, https://www.agrifutures.com.au/wp-content/uploads/2019/03/19-009.pdf>

Need for Graduates

Many crocodile industry enterprises operate within remote areas that are affected by tight labour markets. It is critical that Australia maintain its reputation for safe, effective and sustainable crocodile farming operations – and so its international markets – given that there are higher production costs in Australia compared to competitor countries. This need can be partially met through the provision of accredited training.

The NT Government has funded an accredited course, *SFI20104 Certificate II in the Seafood Industry (Aquaculture)*, which was specific to field-based management training primarily for Indigenous Rangers. This program incorporated training in four areas which are needed both for employees in crocodile farming and for Indigenous and Park Rangers working with crocodiles:

1. Crocodile population surveys and nest surveys
2. Egg harvesting and incubation
3. Control of problem crocodiles and capture of wild crocs
4. Hatchling Maintenance

However, this training is not available in Queensland or WA. Given the nature and growth of the crocodile farming industry – including in Queensland and WA – and the inherent dangers of this occupation, the AWC IRC recommends that training package components in this area be *nationally*-accredited.

Timeline for Latest Changes

There are no current qualifications relating to crocodile farming.

There are two current Units of Competency relating to crocodiles[53], both of which were released in, and not updated since, July 2011:

- SFIAQUA212C – Work with crocodiles
- SFIPROC305B – Slaughter and process crocodiles

Low Enrolments and New Components

There are no current qualifications relating to crocodile farming. This project proposes up to two new qualifications in crocodile farming. Also, units of competency should be developed for the qualifications, which may be imported into other qualifications with job roles for park rangers, agritourism operators and meat processors.

Data

National employment data is not available for the specific field of crocodile farming. During 2014-2015, total employment (direct and indirect) in the industry was approximately 231 FTE (Full Time Equivalent) workers, with a further 33 FTE workers in associated construction activities. Most (91.4 per cent) farming operations employment was attributed to Darwin and the surrounding area, with the rest in regional areas[54]. Information is not available, however, on the breakdown of part- and full-time roles, but, in line with a number of occupations relevant to remote and Indigenous communities, high-levels of part-time and casual workers who share job roles are likely.

The maturity of the NT crocodile farming industry has resulted in a level of data that is not available for the other states. However, it should be noted that crocodile farming occurs across Northern Australia (including

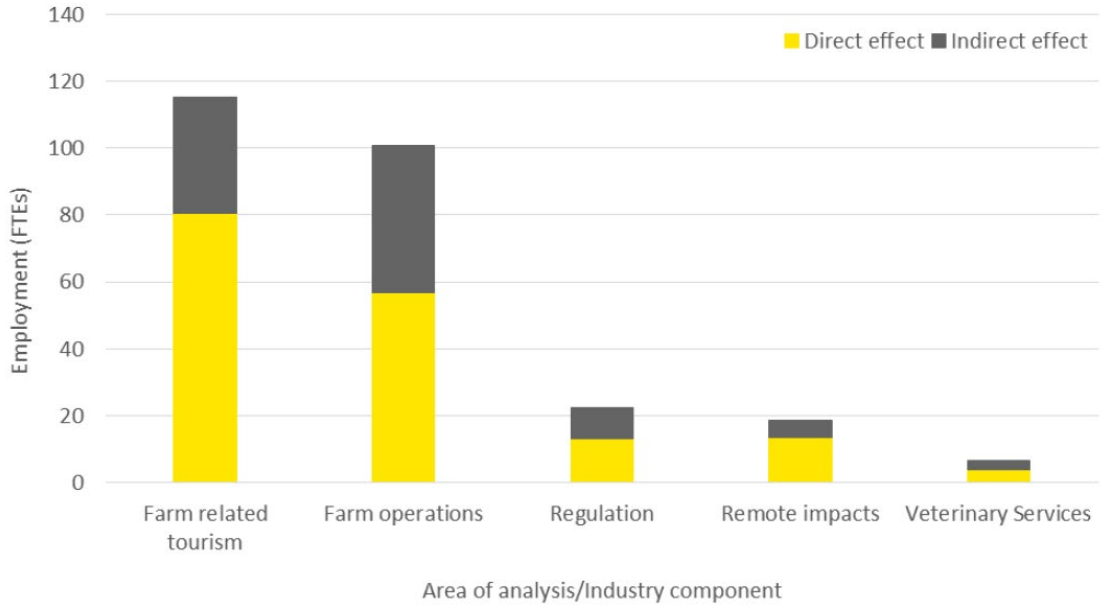
[53]https://training.gov.au/Search/Training?searchTitleOrCode=crocodiles&nrtSearchSubmit=Search&includeSupersededData=false&includeDeletedData=false&homePage=true&javaScriptEnabled=true&typeAllTrainingComponents=true
[54] Ernst & Young, 2017, Economic Value of the Crocodile Farming Industry to the Northern Territory, p.4

WA and Queensland) and that, in December 2018, Queensland removed restrictions on the collection of crocodile eggs. Thus, while the focus is on data from the NT (due to the solid evidence of industry growth and potential), industry is substantively broader.

According to Ernst & Young[55]:

> "*The Industry [in the NT] has the potential to significantly impact regional and remote communities by providing employment and income opportunities. The primary impact is through the egg collection or ranching process with Traditional Owners receiving royalty payments for eggs collected on their lands and locals being employed for the egg collection itself.*
>
> *The results indicate that during the 2014/15 financial year, crocodile farms spent $2.3m on egg collection and royalty costs. This direct output is the equivalent of employing 14 employees over the course of the year. The direct value added of this activity was $1.2m and the total value added was estimated at $1.9m.*"

Figure 5: Total employment within the Northern Territory crocodile farming industry components (FTEs), 2014/15



Source: Ernst & Young, 2017, Economic Value of the Crocodile Farming Industry to the Northern Territory, p.4

[55] Ernst & Young, 2017, Economic Value of the Crocodile Farming Industry to the Northern Territory, p.5

Table 9: Summary of economic output, value added and employment generated by the NT crocodile industry, 2014/15 Financial Year

	Direct	Indirect	Total
Economic contribution – Gross output			
Remote and Regional NT ($m)*	$2.31	$1.86	$4.17
Total Northern Territory ($m)	$64.44	$42.34	$106.77
Value added (subset of Gross output)			
Remote and Regional NT ($m)*	$1.19	$0.96	$2.14
Total Northern Territory ($m)	$33.67	$20.65	$54.33
Employment (jobs)			
Remote and Regional NT*	14	5	19
Total Northern Territory	168	96	264

Source: Ernst & Young, 2017, Economic Value of the Crocodile Farming Industry to the Northern Territory, p.6

Qualifications and Funding

There is no relevant data for qualifications or funding.

Ministers Priorities Addressed

Obsolete and duplicate qualifications removed from the system

There are no qualifications currently available. The only crocodile-related Units of Competency are obsolete and should be reviewed and updated or deleted.

More information about industry's expectations of training delivery is available to training providers to improve their delivery and to consumers to enable more informed choices

Information will be made available to training providers to assist in developing training in crocodile farming. Information will be developed to ensure training can be delivered appropriately in rural areas and Indigenous communities.

The training system better supports individuals to move more easily between related occupations

The proposed qualifications are trade-level and relate to an important, growing and multifaceted industry. Those appropriately trained in crocodile *farming* will also be substantially trained in dealing with crocodiles in wild and park settings, and in crocodile parks, as well as dealing with dangerous animals in multiple settings.

Improved efficiency of the training system through units that can be owned and used by multiple industry sectors

Units of Competency will be developed which will be appropriate for importation into qualifications in other training packages, including ACM, AHC (conservation and land management) and AMP. Units developed with aspects related to crocodile-specific agritourism may also be useful in the proposed AHC project covering incorporation of ecotourism and agritourism into AHC training.

Foster greater recognition of skill sets

It is likely that this project will result in the identification and development of additional Skill Sets, particularly relating to egg collection, wild capture and release, and agritourism.

Additional Federal Government Policies, Strategies and Priorities

The creation of accredited training to support the crocodile farming industry would also support priorities supported by the federal, State and Territory Governments outlined in the *2017 National Aquaculture Strategy* and the *2017 Productivity Commission Inquiry Report into Marine Fisheries and Aquaculture.*

Consultation Plan

The AWC IRC will advise on and oversee consultations, including identification of relevant experts and stakeholders. Initial development work will be undertaken in consultation with subject matter experts. Drafts will be created and reviewed by the experts. The drafts will then be made available for public feedback, with consultation sessions to be held around Australia. Following this, the final drafts will be validated through further consultation and Quality Assurance processes. The Case for Endorsement will be finalised and submitted to the AWC IRC for review and final approval, prior to submission to the AISC.

Stakeholders for Consultation

The *Aquaculture and Wild Catch* IRC will consult with the *Amenity Horticulture, Landscaping and Conservation & Land Management* IRC and the *Meat* IRC.

Stakeholders may include, but will not be limited to, the following:

- Crocodile Farm Operators
- Crocodile Farmers Association NT
- Queensland Crocodile Industry Group
- Crocodile Park Operators
- North Australian Indigenous Land and Sea Management Alliance
- Indigenous Rangers (including Federal Rangers, who are Commonwealth employees)
- Northern Land Council
- Big Gecko Crocodilian Research & Consulting
- Charles Darwin University

Other bodies:

- Indigenous communities, representatives and training organisations
- RTOs with potential to offer the qualifications
- Industry Training Advisory Bodies
- State/Territory Training Authorities

Scope of Project
Overview

Overview

Overall timing: eight months from delivery of signed Activity Order.

Expected Date for Endorsement: August 2020

Summary of Components

All work is within the SFI Training Package.

Qualifications

- New – up to two trade-level qualifications: crocodile farm operations; management of crocodiles.

Units of Competency

- Review – two Units
    - Update – two Units
- New – up to 15 units

Skill Sets

New – up to three Skill Sets

Table 10:

Qualification / unit / skillset	Code	Previous change (endorsement date)	Previous work (transition / update / establishment)	Work (new / update / deletion)	Entry level / trade / post-trade qualification	Expected date for endorsement
Unit	SFIAQUA212C	July 2011	Update	Update	N/A	July 2020
Unit	SFIPROC305B	July 2011	Update	Update	N/A	July 2020

Project 2: Skills for Future Fishtech & Aquabotics in real-time, distant operations

Description

The proposed project is to review specific units of competency to ensure that the skills required for an emerging work function, distant operations, are incorporated into existing units or covered in new units. The project does not include the review of qualifications but may result in the development of new skill sets. The review will include assessing whether relevant units and skill sets can be imported from the *MAR Maritime Training Package.*

Rationale

This priority was initially identified through consultation with Huon Valley Trade Training Centre (HVTTC) in Tasmania, who are working with Tassal and Huon, two companies that have already invested heavily in FishTech and Aquabotics for environmental and compliance monitoring, and net inspections, repairs and cleaning. Both companies have indicated their support and willingness to be involved with the development of training and skill standards, having already worked closely with HVTTC to develop resources. This project will also benefit smaller operators, who, as stakeholders have attested, will increasingly implement the technology as it becomes cheaper and more developed. Training would further enhance the ability of rural and regional communities to implement this technology.

Direct consultation which supported this project proposal was undertaken with:

- Tassal
- Huon Aquaculture
- HVTTC
- Tasmanian Seafood Industry Council (TSIC)
- Seafood & Maritime Training (SMT)
- Seafarms Group[56]

Reviewing specific units of competency will ensure that the skills required for a current – and currently emerging – work function, distant operations, are incorporated into the training package. The principal reasons are:

- Existing units need to be updated to meet current industry practices, as evidenced through stakeholder engagement that was demonstrative of widespread industry demand. Major employers, such as Huon and Tassal, are already using automation and remote operations technology, and train their employees in-house.
- Consultation on the current review of units (from previous Skills Forecast projects) has brought into focus developments for the future of the industry, particularly the application of automation and remote operations. Smaller operators are already investigating economically-viable ways of

[56] Seafarms provided information pertaining to specific requirements for Remotely Operated Vehicles in inland ponds (as vision is impaired underwater). Previously, the technology was considered inappropriate and prohibitively expensive; however, investment and support of any training development in this area is considered a strong possibility as a result of technological development. This company has been also been instrumental in the current SFI projects along with Tassal and Huon.

applying this technology to their operations, while the training sector, including technical colleges, is already introducing students to this future industry 'paradigm'. The objectives of this proposal therefore concern meeting emergent *and* future needs.

On a broader level, one of the priority areas identified in the 2017 *National Aquaculture Strategy*[57] is training and education in the sector, which is seen as a key driver for doubling the value of Australia's aquaculture industry by 2027. This strategy is supported (in material respects within the scope of the AISC/IRC) by Federal, State and NT Governments. The recommendations of the 2017 *Productivity Commission Inquiry Report into Marine Fisheries and Aquaculture* further reinforce the training directions and strategies of the aquaculture and wild catch industry.

There are major operational advancements emerging through 'distant operations' in aquaculture, wild catch, fishing and fisheries compliance, using remote control centres, cybernated processes and technologically-enhanced equipment. The IRC has identified this as a skills gap and priority training area, especially as rapid technological change is driving or contributing to productivity, operations, catch sustainability, environmental control, stock and habitat welfare, and biosecurity. There are numerous industry drivers for the adoption of this technology, with significant benefits for the environment, local community, workers, businesses and the international reputation and quality of the produce.

The aquaculture and wild catch industry has a number of major employers, whose training needs are changing. Some are already using remote operation centres and establishing additional capacity in distant operations. These employers have indicated a willingness to be involved in designing training suitable for remote operations which will better suit their needs.

With the growing potential and decreasing cost of the technology, industry operators are expected to increasingly adopt real-time, distant operations and uncrewed vessels and vehicles to enable more efficient monitoring, welfare and biosecurity practices, even in offshore aquaculture and wild catch operations. Many employers are undertaking planning and scoping exercises with a view to introducing these technologies. The IRC believes that these training requirements will need to be met by the time development of the training program is completed.

Distant operations (including control centres) have the capacity to be established in Indigenous and rural communities, and so facilitate government priorities relating to regional economies, employment and training opportunities, as outlined in the *National Aquaculture Strategy* and the *Productivity Commission Report*.

A successful aquaculture industry results in many economic and social benefits to regional and remote areas through employment and flow-on benefits to local businesses and the wider community; for example, infrastructure companies being contracted for developments. Training on remote operations will facilitate participation, as well as inclusivity for Indigenous communities in that it can be designed in light of 'the relationship between [the] social, cultural and physical contexts in which learners and (mobile) technologies operate.'[58]

Changes in job roles, workplace or industry

Large industry operators have already invested extensively in remote technologies, including remote operated vehicles and monitoring. Technological advancement is enabling increasingly efficient monitoring, welfare practices and biosecurity activities, even in offshore aquaculture operations. It is also being used to conduct diverse activities previously undertaken by workers manually, including diving operations, on-deck vessel work, harvesting, hatchery and sample collections.

[57] Department of Agriculture and Water Resources, 2017, National Aquaculture Strategy, Canberra.
[58] Wallace, 2011, in FRDC, 2016, *Development of the East Arnhem Fisheries Network Training Framework*, p.19 http://frdc.com.au/Archived-Reports/FRDC%20Projects/2012-403-DLD.pdf

Operating on- and under-water is distinct from land and air operations. Maintenance issues, navigation, contingency planning and data analysis are all different from equivalent practices in other industries. Factoring in issues such as tidal movements, water flows, transition waters (e.g. estuarine and intertidal areas), salt-impacts, protection of water-based environments, equipment contamination, hydrostatic pressure and water quality adds to the complexity. While current foundation courses in other training packages may be suitable for importation, it is likely that extensive development will be required to suit the specific employment needs of the aquaculture and wild catch industry.

Distant operations also create potential complications for fisheries compliance, from enforcement of catch limits of recreational fishers being affected by the growing prevalence of small remote operated fishing units, to shipboard wild catch monitoring operations in open sea, which may be superseded by uncrewed vessels and autonomous vehicles. Training developed and instituted over the next few years will assist the planning and operational adjustments required for compliance purposes.

IRC members advised pest and disease management and surveillance is not limited to domestic borders. Biosecurity risks can enter Australia through the sea and air movement of people through our traditional trade pathways with PNG and Torres Strait. In conjunction with the Developing Northern Australia White Paper more than $60 million is being invested in designing, implementing and promoting collaborative biosecurity surveillance capability, practices and technologies. As a result of this investment, funding is been used to increase and expand the Indigenous Rangers (land and sea) network and specific ROV technology to address aquatic and marine biosecurity surveillance in the Torres Strait.

In this context, most job roles in the industry will be affected over the next few years, and new roles may be introduced, particularly in autonomous, uncrewed and remote vessel/vehicle operations, scientific testing and compliance.

Examples of the ways in which job roles are changing due to this technology include:

- Fish in NSW can be fed at the push of a button in a Tassal control centre in Tasmania. This allows all fish to be fed at the same time, thus sustaining a healthy and balanced diet.
- Real-time, remote monitoring by workers viewing ultra-HD screens (whose shifts overlap to ensure that there are no gaps in observation activities) now allows fish health and behaviour – especially signs of stress or disease – to be identified immediately.
- Increasing application of science knowledge and skills: biosensors are used to monitor water temperature, pH, salinity, oxygen, turbidity and pollutant levels to help ensure fish are in optimal environmental conditions[59].
- Roles for operating drones (above and below the water) are evolving, allowing numerous tasks to be completed remotely that would previously have required specialised and expensive human intervention, including underwater cage inspections for damage or holes. Drones are also able to collect information that can be used to create algorithms to further develop the technology and aquaculture applications. Job roles are thus evolving to focus on data collection and analysis, for fish, environmental conditions and equipment/apparatus. Remotely operated vehicles (ROVs) can survey and monitor benthic habitats and species, especially in depths beyond the range of SCUBA divers. Their manoeuvrability and real-time visualisation means that operators can use them effectively to investigate the seabed. Many scuba divers are now re-training as ROV operators[60]:

  > *Competent ROV pilots are required to ensure a high-quality survey. Previous experience in the planned survey operation is preferred as ROV pilots experienced in other types of operation won't necessarily understand the specific needs of scientific ROV dives and may*

[59] http://ag.alltech.com/en/blog/8-digital-technologies-disrupting-aquaculture
[60] JNCC, 2018, Remotely Operated Vehicles for use in marine benthic monitoring

> *lack experience in manipulating organisms/obtaining samples effectively and efficiently. The amount of experience required to be a competent ROV pilot varies among pilots based on their aptitude and skills*
>
> *JNCC, 2018, Remotely Operated Vehicles for use in marine benthic monitoring, p.8*

These advances have significant safety benefits: fewer manual jobs means less time on boats and underwater, which is significant given the risks of extreme weather conditions.

Current roles that are undergoing or may soon go through transition include:

- Aquaculture Production Hand Assistant
- Aquaculture Leading Hand
- Aquaculture Production Hand
- Aquaculture Business Support Worker
- Aquaculture Maintenance Worker
- Aquaculture Supervisor
- Aquaculture Operations Manager
- Fisher Hand
- Deck Hand
- Senior Deck Hand
- Farm Hand
- Hatchery Attendant
- Diver
- Environmental Management Specialist
- Fisheries Compliance Support Worker
- Fisheries Compliance Officer
- Senior Fisheries Compliance Officer
- Fisheries Compliance Manager

Need for Graduates

Both the *National Aquaculture Strategy* and the *Productivity Commission Report* identify an increasing requirement for graduates. This includes the need to minimise skill shortages, secure long-term jobs growth, improve the development of industry-based career paths, address issues relating to overseas labour and seasonal worker schemes and attract new workers to the industry. The *National Aquaculture Strategy* specifically identifies the pivotal roles of the AISC and the AWC IRC in achieving the strategic outcomes.

Timeline for Latest changes

All relevant qualification and units have been reviewed and updated in 2018 or are currently in the validation process, with the Case for Endorsement scheduled for submission in the next few months.

The *Aquaculture and Wild Catch* IRC has focused on updating all SFI qualifications over the last two years so that they are fit-for-purpose for current, broad industry requirements. Labour needs, training programs being due for a review, and industry sector change and growth meant that consultations were primarily focused on how work is currently completed across the industry, and on technological advancements in widespread use. The size and scale of previous projects required that focus not be shifted from updating these immediate requirements in order to complete the projects in a timely manner and to start delivering job outcomes for the industry.

During consultations and redevelopment of the training package, it became clear that there are emerging methods of work, particularly relating to distant operations, and that these would need to be addressed soon.

Low enrolments and New Components

Areas of low enrolments have been addressed through previous projects, and only recently-approved units or units that will be recommended for update in the forthcoming case for endorsement are included in this project. Work here will introduce new components related to remote operations and should further encourage additional enrolments from major employers.

New components may be required in:

- Location activities for stock and fishing grounds;
- Operating vessels (uncrewed);
- Performing underwater work;
- Environmental control;
- Stock and habitat welfare;
- Handling, harvesting and collecting stock;
- Retrieving catch and other equipment;
- Feeding and hatchery operations;
- Biosecurity.

It is expected that at least three, and up to 12, new units will need to be developed. In addition, one to three new skill sets may be developed.

Recent changes have been made to the *MAR Maritime Training Package*, which have impacted on AWC industries' abilities to meet some regulatory requirements. The recent updates will be reviewed to assess whether there are new MAR units that can be imported to support remote operations, and the *Maritime* IRC will be consulted about proposed changes.

Existing Components and cross-sector approaches

Forty-two units will be reviewed for their potential to be updated with criteria relating to remote operations. Where possible, preference will be given to updating current units rather than developing new ones, although some new units will need to be developed.

In addition, 16 units will require that information be provided to RTOs to ensure their awareness that existing units can be taught and assessed with reference to remote operation centres and settings.

Data

Detailed data is included in relevant sections of this Skills Forecast and in the 'Table A' document submitted to the AISC separately.

Ministers Priorities Addressed

Obsolete and duplicate qualifications removed from the system

No obsolete or duplicated qualifications will be removed from the system.

More information about industry's expectations of training delivery is available to training providers to improve their delivery and to consumers to enable more informed choices

There are currently 16 relevant Units of Competency that are flexible enough to enable delivery and assessment in remote operations settings. The relevant Companion Volumes will be updated to provide this additional information.

The work will provide competency, knowledge and assessment requirements to enable RTOs to design and develop training for remote operations.

The training system better supports individuals to move more easily between related occupations

Developments will help current workers transition to roles in distant operations settings.

Improved efficiency of the training system through units that can be owned and used by multiple industry sectors

The AWC IRC will look at importing relevant units from the *MAR Training Package* and the *Aviation Training Package*, and the Maritime IRC will be consulted.

Foster greater recognition of skill sets

It is likely this project will result in the identification and development of additional Skill Sets.

Additional Federal Government Policies, Strategies and Priorities

The creation of accredited training to support distant aquaculture and wild catch operations will also support priorities supported by the Federal, State and Territory Governments and outlined in the *2017 National Aquaculture Strategy* and the *2017 Productivity Commission Inquiry Report into Marine Fisheries and Aquaculture.*

Consultation Plan

The Aquaculture and Wild Catch IRC will advise on and oversee consultation strategies, including identification of relevant experts and stakeholders. Initial development work will be undertaken in consultation with relevant subject matter experts. Drafts changes will be created and reviewed by the experts. The drafts will then be made available for public feedback, with consultation sessions to be held around Australia. Following this, the final drafts will be validated through further consultation and Quality Assurance processes. The Case for Endorsement will be finalised and submitted to the Aquaculture and Wild Catch IRC for review and final approval, prior to submission to the AISC.

Stakeholders for Consultation

The Aquaculture and Wild Catch IRC will consult with the Maritime IRC.

Stakeholders may include but will not be limited to the following:

- Seafood Industry Australia

- National Aquaculture Council
- Australian Barramundi Farmers Association
- Australian Prawn Farmer's Association
- Australian Council of Prawn Fisheries
- Australian Southern Bluefin Tuna Industry Association
- Tasmanian Salmonid Growers Association
- Commonwealth Fisheries Association
- Oysters Australia
- Pearl Producer's Association
- Seafood Industry Marketers Association
- Australian Fisheries Management Authority
- Australian Maritime Safety Authority
- Maritime Union Of Australia
- Australian Workers Union
- North Australian Indigenous Land and Sea Management Alliance
- Major and mid-level employers, including Tassal, Huon and Seafarms
- CSIRO
- FRDC

Other bodies

- Indigenous communities, representatives and training organisations
- RTOs with potential to offer the training
- Industry Training Advisory Bodies
- State/Territory Training Authorities

Scope of Project
Overview

Overview

Overall timing: eight months from delivery of signed Activity Order

Expected Date for Endorsement: August 2020

Summary of Components

All work is within the *SFI Training Package*.

Qualifications

No qualifications have been identified for review.

Units of Competency

- Review and update – 42 units
- No units have been identified for deletion
- New – up to 12 units

Skill Sets

- New – up to three Skill Sets

Project 3: Indigenous Consultation for future AWC IRC/SFI Projects

Description

The proposed project is to undertake research and consultation to maximise the chances of successful future *Aquaculture and Wild Catch* (AWC) projects aimed at:

- Taking advantage of new and emerging markets;
- Improving training and job outcomes (particularly in remote areas and Indigenous communities);
- Improving industry skills in negotiations and partnerships with Indigenous business and community organisations, in both industry and training sectors.

Key Project Deliverables

The AWC IRC has identified key deliverables to be achieved during the project:

- Joint guidance developed with Indigenous organisations to initiate effective consultation for the future development of training package projects;
- Identifying potential solutions – which can be researched by the AWC IRC and enshrined through training package standards – which are acceptable to Indigenous organisations for improving training and employment outcomes in remote Indigenous communities;
- Joint guidance on designing a future project for VET training to help AWC organisations develop joint ventures and commercial opportunities with Indigenous communities and organisations;
- Recommendations from the Indigenous communities and organisations on the potential for developing commercial, customary AWC activities, including issues relating to sharing customary traditions and the opportunities that may exist to support development (focused on the skills and training needed to create outcomes).

Each of these will be assessed and approved by the AWC IRC prior to submission to the AISC. While the project is utilising the footprint of the aquaculture and wild catch industry (as outlined below), it is anticipated that these four deliverables will include useful information for a range of IRCs in industries operating on or near Indigenous lands and seas across Australia.

Rationale

The *Aquaculture and Wild Catch* Industry Reference Committee acknowledges the importance of Aboriginal and Torres Strait Islander (Indigenous) involvement in the development of all aspects of the aquaculture and wild catch industries. This is not only reflected in industry experience and practices, for both the *2017 National Aquaculture Strategy* and the *2017 Productivity Commission Inquiry Report into Marine Fisheries and Aquaculture* highlight the mutually-beneficial outcomes that can be achieved through improvements in relationships between industry operators and Indigenous communities.

The importance of an Aquaculture & Wild Catch Project

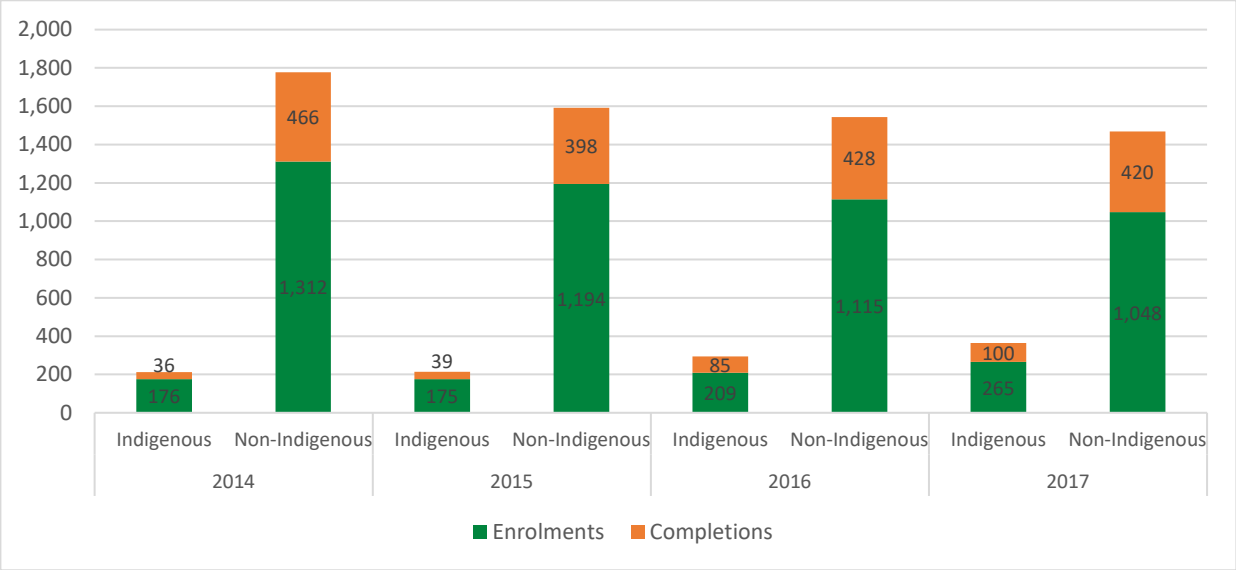
In considering submission of a project in this area, the AWC IRC assessed whether this was an appropriate industry for the project, and whether a cross-sector project would be more suitable.

Aquaculture and wild catch are traditional activities of Indigenous communities, both in the customary and commercial senses. This is very different to most of the trades and industries – many of which were established in post-settlement Australia – in which VET training is offered. There is evidence of seafood trading and ceremonies involving the sharing of seafood between Indigenous communities. There is also evidence of trading in sea products between Australian Indigenous communities and countries to the North and into the Pacific islands prior to settlement[61].

Aquaculture and wild catch is a noteworthy and growing employer of Indigenous people, who already make up around three per cent of the industry labour force (which is higher than the general Indigenous participation rate in the labour force). According to the *2016 Census of Population and Housing*, there were around 400 Aboriginal and Torres Strait Islander (Indigenous) employees in aquaculture and wild catch occupations. It is very likely that these figures under-report participation as they do not include Indigenous customary fishing activities.

Since 2014, participation by Indigenous people in the *SFI Training Package* has increased significantly. Enrolments by Indigenous people in 2017 were 50 per cent greater than in 2014; and, concurrently, completions increased by 178 per cent.

Figure 6: Enrolments & completions by Indigenous and non-Indigenous people



Source: NCVER VOCSTATS, a) TVA program enrolments 2014-2017; b) TVA program completions 2014-2017

Northern Territory Fisheries manages the Aboriginal Coastal Licences and delivers two support programs, the Aboriginal Fishing Mentor Program and the Indigenous Marine Training Program. Indigenous Northern Territory Fisheries officers act as mentors to help fishers learn how to operate commercially in their communities, including how to maintain gear, how to process and store catch, and how to comply with fisheries regulations. The Indigenous Marine Training Program formalises the skills and training provided through the delivery of nationally-accredited training to participants. More than 45 participants have completed a *Certificate II in Fishing Operations*, which is delivered by Northern Territory Fisheries in partnership with the Northern Territory Department of Trade, Business and Innovation and the Australian

[61] Productivity Commission, 2016, Marine Fisheries and Aquaculture, Final Report, p.158

Maritime and Fisheries Academy. The success of the program saw it awarded the 2017 National Seafood Industry People Development Award.[62]

The *Productivity Commission Report* was particularly important in informing the IRC's decision to undertake its own industry project. A key issue for the productivity Commissions was that:

> *"A number of participants have raised concerns about the small number of Indigenous Australians engaged in commercial fishing and suggested that governments should be more active in promoting involvement. More generally, commercial fishing is seen to provide an opportunity for employment, income and economic development for Indigenous Australians while also providing an opportunity to maintain an attachment to country."*[63]

The Commission Report devotes Chapter Five to Indigenous Fishing, noting that more than half of all Indigenous people aged over 15 have participated in customary fishing. Among the key points made in the report were:

- There is a need to improve engagement between fisheries managers and Indigenous fishers. There is also scope to increase the application of Indigenous traditional knowledge in fisheries management through Indigenous sea ranger programs and other means;
- To ensure that the customary allocations and any controls over customary fishing activities are culturally sensitive and do not infringe on the rights and interests of native title holders, they need to be developed in collaboration with Indigenous communities;
- Native title determinations have recognised the right of some native title holders to fish for any purpose, including sale, barter and exchange. Consistent with the intent of recognising customary fishing rights, the definition of customary fishing should provide for fishing for such purposes where in accordance with Indigenous laws and customs;
- Native title provides access to fisheries for some groups. Changes in jurisprudence and the slow pace of native title determinations have created uncertainty over the full extent of native title rights and interests. This uncertainty has contributed to customary fishing often being managed by exemption under fisheries laws rather than being recognised (and managed) as a sector in its own right.

The Productivity Commission Report further notes that customary fishing has individual benefits for the fisher, through the value of the catch, its consumption and connectivity to cultural heritage, and to the wider Indigenous community, wherein traditional customs and behaviours are upheld.

A further factor considered by the IRC is the lack of knowledge concerning Indigenous fisheries practices and management that could inform training programs. The *Productivity Commission* notes that there are few systems in place to formally recognise the traditional fishing knowledge and management practices of Indigenous Australians by fisheries authorities. This knowledge will be useful in the development of training relating to any commercial customary fishing activities and may be useful more broadly in SFI training products.

Previous endeavours by industry stakeholders have demonstrated the efficacy of establishing robust frameworks from which projects may proceed (see the example of the East Arnhem Fisheries Network Training Framework below). Such precursors will act as resources for establishing this project's research methods and opportunities for engaging with experienced stakeholders. The project will also take heed of

[62] http://www.frdc.com.au/Media-and-Publications/FISH/FISH-Vol-26-2/On-country-fishing-brings-broader-benefits
[63] Productivity Commission, 2016, Marine Fisheries and Aquaculture, Final Report, p.181

the documented successes and failures of other aquaculture projects in Northern Australia[64], and acknowledge the challenges for Indigenous participation in VET (as described in a "series of projects [that] were undertaken by a partnership of Indigenous enterprise owners, Registered Training Organisations and Industry representatives to explore the role of accredited training and effective pedagogies."[65]).

East Arnhem Fisheries Network Training Framework

The report on the *Development of the East Arnhem Fisheries Network Training Framework*[66] contends that, generally, delivery of seafood-related training and materials to support enterprise development lacks coordination, while delivery methods are inconsistent and are not sufficiently contextualised. To encourage participation by Yolngu in the seafood industry, the NT Department of Primary Industry and Fisheries (DPIF) proposed that the project aim to support the establishment of Yolngu commercial fishing and aquaculture in the East Arnhem region, and to coordinate education and training in seafood and small business skills for Yolngu[67]. Support from the Department of Resources – Fisheries Division included technical training, while the seafood industry was consulted for input from commercial fishers as mentors and partners to help with skill development.

The project aimed for transparency and inclusivity, with materials and updates published in an online forum[68], which includes passages on 'Training Approaches', 'Resources, Vocational Training Program (VTP), Work skills and qualification levels', 'Literature About Aquaculture Business Development' and 'How resources, Vocational Training Package, qualification levels and work match up' (which includes tables mapping work role skills to specific units of competency).

The project created a tool for stakeholders and a foundation for VET at Charles Darwin University to recognise students' competence. Outcomes included:

1) The development of a training framework for sustainable seafood-based enterprises for Indigenous people
2) Accreditation of a Vocational Training Programme for Indigenous Seafood based Enterprises at Charles Darwin University using Nationally Endorsed Units of Competence
3) Exemplars of contextualised training and assessment plans and materials in English, Maung and Yolngu Matha, and additional material available on a shared website which includes extension project work as other Aboriginal groups involved in aquaculture have joined the project.

In consideration of these factors, the AWC IRC submits that an industry-specific project is appropriate, while recognising that the results of this project should be shared with other IRCs, SSOs and more broadly where possible.

Initial stakeholder feedback has been positive.

[64] Fleming, Petheram and Stacey, 2015, Australian Indigenous women's seafood harvesting practices and prospects for integrating aquaculture, *Journal of Enterprising Communities: People and Places in the Global Economy*, Vol. 9, Issue 2
[65] https://indigenousfisheriestrainingframework.files.wordpress.com/2015/06/cs4-2-ruth-wallace-et-al.pdf
[66] R. Wallace and J. Funk, 2016, Development of the East Arnhem Fisheries Network Training Framework, FRDC Project No 2012/403, accessed April 2019, <http://frdc.com.au/Archived-Reports/FRDC%20Projects/2012-403-DLD.pdf>
[67] https://dpir.nt.gov.au/__data/assets/pdf_file/0005/258791/east-arnhem-indigenous-fisheries-network.pdf
[68] https://indigenousfisheriestrainingframework.wordpress.com

Project Need

The AWC IRC recognises that there are very significant differences in approaches between industrial and Indigenous cultures, which have an impact in the VET sphere. For example, Altman and Fogarty[69] note:

> *"Education needs to be tailored to serve the livelihood aspirations of Indigenous people participating in a hybrid and intercultural economy […] Rather than providing mainstream education for futures in the market (sometime called the 'real') economy, consideration also needs to be given to educational innovation to meet diverse vocations needs in the hybrid economy."*

Delivering the objectives identified in the *National Aquaculture Strategy* and the *Productivity Commission Report* will require tailored training solutions that meet the needs of both the 'real' and 'hybrid' economies. While many of these issues should be addressed at delivery/RTO level, solutions need to be offered within the National Training Package Standards to meet overarching objectives guided by the AISC. While localised and tailored training delivery may produce better outcomes for learners, there is a need to avoid entrenching disadvantage by failing to recognise achievement through a national qualification and by limiting graduate portability and mobility.

The IRC wish to support the foundations for increasing Indigenous involvement in AWC and is considering projects that could facilitate opportunities in areas such as:

- The development of enterprises, partnerships or agreements for AWC onshore, offshore and intertidal activities within areas covered by Native Land/Sea Titles and Claims;
- The establishment of operations and remote operations centres in Indigenous and isolated communities where establishment may have significant impacts on the economic health and training opportunities for local communities;
- Commercial fishing using customary methods to service markets through Australia and the Asia Pacific area (especially the Pacific Islands) where sea produce has been used in customary celebrations, rites and ceremonies.

Developing opportunities for creating beneficial outcomes faces numerous barriers[70], including:

- Ensuring Indigenous involvement and 'ownership' of projects to drive the greatest prospects of success;
- Addressing high levels of non-completion of VET training in remote Australian locations, and the disconnect between successful completion of training and employment outcomes[71];
- Addressing issues concerning the delivery of training in remote areas, relating to both Indigenous VET and to meeting the needs of the AWC industry, especially the lack of RTO availability and delivery;

[69] J. Altman and B. Fogarty, 2010, Indigenous Australians as 'No Gaps' Subjects, Education and Development in Remote Australia, p.110

[70] The success and failure of aquaculture projects in Northern Australia has been discussed in Fleming, Petheram and Stacey, 2015, Australian Indigenous women's seafood harvesting practices and prospects for integrating aquaculture, Journal of Enterprising Communities: People and Places in the Global Economy, Vol. 9, Issue 2

[71] G. Windley, 2017, Indigenous VET participation, completion and outcomes: change over the past decade, NCVER, Adelaide.

- The difficulties for AWC industries and Indigenous communities in obtaining the information and skills needed to work together to create commercial and other opportunities;
- Addressing the lack of incentive for Indigenous students to participate in training in very remote areas where there is no labour market.

Previous consultative arrangements in fisheries management have been described as ineffective by the Productivity Commission. Quoting the Northern Land Council, the report notes[72]:

> "*A number of participants considered that existing engagement is inadequate, and many Indigenous Australians are unable to participate in the design and implementation of fisheries regulations. While Indigenous Australians may be consulted on management decisions, 'frameworks for community engagement toward consent and decision making processes remain strikingly absent.'*"

This means that there is already a cultural barrier that the AWC IRC needs to overcome to successfully consult with Indigenous communities on future Training Package projects. Further examples of barriers for Indigenous involvement in aquaculture and wild catch include commercial, regulatory and licensing arrangements, which are not aligned to traditional practices and requirements.

The Productivity Commission Report states[73]:

> *"More fundamentally, experience in Australia has demonstrated that policy initiatives aimed at creating development and employment opportunities for Indigenous communities often fail because they do not incorporate the broader prerequisites for success. These include* ***closely involving the community in designing and implementing initiatives, as well as investing in education, training and broader capacity-building****. In other words, access to a fishery is only likely to generate positive and sustainable economic benefits and employment for an Indigenous community (presuming that this is indeed the best way of encouraging economic development) if it is part of a broader, multifaceted strategy in which the community is actively involved."*

These concepts are central themes running through guidelines and research on engaging with Indigenous communities, including the *Australian Government Closing the Gap Engagement Principles* (2013), the *Australian Government Guidelines for Communicating with Aboriginal and Torres Strait Islander Audiences* (2016), the *Australian Institute of Aboriginal and Torres Strait Islander Studies principles for ethical research* (current), the *Aboriginal Knowledge and Intellectual Property Protocol* (2010), *IP Australia Consultation Paper on Indigenous Knowledge Protection* (2018), and many other examples.

These themes are evident in NCVER reports[74] identifying factors critical to positive and improved outcomes for Indigenous Australians from vocational education and training. The relevant factors are:

- Community ownership;
- Trusting relationships and partnerships with communities;
- Respect for cultural knowledge and capacity;
- The utilisation of local capabilities and aspirations;
- Culturally aligned policies and practices.

The Australian Government's *Closing the Gap*[75] engagement principles raise an issue of particular concern to the AWC IRC when identifying a barrier to success:

[72] Productivity Commission, 2016, Marine Fisheries and Aquaculture, Final Report, p.179
[73] Productivity Commission, 2016, Marine Fisheries and Aquaculture, Final Report, p.184
[74] Ackehurst, Polvere and Windley, 2017, Indigenous participation in VET: understanding the research
[75] J. Hunt, 2013, Closing the Gap: Engaging with Indigenous Australia - exploring the conditions for effective relationships with Aboriginal and Torres Strait Islander communities, p.3

> "*Hurried, one-off 'consultations' that are organised without Indigenous input into their design,* ***where the parameters for discussing the analysis of the problem and possible solutions are centrally determined and fail to take proper account of Indigenous aspirations, ideas of wellbeing, and social contexts.***"

From the perspectives of those working inside the National VET Training Package system, it may be seen to have significant flexibility; however, when trying to engage with outsiders to the system, there is a need to be open about the guiding frameworks, which include:

- Minister's priorities;
- Training Package Standards;
- IRC Operating Framework;
- The extensive use of templates which must be completed to set standards.

Particularly from the perspective of Indigenous communities, work from these starting points may be considered as taking place in a system designed without Indigenous consultation and precluding consultation suitable for Indigenous communities. Any consultations may justifiably be interpreted as occurring within centrally-determined parameters that hence limit involvement, ownership and solutions.

This may also lead to solutions being viewed as having been designed with a one-size-fits-all approach. Cuervo, Barakat and Turnbull[76] identify many recent examples where the appearance of a one-size-fits-all approach failed. Even the use of terminology can cause issues; for example, the Queensland Government recommend the use of the term "negotiation" rather than "consultation" to ensure Indigenous communities are reassured that contributions are important and valued and will lead to practical results.

Project recommendation

The IRC recommends an initial project, that precedes specific training package project work, to describe methodologies on addressing these issues. The IRC must consider how to work with Indigenous communities to fully understand the scope of the opportunities and barriers, including:

- skills and competency requirements;
- the best methods of development (including consultation/negotiation) and working with Indigenous communities;
- appropriate methods for developing competencies and assessment, including Elder involvement, and the potential for the SFI or other training packages to support job outcomes.

The AWC IRC believes that this project is required to ensure the building of trusting relationships, Indigenous community ownership and involvement in future developments, and to achieve the market growth and other targets identified in the National Aquaculture Strategy, the Productivity Commission Report and those that may need to be defined to establish and strengthen hybrid local economies.

The AWC IRC also acknowledges the possibility that the project will overstep its boundaries if they are not well-defined and consistently relevant to training products. This project cannot extend into consultation with individual communities until the preliminary groundwork is completed. The scope of this project has been limited to key Indigenous organisations that can provide the foundational knowledge for informing project design (prior to detailed community consultation on training package products).

[76] Cuervo, Barakat and Turnbull, 2015, Youth, belonging and transitions: Identifying opportunities and barriers for Indigenous young people in remote communities

As a result, the AWC IRC has elected to define key deliverables with reference to training package products, thus averting ethical concerns of the project encroaching beyond its scope.

Case Study: Pilbara Rock Oyster R&D Project

Pilbara Rock Oyster Research & Development Project is a partnership between the Pilbara Development Commission, Fisheries Research Development Corporation, Murujuga Aboriginal Corporation, City of Karratha and Maxima Pearling Company. The project is the initial stage in developing a commercial oyster industry within the region and seeks to fill the knowledge gap to assist in attracting prospective aquaculture developers and investors to the region. WA has the largest coastline in Australia, although this is not reflective of the aquaculture industry presenting enormous growth opportunities.

The project currently receives government funding for one Ranger. This is inadequate as regulations require two persons on vessel, so there is always a need to find additional skilled workers, which is difficult in light of regional isolation. Rangers enjoy the work on oyster farms and learning growing techniques; but they are limited for time, always competing with their daily Ranger duties.

There is a lack of skills in aquaculture within regional and the Indigenous communities. One option being examined is a Prisoner Employment Program working with the local correctional facility, in which more than 90 per cent of the inmate population is Indigenous. The scheme would allow transition to work and create the opportunity for meaningful work and training, two-days per week, with appropriate SFI & MAR training/qualifications.

Sourced from Steven Gill, Deputy Chair, AWC IRC

Changes in job roles, workplace or industry

Aquaculture and wild catch has a complex and difficult operating environment.

As a starting point, AWC operations face the complexity of defining the rights to operate, not only in terms of the complex and restrictive regulatory environment identified by the Productivity Commission, but also in terms of territorial rights issues. Australia has legislative and judicial approaches to the identification and recognition of Native Land and Sea Claims under the Australian system, and also utilises Indigenous Land Use Agreements. Specific rights vary depending on whether claims cover land, intertidal zones, 'sea country', the contiguous zone and the exclusive economic zone. At least one Australian jurisdiction (South Australia) requires Indigenous Land Use Agreements in any area where there may be a question of traditional fishing rights. The Productivity Commission recommends that Indigenous customary fishing should not be defined and limited by grants of Native Title or claims by specific Indigenous communities, but "should recognise all Indigenous Australians with a connection to sea country and a desire to engage in fishing activities in accordance with customary laws."[77]

Any sea rights may be further complicated by various agreements between Australia and Papua New Guinea, Timor-Leste, Indonesia, the Solomon Islands and New Zealand.

As operating licenses expire, renewals may become more uncertain due to the changing territorial rights environment, as well as standard renewal issues relating to sustainability, environmental protection and market considerations.

AWC operations often take place in remote areas, both on- and off-shore, and it is in the interests of the industry to ensure that issues with remote training, RTO delivery and thin markets are addressed. In

[77] Productivity Commission, 2016, Marine Fisheries and Aquaculture, Final Report, p.171

addition to sharing these concerns with Indigenous communities, it is important for industry to ensure there are stable labour markets in remote communities to be able to service industry needs.

Conversely, there is a movement towards remote operation centres as technology and work roles evolve. Distant operations can be centred in many locations, but the temptation will be to focus on urban areas with access to industry-ready labour, power supplies and technology channels. An urban-bias of AWC operations and labour markets could have devastating impacts on local economies, especially for Indigenous communities (*Productivity Commission Report*). This project provides an opportunity to exchange information with Indigenous communities and to identify potential opportunities for both the communities and industry in the search for mutually beneficial outcomes.

The AWC IRC recognises through the experiences and consultations of members that the industry needs grounding and training to be able to identify potential issues. However, better results will almost certainly be obtained if risks are minimised by working cooperatively and at early stages with Indigenous communities and organisations. Laying the groundwork for future success is hence a driver for submitting this project.

Need for Graduates

As noted earlier, NCVER research[78] indicates that improved participation rates of Indigenous learners in VET are not necessarily translating into employment outcomes (even with improvements at higher levels), and this disparity is more acute in remote areas.

There are many issues that impact on the school-to-work transition of young Aboriginal and Islander people. The cultural contexts, social norms and strong kin-based networks in Indigenous communities are very different to the non-Indigenous experience, and the failure to recognise this has caused frustrations[79]. These issues have some recognised effects. When Indigenous youths move away from their communities into urban areas, they find it more difficult to get work because:

- they lose their kin-based networks and have limited skills and capacities to create new networks;
- in remote communities, job outcomes are often achieved without qualifications due to the lack of labour market and, therefore, completion of qualifications is diminished;
- on-site training outside of the community (short- or medium-term) can deny access to traditional homelands and be difficult to undertake without interruption for traditional purposes.

Employers working with Indigenous communities have experienced such issues, and while they have tried to adjust training to suit local conditions and requirements, they are often unable to access RTO delivery, particularly for assessment and credentialing purposes.

The AWC IRC, through consultations and experience, has formed the view that employers are keen to employ trained and competent graduates, and would prefer to work in partnership with Indigenous communities to ensure recognition of achievement through national qualifications.

Government Policies, Strategies and Priorities

[78] Ackehurst, Polvere and Windley, 2017, Indigenous participation in VET: understanding the research
[79] Cuervo, Barakat and Turnbull, 2015, Youth, belonging and transitions: Identifying opportunities and barriers for Indigenous young people in remote communities

The Australian Government's *Closing the Gap* policy is a key driver for this project. Reports and research indicate that, while Australia is achieving improved participation rates for Indigenous learners in VET, there is a failure to translate that participation into completion and job outcomes.[80]

An objective of the 2017 *National Aquaculture Strategy* is to double the value of Australia's aquaculture industry by 2027, with training and education in the sector a priority for achieving this goal. The strategy is supported in material respects (within the scope of the AISC/IRC) by Federal, State and NT Governments. The recommendations of the 2017 *Productivity Commission Inquiry Report into Marine Fisheries and Aquaculture* reinforce the training directions and strategies of the aquaculture and wild catch industry. Both reports are strongly supportive of greater involvement of Indigenous communities in AWC industries and VET training.

Cross-sector approaches

The AWC IRC has an imperative to undertake this project given the information provided above. However, the project also has the capacity to inform and drive other consultations and training package projects. It is the intention of the AWC IRC to ask *Skills Impact* to share the results of this project with other SSOs and the Department of Education and Training. The AWC IRC will also ensure that results are shared with AWC industry operators to encourage further actions and the uptake of opportunities. The AWC IRC would also encourage *Skills Impact* to publish the results more widely in other forums where possible.

Ministers Priorities Addressed

The proposed project precedes work to develop and update the training package, and its outcomes cannot be defined in advance. At this stage, it is impossible to accurately describe how each of the Minister's priorities will be addressed.

Consultation Plan

The ACW IRC will advise on and oversee consultation, including identification of relevant experts and stakeholders. As this is a project to develop knowledge and skills to inform future processes, consultation will be mainly limited to established and credible Indigenous organisations, and potentially with communities where a strong relationship with an existing AWC operator already exists.

The AWC IRC recognises that consultations with Indigenous communities can be difficult and requires a higher-level approach to consultation/engagement (as described on the International Association of Public Participation spectrum) to have more chance of success (Australian Government Closing the Gap Engagement Guide). The use of 'local voices' is encouraged to deliver and to receive information.

The AWC IRC notes that the general approach to the VET Training Package development system is to encourage voluntary participation, representing the industry's 'in-kind contribution' to the operation of a robust VET system that underpins skilled and productive labour forces.

However, guidelines for research and consultation projects with Indigenous communities encourages payment to Indigenous participants, recognising that Indigenous knowledge and culture has value and should not be exploited. IP Australia is currently investigating formal options to protect the value of traditional Indigenous knowledge. In their *Protection of Indigenous Knowledge in the Intellectual Property System Consultation Paper*, IP Australia recognises that obtaining traditional knowledge (for example, on customary fishing practices) has occurred without the value flowing back to the community sharing that knowledge, which undermines both local culture and economic opportunities.

[80] Ackehurst, Polvere and Windley, 2017, Indigenous participation in VET: understanding the research

The *Australian Institute of Aboriginal and Torres Strait Islander Studies Guidelines for Ethical Research in Australian Indigenous Studies (AIATSIS GERAIS)*[81] is identified in the Australian Government *Closing the Gap Engagement Guide* as the best standard for guiding Indigenous engagement projects. AIATSIS GERAIS Principle 11 states that Indigenous people involved with research should benefit from their involvement, and specifically states that applying this principle requires recognition "that certain cultural information is owned and may need to be paid for".

The Institute asks that researchers "be prepared to pay those contributing to the research in recognition of the value of their contributions, particularly where significant time is given outside normal personal or community commitments" (AIATSIS GERAIS Principle 11). The Australian Government *Closing the Gap Engagement Guide* provides a case study (Case Study 2: Local boards in the Northern Territory shires) in which one of the contributing factors to the failure of the scheme was that participants "were not paid to attend meetings as were shire staff, nor was lunch provided". A similar situation would apply where *Skills Impact* staff and contractors are paid during this project.

The AWC IRC recommends that an allocation be made in project costing for payments to Indigenous participants, where appropriate, for research and consultation in recognition of their imparting traditional knowledge.

Skills Impact will undertake desk research and direct consultation with non-Indigenous stakeholders and Indigenous organisations that have been contacted in developing this proposal. *Skills Impact* will also engage with NCVER to ensure full access is available to the latest research that may prove beneficial to the completion of the project. To establish rigour, robustness and potential transferability, the research plan will include full consideration of:

- Specific research questions to be addressed
- Ethical considerations
- Methodology (including methods)
- Literature review
- Potential actions/products

Appropriately qualified researchers and Indigenous consultation specialists will be sub-contracted by *Skills Impact* to lead direct negotiations/consultations with Indigenous organisations and communities to help deliver the identified Key Deliverables. A variety of individuals and organisations, identified by *Skills Impact* and approved by the AWC IRC, will be engaged to ensure a diversity of 'local voices' facilitate the project. They will be assessed based on Indigenous involvement in the ownership of the consultancy business/organisation (where appropriate), involvement in previous projects with Indigenous communities (preferably in a fishing or other AWC related context) and knowledge and understanding of the VET sector. It is expected that Indigenous consultation specialists will be from Aboriginal and Islander backgrounds and understand the importance of protecting traditional knowledge to maximise the potential for cultural and economic benefits for local communities.

The detailed consultation plan for each Key Deliverable will need to be developed jointly with relevant Indigenous stakeholders, the sub-contractors and *Skills Impact*.

Stakeholders may include but will not be limited to the following:

Indigenous and Indigenous Training Stakeholders

[81] https://aiatsis.gov.au/research/ethical-research/guidelines-ethical-research-australian-indigenous-studies

- Northern Australia Indigenous Land and Sea Management Alliance
- Torres Strait Regional Authority
- South West Aboriginal Land and Sea Council
- Goldfields Land and Sea Council
- Carpentaria Land Council Aboriginal Corporation
- North Queensland Land Council
- Kimberly Land Council
- Yamatji Marlpa Aboriginal Corporation
- Australian Institute of Aboriginal and Torres Strait Islander Studies
- Batchelor Institute of Indigenous Tertiary Education
- Australian Indigenous Education Foundation
- The Lowitja Institute
- Stronger Smarter institute
- AIME (AIME Mentoring)
- State and territory based Aboriginal Education Associations and Consultative Groups
- University-based Indigenous education centres, groups and institutes
- Australian Council for Educational Research
- Indigenous Business Australia

AWC Stakeholders

- Seafood Industry Australia
- National Aquaculture Council
- Australian Barramundi Farmers Association
- Australian Prawn Farmer's Association
- Australian Southern Bluefin Tuna Industry Association
- Australian Trout & Salmon Farmer's Association
- Commonwealth Fisheries Association
- Oysters Australia
- Pearl Producer's Association
- The Master Fish Merchants' Association Of Australia
- Seafood Processors And Exporters Council
- Australian Fisheries Management Authority
- Australian Maritime Safety Authority
- Maritime Union of Australia

- Australian Workers Union
- Major and mid-level employers
- NCVER
- CSIRO

Scope of Project
Overview

Overview

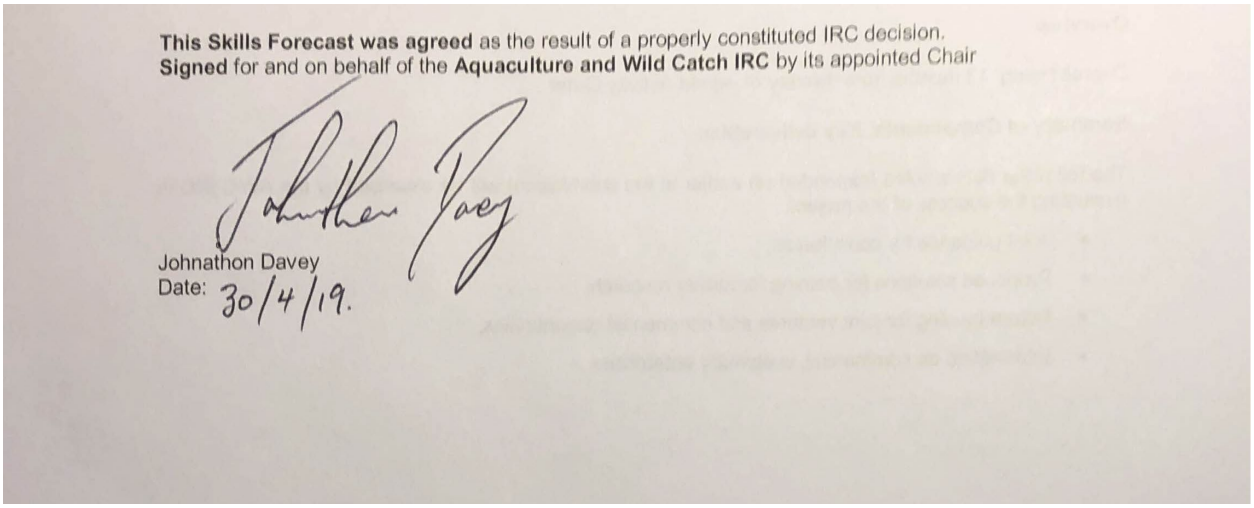
Overall timing: 12 months from delivery of signed Activity Order

Summary of Components: Key deliverables

The following deliverables (expanded on earlier in the submission) will be assessed by the AWC IRC in evaluating the success of the project:

- Joint guidance for consultation;
- Proposed solutions for training for further research;
- Future training for joint ventures and commercial opportunities;
- Information on commercial, customary enterprises.

IRC SIGN-OFF



This Skills Forecast was agreed as the result of a properly constituted IRC decision.
Signed for and on behalf of the **Aquaculture and Wild Catch IRC** by its appointed Chair

Johnathon Davey
Date: 30/4/19.

APPENDIX 1: SFI TRAINING PACKAGE DATA

There were 5,766 enrolments in *SFI Seafood Industry Training Package* qualifications between 2014 and 2017. There was an 11 per cent decline in enrolments in this time, which is indicative of the need to update the qualifications to meet industry needs. Almost three-quarters of SFI program enrolments are in aquaculture qualifications.

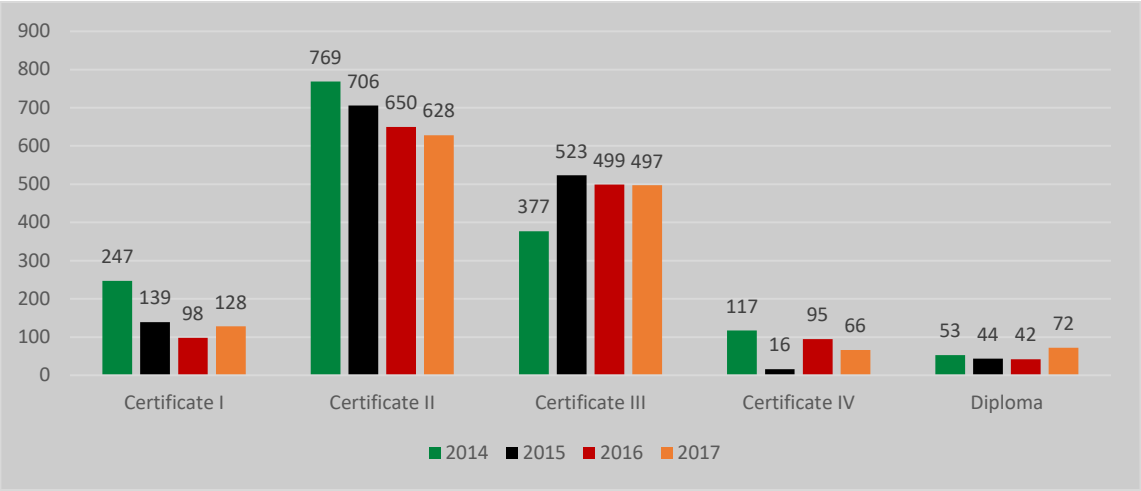
Table 11: Enrolments by Qualification

	Program Enrolments				
Qualification	**2014**	**2015**	**2016**	**2017**	**Total**
SFI10111 - Certificate I in Aquaculture	186	109	75	99	**469**
SFI10211 - Certificate I in Fishing Operations	61	30	23	29	**143**
SFI10511 - Certificate I in Seafood Processing	0	0	0	0	**0**
SFI20111 - Certificate II in Aquaculture	492	507	500	426	**1,925**
SFI20211 - Certificate II in Fishing Operations	257	168	116	158	**699**
SFI20411 - Certificate II in Fisheries Compliance Support	0	0	34	44	**78**
SFI20511 - Certificate II in Seafood Processing	20	31	0	0	**51**
SFI20611 - Certificate II in Seafood Industry (Sales and Distribution)	0	0	0	0	**0**
SFI30111 - Certificate III in Aquaculture	248	424	439	428	**1,539**
SFI30211 - Certificate III in Fishing Operations	34	31	5	21	**91**
SFI30311 - Certificate III in Seafood Industry (Environmental Management Support)	0	0	0	0	**0**
SFI30411 - Certificate III in Fisheries Compliance	19	3	28	33	**83**
SFI30511 - Certificate III in Seafood Processing	54	33	13	8	**108**
SFI30611 - Certificate III in Seafood Industry (Sales and Distribution)	22	32	14	7	**75**
SFI40111 - Certificate IV in Aquaculture	11	6	6	0	**23**
SFI40211 - Certificate IV in Fishing Operations	0	0	0	0	**0**
SFI40311 - Certificate IV in Seafood Industry (Environmental Management)	7	0	0	0	**7**
SFI40411 - Certificate IV in Fisheries Compliance	18	0	2	0	**20**
SFI40511 - Certificate IV in Seafood Processing	7	10	5	0	**22**
SFI40611 - Certificate IV in Seafood Industry Sales and Distribution	74	0	82	66	**222**
SFI50111 - Diploma of Aquaculture	33	37	27	55	**152**
SFI50211 - Diploma of Fishing Operations	0	0	0	0	**0**
SFI50411 - Diploma of Fisheries Compliance	20	7	15	17	**59**
SFI50511 - Diploma of Seafood Processing	0	0	0	0	**0**
	1,563	**1,428**	**1,384**	**1,391**	**5,766**

Source: NCVER VOCSTATS, TVA program enrolments 2014-2017

Between 2014 and 2017, almost half (48 per cent) of program enrolments were in certificate II qualifications, and one-third (33 per cent) in certificate III qualifications (see Figure 7).

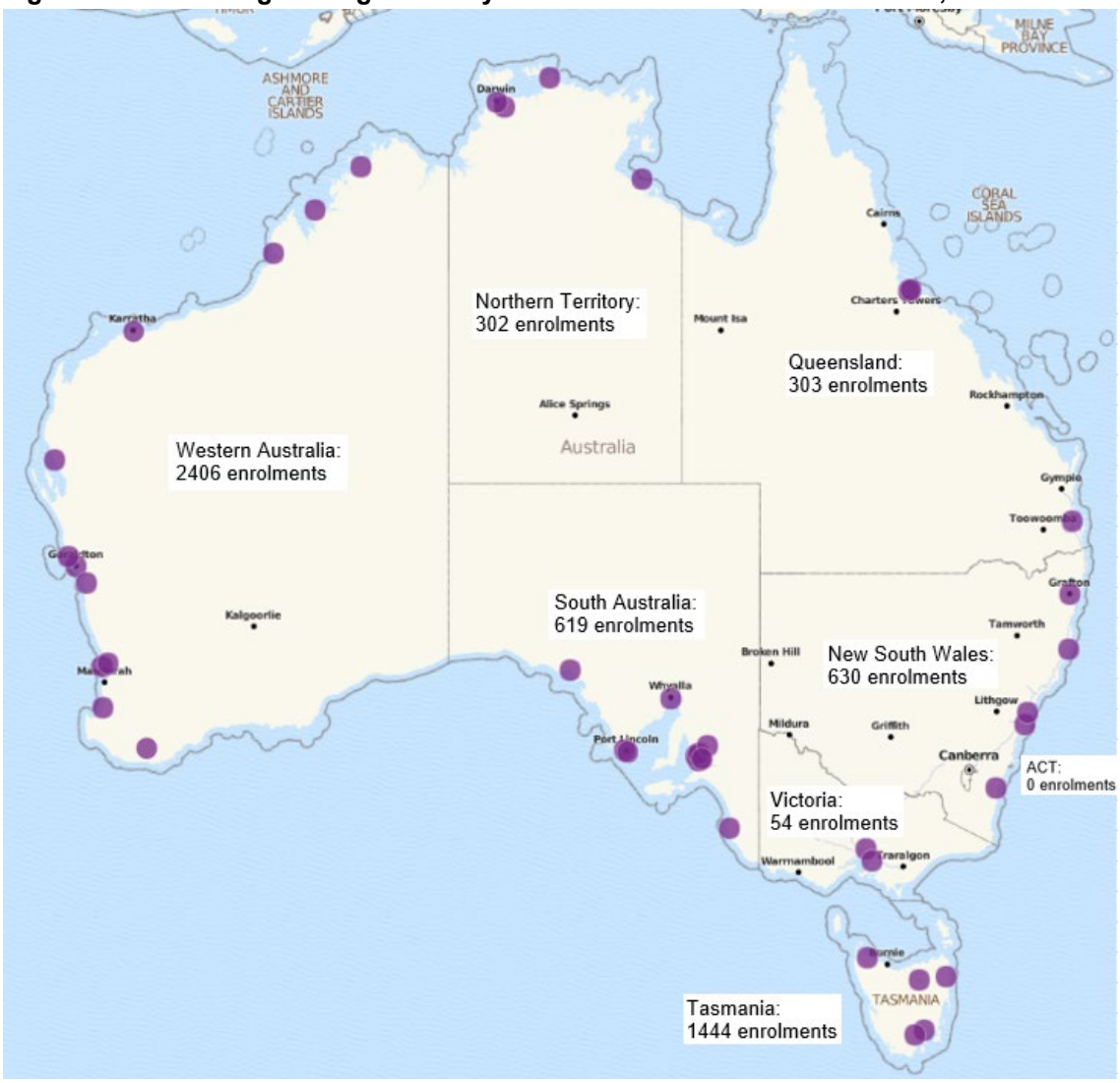
Figure 7: Program Enrolments by AQF Level, 2014-2017



Source: NCVER VOCSTATS, TVA program enrolments 2014-2017

The greatest proportion of enrolments between 2014 and 2017 were in Western Australia (42 per cent), followed by Tasmania (25 per cent).

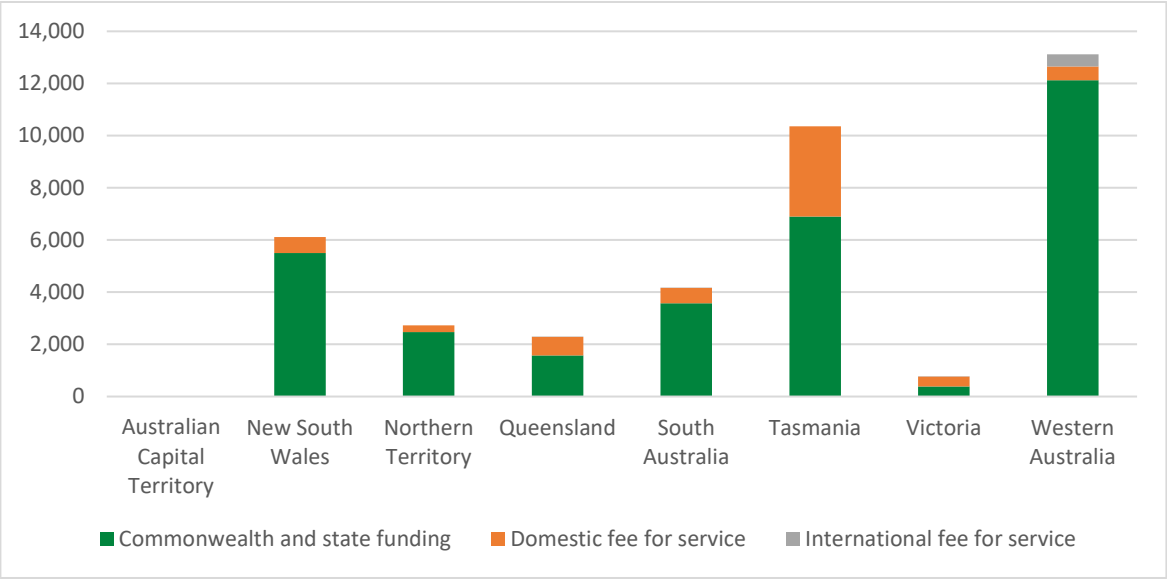
Figure 8: SFI Training Package Delivery Locations and Enrolment Numbers, 2014-2017



Sources: a) NCVER Atlas of total VET 2017 – data visualisation; b) NCVER VOCSTATS, TVA program enrolments 2014-2017

Between 2014 and 2017, government funding supported 82 per cent of SFI subject enrolments in Australia. Year-to-year fluctuations in subject enrolments are evident in particular states.

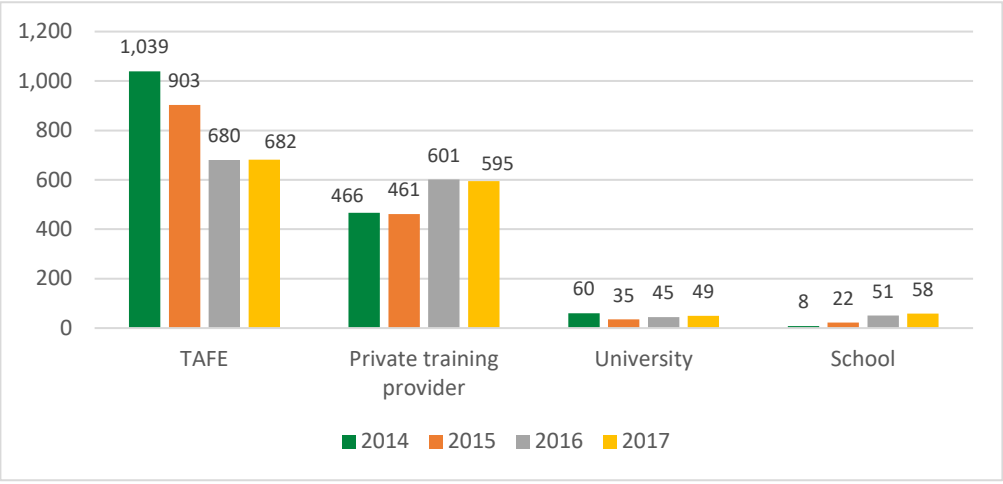
Figure 9: Subject Enrolments by State & Funding Types



Source: NCVER VOCSTATS, TVA subject enrolments 2014-2017

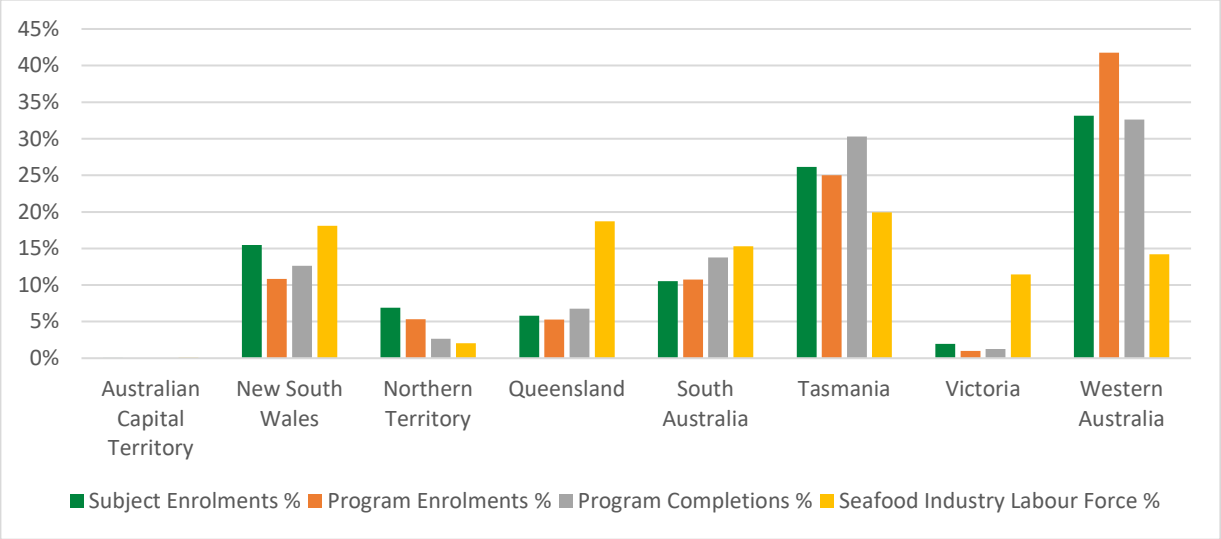
Western Australia has promoted and supported the use of the SFI Training Package, with 42 per cent of program and 33 per cent of subject enrolments nationally (despite currently employing only 14 per cent of the Seafood Industry labour force). Western Australia attracts the highest rate of government funding, with 92 per cent of subject enrolments receiving Commonwealth and state funding (almost all of which are through TAFE providers).

Figure 10: Program Enrolments by Provider Type, 2014-2017



Source: NCVER VOCSTATS, TVA program enrolments 2014-2017

Figure 11: Proportions of program enrolments, subject enrolments, program completions & seafood industry labour force, 2014-2017



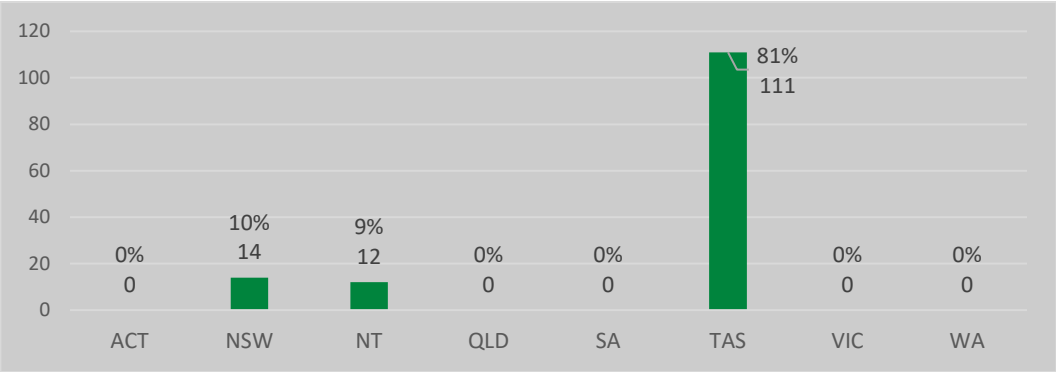
Sources: a) NCVER VOCSTATS, TVA program enrolments 2014-2017; b) NCVER VOCSTATS, TVA subject enrolments 2014-2017; c) 6202.0 - Labour Force, Australia, August 2018: Table 12. Labour force status by Sex, State and Territory - Trend, Seasonally adjusted and Original

The high proportion of Tasmanian traineeships/apprenticeships reflects efforts to promote aquaculture to a new generation of workers. Circular Head Christian School in Smithton manages an oyster farm (called 'Roaring Forties') as part of their aquaculture training program. The oyster farm is run as a commercial enterprise and so students are taught about business requirements in addition to marine science and water safety. The school works closely with the Institute for Marine and Antarctic Studies, the University of Tasmania and Tassal[82] to teach the theoretical and practical side of aquaculture, as well as facilitating business experience for potential commercial oyster and rainbow trout producers. This link-up translates to strong demand for program graduates, who may be able to arrange jobs prior to completing their Certificate I in Aquaculture[83].

In addition, training providers, such Huon Valley Trade Training Centre and Seafood and Maritime Training, have developed close relationships with industry to facilitate traineeships for new and existing members of the labour force. The University of Tasmania has also developed an Associate Degree in Applied Science specialising in aquaculture (level six), which is mapped from the Certificate IV in Aquaculture.

[82] https://www.theadvocate.com.au/story/4769460/aquaculture-teacher-awarded-by-industry/, viewed November 2018
[83] https://www.abc.net.au/news/2017-09-17/oyster-farm-helps-tasmanian-aquaculture-students/8954428, viewed November 2018

Figure 12: Apprentices and Trainees in-training as at 31 December 2017



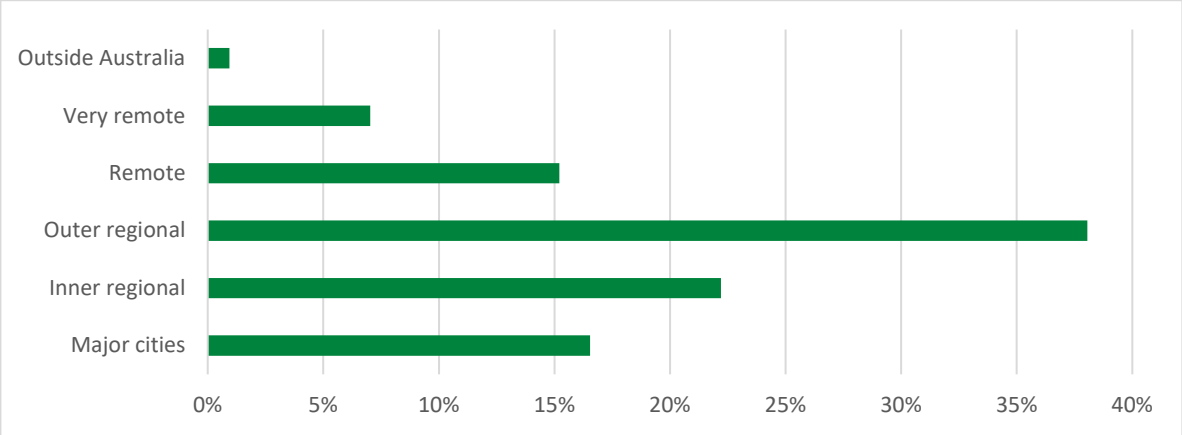
Source: NCVER SAS Visual Analytics Viewer – Training Package Information

Student Profile

With 15 per cent (829) of enrolments between 2014 and 2017, the SFI Training Package has the second highest representation by Indigenous people. This includes 62 per cent (113) of enrolments in the Northern Territory. Indigenous people represented 13 per cent (267) of completions overall (including 26 per cent, 113, of Northern Territory completions). See also **Figure 6: Enrolments & completions by Indigenous and non-Indigenous people**.

There are extremely strong enrolment figures outside of major cities, with SFI arguably one of the most significant Training Package for Australian learners living beyond inner regional areas. In fact, of all the Training Packages, *SFI* has the highest proportion of enrolees in *remote* areas (15.4 per cent), the second highest proportion of enrolees in *very remote* areas (7.1 per cent), and the second highest proportion in *outer regional* areas (38.5 per cent).

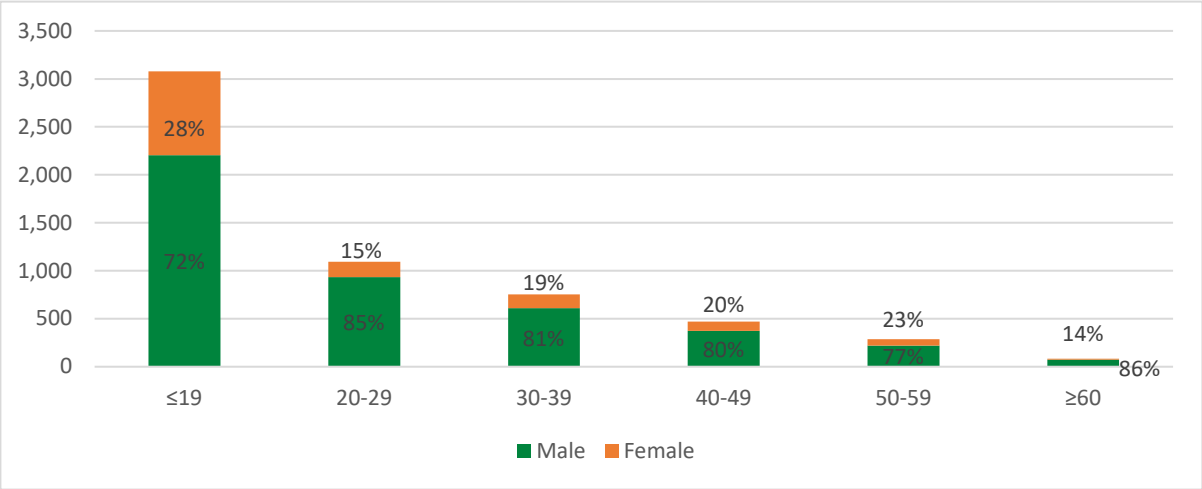
Figure 13: Enrolments by Remoteness, 2014-2017



Source: NCVER VOCSTATS, TVA program enrolments 2014-2017

Both the total number and proportion of women enrolling in SFI training has decreased year-on-year. The total number of women enrolling in 2017 was 39 per cent less than in 2014. Only 19 per cent of SFI enrolments were women in 2017, compared with an all Training Package average of 46 per cent.

Figure 14: Enrolments by Age Group and Sex, 2014-2017



Source: NCVER VOCSTATS, TVA program enrolments 2014-2017

A positive outlook for the development of the next generation of seafood industry workers is that, of all Training Packages, *SFI* has the sixth greatest proportion (53 per cent) of enrolees between the ages of 15 and 19 years.

APPENDIX 2: INDUSTRY REGULATIONS AND STANDARDS

The Australian Government has responsibility for regulating aquaculture in Commonwealth waters and plays an important national role in supporting aquaculture operations through national programmes for research, quarantine, aquatic animal health, export food safety, environmental management and market access and trade. Responsibility for environmental regulation, including the approval of new aquaculture developments and ongoing monitoring and compliance, is generally a matter for state and NT governments. Existing aquaculture operations are regulated by local, state and NT governments (the Australian Capital Territory has no aquaculture operations). Some states have aquaculture legislation, others regulate aquaculture under broader fisheries legislation. State and territory regulation covers licensing, land use and planning and food safety.

Territorial Rights to Operate (including Native title)

Aquaculture and wild catch operations face the complexity of defining the rights to operate in terms of territorial rights issues. Australia has legislative and judicial approaches to the identification and recognition of Native Land and Sea Claims under the Australian system, and also utilises Indigenous Land Use Agreements. Specific rights may vary depending on the natures of the claims and on whether claims cover land, intertidal zones, 'sea country', the contiguous zone and the exclusive economic zone. At least one Australian jurisdiction (South Australia) requires Indigenous Land Use Agreements in any area where there may be a question of traditional fishing rights, as a matter of policy. The Productivity Commission recommends that Indigenous customary fishing should not be defined and limited by grants of Native Title or claims by specific Indigenous communities, but "should recognise all Indigenous Australians with a connection to sea country and a desire to engage in fishing activities in accordance with customary laws."[84]

Any sea rights may be further complicated by various agreements between Australia and Papua New Guinea, Timor Leste, Indonesia, the Solomon Islands and New Zealand.

International instruments

Australia is a signatory to a range of international instruments concerning fisheries. The *United Nations Convention on the Law of the Sea* (UNCLOS), 1982, sets out detailed rules in relation to Australia's and other state's sovereign rights in the Exclusive Economic Zone (EEZ), including in relation to fisheries. Key supporting instruments are the non-legally binding Food and Agriculture Organization (FAO) *Code of Conduct for Responsible Fisheries*[85], and *International Plans of Action*[86]:

- Prevent, deter and eliminate illegal, unreported and unregulated (IUU) fishing
- Reduce fishing (over) capacity
- Reduce the incidental catch of seabirds
- Conserve and manage sharks.

[84] Productivity Commission, 2016, Marine Fisheries and Aquaculture, Final Report, p.171

[85] FAO, 2018, Fisheries & Aquaculture - Code of Conduct for Responsible Fisheries. [www] http://www.fao.org/fishery/code/en

[86] FAO, 2018, Fisheries & Aquaculture - International Plans of Action. [www] http://www.fao.org/fishery/code/ipoa/en

Federal and state government regulation

Aquaculture and fishing in Australia is managed under strict environmental guidelines. Federal and state governments have shared responsibility for the management of Australia's fisheries resources. The Offshore Constitutional Settlement (OCS) is a formal agreement that deals with Commonwealth and individual state fisheries jurisdictions that manage arrangements for specific fisheries within a single jurisdiction or a joint authority (Commonwealth or state). There are presently three joint authorities, involving the Commonwealth and the Northern Territory, Queensland and Western Australia.

The Australian Government has no direct management responsibility for aquaculture. However, multiple national programs for research, quarantine, aquatic animal health, food safety, environmental management, and market access and trade are available for the aquaculture industry.

The state governments regulate domestic fisheries and aquaculture production in their jurisdiction through the issuing of licences, permits, leases and quotas; and through regulations, which cover the environment, animal welfare, water supply and wastewater, monitoring and compliance.

Aquaculture occurs almost exclusively in state/territory waters, although there is likely to be increasing interest in undertaking aquaculture in Commonwealth offshore waters as technology allows aquaculture operations in further offshore areas.

Legislative frameworks

There are two fields of legislation relevant to the Australian seafood industry: Commonwealth and state. The primary legislation governing Commonwealth fisheries management is the *Fisheries Management Act 1991* (FMA) and the *Fisheries Administration Act 1991* (FAA).

The Australian Fisheries Management Authority (AFMA) was originally established under the *Fisheries Administration Act 1991* as a statutory authority to be responsible for the efficient management and sustainable use of Commonwealth fish resources. AFMA is now a Commission under the Department of Agriculture and Water Resources. They appoint Commissioners with a high level of expertise in the fields, including fisheries management and fishing industry operations, who are responsible for domestic fisheries management.

The *Fisheries Management Act 1991* sets out the legislative parts of the Commonwealth's fisheries management framework, including the regulation of fisheries, preparation of fisheries management plans, allocation and management of statutory fishing rights and other concessions, determination of allowable catch, fish receival, compliance and foreign fishing controls, cooperation with the states and the Northern Territory, and satisfying international obligations. The Act enables AFMA to prepare and determine a Plan of Management for each Commonwealth fishery.

Fisheries under state management are governed by various state Fisheries Acts, with some states (e.g. South Australia and Tasmania) also having established specific aquaculture Acts/legislation to facilitate growth and streamline management in this sector.

The fishing and aquaculture sector interacts with other national and international legislation, including:

- *Torres Strait Fisheries Act 1984*, which governs fisheries between Australia and Papua New Guinea
- *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*, involving accreditation of a plan of management and risk assessment for a fishery; and components that seek to protect listed threatened species and ecological communities; as well as to regulate the international movement of wildlife specimens
- *Navigation Act 2012*, regulating ship and seafarer safety

- *Customs Act 1901*, concerning border controls
- *Biosecurity Act 2015*, regarding biosecurity threats from transportation of species across borders and from foreign fishing vessels
- *Migration Act 1958*, regulating detention of illegal foreign fishers
- *FAO Compliance Agreement*
- *United Nations Convention on the Law of the Sea*
- *United Nations Fish Stocks Agreement*
- *Native Title Act 1993*
- Food standards rules
- Workplace safety legislation.

Commercial fishing permits

The *Fisheries Management Act 1991* enables AFMA to allocate statutory fishing rights or permits to all commercial fishing operators for access to the resources of each Commonwealth fishery. Many fishers have individually tradable quotas (ITQs) or shares of the resource assigned as a proportion of the total allowable catch determined by AFMA each year. Where ITQs are not used, AFMA uses a direct permit system to specify the amount of catch each concession holder can take in a fishing season.

Other provisions of the Act deal with fish receiver permits (receivers are typically those who accept fish from a boat at landing); scientific fishing permits; foreign fishing; illegal foreign fishing; fishing on the high seas; treaty licences; surveillance and enforcement; and the procedures AFMA must follow in implementing these things.

The issuance of licences, permits and quotas required for aquaculture and fishing in state and territory jurisdictional waters is the responsibility of state and territory governments; however, the responsibility for the jurisdiction of domestic commercial vessels is transitioning to the Australian Maritime Safety Authority (AMSA) effective from 1 July 2018. Most state governments require annual reports on sustainability of the target stocks, adherence to regulatory conditions and environmental monitoring programs. State aquaculture legislation and regulations cover the environment, disease prevention, water supply and wastewater, monitoring and compliance, and prevent uncontrolled or extensive development.

A sector-specific legislative example is pearl production in Western Australia, currently managed under the *Pearling Act 1990*[87], with regulations involving state government licensing and quota systems for taking wild stock, leases for establishing a pearl farm and permits for a hatchery.

Industry codes of conduct

The *Code of Conduct for Responsible Fisheries* (the Code), initiated by the United Nations Food and Agriculture Organization Committee on Fisheries, is adopted by over 170 countries, including Australia. The Code is voluntary and provides operators with principles and standards applicable to the conservation, management and development of all fisheries. It also covers the capture, processing and trade of fish and fishery products, fishing operations, aquaculture, fisheries research and integration of fisheries into coastal area management.

[87] http://www.fish.wa.gov.au/About-Us/Legislation/Pages/default.aspx

The *Australian Aquaculture Code of Conduct*, initiated by the Australian Aquaculture Forum, provides principles aimed at maintaining ecological and economic sustainability for the aquaculture industry. The Code of Conduct requires compliance with regulations, respect for the rights and safety of others, humane treatment of aquatic animals, and promotion of the safety of seafood for human consumption.
Further examples of codes of conduct in the sector include:

- Aquatic Animal Welfare Overarching Principles
- WA Fishing Industry Occupational Health and Safety Code
- Environmental Code of Practice for Australian Prawn Farmers
- Pearl Diving Industry Code of Practice
- EMS for Oyster Farmers in NSW.

Sustainability certification programs

Fisheries and seafood businesses voluntarily seek independent certification to recognise their sustainable fishing practices and to influence the choices made by people when buying seafood. The Marine Stewardship Council oversees two certification schemes: the *MSC Fisheries Standard*[88] and the *MSC Chain of Custody Standard*[89]. The *MSC Fisheries Standard* measures the sustainability of wild-capture fisheries and is open to all fisheries globally. The Western Rock Lobster Fishery was the world's first MSC certified fishery in March 2000. The *MSC Chain of Custody Standard* ensures that MSC products handled through the supply chain are traceable and identifiable from fishery to plate. The MSC's ecolabel can be used on packaging to demonstrate the sustainability of the fishery product against third-party certification requirements. The aquaculture sector can be certified by the Aquaculture Stewardship Council.

In addition, the Australian Barramundi Farmers Association (ABFA) is rolling out a Sustainability Certification Program to ensure that the farming of barramundi in Australia is ecologically sustainable, eco-efficient and produces a quality product that is internationally competitive.

Many other certification bodies, including Global Aquaculture Alliance and Global Reporting Initiative, offer standards and mechanisms for independent assessment against sustainability standards.

The tuna industry in SA was the first fishery in the world to be ISO14001 accredited. ISO14001 is the International Standard for environmental management and overrides all other systems in scope and coverage.

Food Standards Australia New Zealand

Strict food health standards apply to both aquaculture and wild-capture products. The sector is subject to national food standards and food safety assurance systems enforced by Food Standards Australia New Zealand (FSANZ). Requirements that apply to seafood products include labelling of ingredients, country of origin, nutrition, directions for use, best before date, supplier name and details, maximum residue limits for agricultural chemicals, contaminants and natural toxins, and maximum levels of foodborne micro-organisms.

Export/import legislation

Fish and fish products are 'prescribed' goods under Australian legislation, and as a result the export of fish and products for human consumption is regulated by Australian's Export Control legislation[90]. The

[88] https://www.msc.org/standards-and-certification/fisheries-standard
[89] https://www.msc.org/standards-and-certification/chain-of-custody-standard
[90] http://www.agriculture.gov.au/biosecurity/legislation

legislation supports the production of safe food and ensures that all food exported complies with Australian Food Standards and any additional importing country requirements. Depending on what part of the export chain the business falls within, exporters and importers of fish and fish products must meet differing requirements.

APPENDIX 3: INDUSTRY PRIORITY FOR GENERIC SKILLS

Table 12: Industry Priority for Generic Skills

Rank	Generic Skill
1	**Learning agility/Information literacy/Intellectual autonomy and self-management skills**
	Ability to identify a need for information. Ability to identify, locate, evaluate, and effectively use and cite the information. Ability to discriminate and filter information for importance. Ability to do more with less. Ability to quickly develop a working knowledge of new systems to fulfil the expectations of a job. Ability to work without direct leadership and independently.
2	**Communication/Collaboration including virtual collaboration/Social intelligence skills**
	Ability to understand and apply the principles of creating more value for customers with fewer resources (lean manufacturing) and collaborative skills. Ability to critically assess and develop content that uses new media forms and leverage these media for persuasive communications. Ability to connect with others deeply and directly, to sense and stimulate reactions and desired interactions.
3	**Language, Literacy and Numeracy (LLN) skills**
	Foundation skills of literacy and numeracy.
4	**Managerial/Leadership skills**
	Ability to effectively communicate with all functional areas of the organisation. Ability to represent and develop tasks and work processes for desired outcomes. Ability to oversee processes, guide initiatives and steer employees toward achievement of goals.
5	**Technology use and application skills**
	Ability to create and/or use of technical means understand their interrelation with life, society, and the environment. Ability to understand and apply scientific or industrial processes, inventions, methods, etc. Ability to deal with increasing mechanisation and automation and computerisation. Ability to do work from mobile devices rather than from paper.
6	**Design mindset/Thinking critically/System thinking/Solving problems skills**
	Ability to adapt products to rapidly shifting consumer tastes and trends. Ability to determine the deeper meaning or significance of what is being expressed via technology. Ability to understand how things that are regarded as systems influence one another within a complete entity, or larger system. Ability to think holistically.
7	**Science, Technology, Engineering and Maths (STEM) skills**
	Sciences, mathematics and scientific literacy.
8	**Entrepreneurial skills**
	Ability to take any idea, whether it be a product and service, and turn that concept into reality and not only bring it to market but make it a viable product and/or service. Ability to focus on the very next step to get closer to the ultimate goal. Ability to weather the ups and downs of any business. Ability to sell ideas, products or services to customers, investors or employees etc.
9	**Environmental and sustainability skills**

	Ability to focus on problem-solving and the development of applied solutions to environmental issues and resource pressures at local, national and international levels.
10	**Customer service/Marketing skills**
	Ability to interact with another human being, whether helping them find, choose or buy something. Ability to supply customers' wants and needs both via face to face interactions or digital technology. Ability to manage online sales and marketing. Ability to understand and manage digital products.
11	**Data analysis skills**
	Ability to translate vast amounts of data into abstract concepts and understand data-based reasoning. Ability to use data effectively to improve programs, processes and business outcomes. Ability to work with large amounts of data: facts, figures, number crunching, analysing results.
12	**Financial skills**
	Ability to understand and apply core financial literacy concepts and metrics, streamlining processes such as budgeting, forecasting, and reporting, and stepping up compliance. Ability to manage costs and resources, and drive efficiency.
13	**Other generic skills**
	Risk assessment and writing SOPs Safety Operating Procedures