CAREER PROGRESSION ANALYSIS –
PRAWN FARMING SECTOR

October 2015
Information should be cited as:
Atkinson, M. & McShane, C., 2015, Career Progression Analysis – Prawn Farming Sector, Online Publication, AgriFood Skills Australia, pp 93.

For further information contact:
Margie Atkinson
Research and Innovation Division
James Cook University
Townsville, QLD
Email: margaret.atkinson@jcu.edu.au

Photos courtesy of: Helen Jenkins, APFA; Dean Jerry, JCU; Nigel Preston, CSIRO (now WorldFish).

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Acknowledgments:
We would like to thank all the people, from a range of aquaculture and agri-businesses, peak bodies, government agencies and research and training organisations, who took time from their very busy schedules to participate in the survey and/or the consultations that formed the core of this study. The knowledge and advice provided by our two advisory groups – the industry-led external reference group (John Maloney, GM Pacific Reef; Tony Charles, Chair APFA R&D Committee; Jo-Anne Rusco, FRDC; Ross Ord, AgriFood Skills Australia) and our multidisciplinary expert project team (Dean Jerry, HOD Aquaculture JCU; Marcus Lane, Dean, College of Marine & Environmental Sciences JCU; Allan Dale, Professor of Tropical Regional Development JCU; Anna Blackman, College of Business, Law & Governance JCU; Helen Jenkins, Executive Officer APFA; Mark Oliver, Director LMC Training) was very much appreciated. Special thanks go to Helen Jenkins, Chris Calogeras (EO, ABFA), Chad Mumme (Coordinator & Lecturer, Tropical Aquaculture VET Program, CDU), Leanne Kruss (FNQ Regional Workforce Development Officer, Production Horticulture) and Bianca Fullerton ( Bowen Gumlu Workforce Development Officer, Production Horticulture) for their assistance in attracting aquaculture and agribusiness respondents to the online survey and face-to-face interviews and focus groups. Thanks are due also to Greg Crossan (Queensland DAF), John Hall (Queensland DET) and Ruth Wallace (WFD theme leader in growNORTH) for their interest in the project and our discussions about possible mechanisms to assist industry with their workforce development needs to support future growth of tropical aquaculture in Northern Australia.

Finally we thank Ross Ord for his invaluable support throughout the research and the Commonwealth Government through AgriFood Skills Australia for funding the project.
Forward

The following report is the culmination of a need identified by the Australian Prawn Farmers Association (APFA) to identify strategies to ensure the industry is in a position to attract and retain appropriately qualified and skilled workers, particularly to fulfil higher-level technical and managerial roles.

The report has been produced with the assistance of funding provided by the Commonwealth Government through the Department of Industry.

AgriFood Skills Australia wishes to acknowledge the significant contribution to the project provided by Helen Jenkins, EO of APFA including her foresight in recognising the need for the study.

AgriFood would also like to acknowledge the very professional approach taken to all aspects of the project by team leader Margie Atkinson from James Cook University. The high calibre work undertaken on behalf of the project team by Margie Atkinson supported by Dr Connar McShane will position the industry to make evidenced-based decisions on strategies to adopt to address its workforce development challenges.

Ross Ord
Project Manager
AgriFood Skills Australia
EXECUTIVE SUMMARY

Australian prawn farmers plan to build a reliable, highly skilled, regionally-based workforce of managers and technicians to enable ongoing and significant expansion plans for the industry across northern Australia. This requires increasing the attractiveness of the sector to graduates of university and higher level VET training programs, offering a clear career progression within the industry, and identifying the range of managerial and technical skills that are required to do these jobs. The Australian Prawn Farmers Association (APFA) and AgriFood Skills Australia commissioned this project to provide the information needed to guide the planning and implementation of an effective workforce development program for prawn farming businesses.

The prawn farming industry sits on the cusp of significant growth that could bring real benefit flow to many of the coastal communities in Northern Australia. It is already a high value industry, demonstrating world’s best practice with more technological innovation in the pipeline, yet its training culture is underdeveloped and its change management skills are limited due to the lack of growth to date. Its small size, scattered distribution, lack of public profile as an attractive career option, thin training market and limited engagement across research, education, training and industry mean that it is currently ill-prepared for rapid expansion.

This study incorporated a desktop review of current trends, policies and emerging issues for agribusiness workforce development with extensive stakeholder consultation (via an online survey, face-to-face interviews, focus groups and contextual discussions) to gather the necessary evidence for the APFA and AgriFood Skills Australia. The results provide a solid foundation to support the development of an innovative workforce development program for the prawn farming industry. Potential policy and funding mechanisms were identified to collaboratively progress an end-to-end approach (across VET and higher education sectors) to customise and target a place-based program that could provide a step change for industry growth. If successful this model could be applied more broadly to workforce development in other sectors in Northern Australia.

Key learnings include:

- That the primary barriers for upskilling existing managers are the lack of clear career pathways, lack of funding, high cost of training, lack of awareness of courses and lack of time to commit to training. Preferred learning methods are hands-on, on farm and short courses.
- That to ensure existing managerial and technical employees keep abreast of the rapid changes in technology and markets, community expectations around social licence and environmental management, and the ever increasing complexity and risk of doing business in remote locations, a culture of continual professional development will need to be developed. For improving business, frontline management and practical skills, existing regional cross-industry training models that incorporate a ‘hands-on’ approach would be worth investigating. Short courses or masterclasses are needed for new technology skilling.
- That until the industry expands significantly it will need to consider aligning with other tropical aquaculture sectors to achieve sufficient critical mass to access a meaningful co-funded workforce development program for highly skilled roles and to develop a clear career progression pathway (across aquaculture in Northern Australia) with which to promote tropical aquaculture as an exciting and rewarding career option.
- Attracting and retaining staff is currently hampered by poor remuneration particularly for entry level roles. Employers will need to focus on improving remuneration packages and striving to be ‘employers of choice’ if they are to attract talented workers in future.
- Future workforce training needs to be a hybrid of VET and university education - integrating highly technical skills/knowledge with hands-on application experience, practical skills, frontline management skills, communication skills and attitude development.
# Contents

EXECUTIVE SUMMARY .................................................................................................................. 6
Glossary and abbreviations ........................................................................................................... 8
Introduction ................................................................................................................................... 10
Background .................................................................................................................................... 13
Methods ........................................................................................................................................ 14
Advisory Groups and Project Promotion ....................................................................................... 14
Desktop Review ............................................................................................................................... 14
Online Survey ................................................................................................................................. 14
Interviews and Focus Groups ......................................................................................................... 16
Contextual Meetings ....................................................................................................................... 16
Results ........................................................................................................................................... 17
Desktop Review ............................................................................................................................... 17
External factors ............................................................................................................................... 17
Internal factors – enterprise level issues for agribusiness ........................................................... 20
Online Survey Results (results in full at Appendix 6) ................................................................. 20
Interviews and Focus Groups ......................................................................................................... 24
Major Themes ................................................................................................................................. 24
Facilitating a Stable Skilled Workforce: Attraction and Retention ............................................. 25
Training and Course Content ......................................................................................................... 27
Delivery of Training ......................................................................................................................... 28
Responsibility for Facilitation ........................................................................................................ 28
Discussion ...................................................................................................................................... 29
Scope of the study and what was achieved .................................................................................... 29
Recommendations ........................................................................................................................... 37
References ..................................................................................................................................... 42
Appendices ..................................................................................................................................... 44
Appendix 1: Desktop Review .......................................................................................................... 44
Appendix 2: Survey Questions ......................................................................................................... 54
Appendix 3: Information Sheet for industry explaining the project .............................................. 67
Appendix 4: Definition of on-farm roles .......................................................................................... 68
Appendix 5: Main groupings of codes for analysis of interview data .......................................... 70
Appendix 6: Online Survey (full results) ......................................................................................... 71
Appendix 7: 2013-2015 Queensland Production Horticulture Work Force Development Project ...80
Appendix 8: Content areas for upskilling and new training as identified by industry ................. 92
## Glossary and abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ABFA</td>
<td>Australian Barramundi Farmers Association</td>
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<tr>
<td>Agrifood</td>
<td>AgriFood Skills Australia - is one of 11 independent, not-for-profit Industry Skills Councils (ISCs) established by the Australian Government Department of Industry</td>
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<tr>
<td>AMSA</td>
<td>Australian Maritime Safety Authority</td>
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<td>APFA</td>
<td>Australian Prawn Farmers Association</td>
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<tr>
<td>ARC</td>
<td>Australian Research Council</td>
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<tr>
<td>CDU</td>
<td>Charles Darwin University, Darwin, Northern Territory</td>
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<td>CEDA</td>
<td>Committee for Economic Development of Australia</td>
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<tr>
<td>CRC</td>
<td>Cooperative Research Centre</td>
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<td>CSIRO</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
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<tr>
<td>DET</td>
<td>Queensland Department of Education and Training</td>
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<tr>
<td>EO</td>
<td>Executive Officer</td>
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<tr>
<td>ESTEAM</td>
<td>Entrepreneurship, Science, Technology, Engineering, Arts and Maths – content and skill areas that are increasingly seen as being critical to driving innovation, imagination and creativity which in turn will lead to economic prosperity. Previously there has been a strong focus on STEM subjects to drive innovation.</td>
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<tr>
<td>FIFO</td>
<td>‘Fly-in fly-out’ workers – a method of employing people needing to work in remote areas</td>
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<td>FRDC</td>
<td>Fisheries Research and Development Corporation - is a co-funded partnership between its two stakeholders, the Australian Government and the fishing industry. The FRDC’s role is to plan and invest in fisheries research, development and extension (RD&amp;E) activities in Australia.</td>
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<tr>
<td>FTE</td>
<td>Fulltime Equivalent – a unit that indicates the workload of an employed person</td>
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<tr>
<td>Gen Y</td>
<td>Generation Y - also known as the Millennial Generation are the demographic cohort following Generation X. The approximate start and finish dates defining the cohort are birth years ranging from the early 1980s to the early 2000s</td>
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<tr>
<td>GVP</td>
<td>Gross Value of Production</td>
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<tr>
<td>HACCP</td>
<td>Hazard analysis and critical control points - is a systematic preventive approach to food safety from biological, chemical, and physical hazards in production processes that can cause the finished product to be unsafe, and designs measurements to reduce these risks to a safe level.</td>
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<tr>
<td>HOD</td>
<td>Head of Discipline – a leadership role within a university hierarchy</td>
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<td>HR</td>
<td>Human Resources</td>
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<tr>
<td>IP</td>
<td>Intellectual Property</td>
</tr>
<tr>
<td>JCU</td>
<td>James Cook University, Queensland</td>
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<tr>
<td>M</td>
<td>Mean (or average) number of samples</td>
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<tr>
<td>NRM</td>
<td>Natural Resource Management</td>
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<tr>
<td>QCA</td>
<td>Queensland Competition Authority</td>
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<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
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<tr>
<td>RD&amp;E</td>
<td>Research, Development and Extension (sometimes a second ‘E’ is added to include ‘Education’</td>
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<tr>
<td>RTO</td>
<td>Registered Training Organisation</td>
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<tr>
<td>SD</td>
<td>Standard Deviation around the mean</td>
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<tr>
<td>SME</td>
<td>Small to Medium Enterprise - In Australia, a SME has 199 or fewer employees. Microbusinesses have 1–4 employees, small businesses 5–19, medium businesses 20–199</td>
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<tr>
<td>VET</td>
<td>Vocational Education and Training</td>
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<tr>
<td>WFD</td>
<td>Workforce Development</td>
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<tr>
<td>WH&amp;S</td>
<td>Workplace Health and Safety</td>
</tr>
<tr>
<td>WIL</td>
<td>Work Integrated Learning - can take many different forms including clinical placements, practicums, fieldwork, internships, vacation work or volunteer work. These opportunities equip students with practical skills and experience to succeed after graduation.</td>
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Introduction

Australian prawn farming is a relatively young industry with a small footprint located mainly in the coastal lowlands of Northern Queensland. A lack of critical mass, small farm size at start up in the 1980s and a complex and restrictive regulatory environment in the intervening years have constrained the industry. There have been no new licences issued in Queensland and almost no growth in farm area in the last 15 years, despite increasing market demand\(^1\). Consequently the industry supplies less than a quarter of the domestic demand for prawns. While prawn farming has become increasingly industrialised overseas, Australia’s productivity gains (compound annual growth of 4%)\(^2\) have had to be driven by developing innovative farm practices (mostly on the larger farms), genetic gains, nutritional improvements for feed and (relatively) better disease control (N. Preston, pers. com.). The best Australian prawn farms lead the world in achieving average yields of more than 9000kg per hectare per annum, without the food safety issues prevalent in many prawn farming countries\(^3\). Nevertheless 16,500 T of farmed prawns worth $150M are still imported from Asia for consumption in Australia annually (QCA, 2014).

From a workforce perspective, industry leaders tend to be younger than the national average for agribusiness and total fulltime employment in the industry is about 200, with additional seasonal use of casual workers to manage harvest, processing and some maintenance tasks. Due to the small size of the industry (mostly family farms) and a lack of growth over the last decade, there has been little movement\(^4\) in high level management roles. This situation restricts the prospects of career progression for existing workers. At the same time the prawn farming industry\(^5\) has had a low public profile and there is currently no coordinated approach to promote it as a career option for young people.

However, over the next five years, the Australian prawn farming industry is anticipating significant growth. New technology dealing with water quality\(^6\) has been incorporated at a commercial scale into world’s best practice on-farm management production systems to address most of the regulatory hurdles that have restricted growth in Queensland. It is anticipated that further regulatory reform recommended by recent reviews of both Queensland and National aquaculture legislation will also result in a more streamlined approach for businesses. These factors, together with growing domestic demand for Australian branded prawns (both farmed and wildcatch “Love Australian Prawns” campaign\(^7\)) and increasing Asian middle class interest in sourcing and paying for safe secure high quality seafood protein has made the investment in expanded production worthwhile.

Extensions to existing prawn farms in Queensland, evolving business models for some farms and the establishment of new farms and hatcheries in other jurisdictions in Northern Australia and Western Australia are planned for the medium term. In some cases the scale of growth planned for individual

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4. Very few new jobs created at this level and little change of personnel in these senior roles
5. For further information about the Australian prawn farming industry see the Industry snapshot text box
7. The result of a marketing project led by the Seafood CRC
companies is very large and may require between 100 and 1,400 new employees at full operation over a 1-5 year period. Currently there are insufficient, highly skilled workers in Australia to meet this level of growth.

The Australia Prawn Farmers Association (APFA) approached AgriFood Skills Australia (AgriFood) for assistance in identifying some of the major workforce implications of the rapid expansion to the commercial prawn farming industry. The APFA and AgriFood have agreed to work with the industry stakeholders to identify strategies to address challenges in recruitment, retention and skilling of the expanded workforce to ensure there are sufficient highly skilled technicians and managers to support this level of growth.
Industry Snapshot

Pond-based prawn farming began in Australia in the 1980s. The two species currently grown in Australia are Black Tiger prawns *Penaeus monodon* and Banana prawns *Fenneropenaeus merguiensis*. Farmed prawns are grown in seawater and require water temperatures of at least 25 degrees celsius during growout, so farms are located next to seawater sources along the east coast of Queensland and a small number in northern New South Wales, with the majority of the farmed area and value of production located north of Mackay. This is also the region in which the majority of Queensland's pond-based Barramundi farms are located – although these are grown in freshwater (see Figure.1).

Current prawn stocks take six months to produce a crop however new research being undertaken by the ARC Research Hub for Advanced Prawn Breeding (a research coalition headquartered at James Cook University, Townsville) is expected to identify the genes that will increase growth rates (and improve disease resistance) considerably in future. Currently, due to temperature limitations, prawn farms in southern Queensland generally produce one crop per year whereas farms in the far north can produce prawns all year round. Some businesses have purchased multiple farm sites (consolidating the industry) to enable them to expand their volume of production in a region, or to supply the market for a longer season by expanding geographically.

Almost all prawn farming businesses are members of the industry peak body, the Australian Prawn Farmers Association (APFA) which was formed in 1993. From the most recent figures available there are about 22 businesses currently farming a total of up to 700 hectares of ponds. Production in 2014 was about 3500T of prawns worth an estimated $62M GVP (QDAF, 2014).

This equates to an average prawn industry GVP per hectare per annum of $90,000; although in some highly productive farms this can be as much as $200,000 per hectare per annum. This contrasts with sugarcane in Queensland, which was worth $1,068M in 2014, farmed over about 565,162 hectares thus returning an average GVP per ha of $1890 per annum.

Prawn farms range in size currently from about 20 ha to 165 ha (though only a handful of the 22 farms have a current production area of >30ha). The business structure of prawn farms range from small owner operators (relying on family members and outsourcing to do the work), to large family-owned farms employing 20 plus full time staff through to corporate farms employing up to 60 full time staff. Although individual farms employ between 2-60 FTEs during the year, the workforce expands significantly with casual operational staff during harvest and processing periods. In areas where sugarcane farming and pond-based aquaculture are co-located the seasonal workforce is often informally shared due to complementary harvesting seasons. Most farms do their own maintenance and have their own hatchery, grow-out and processing facilities, though some of the very small farms have arrangements to outsource hatchery services to a larger farm, and pond and facility maintenance to regional contractors.

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9 https://research.jcu.edu.au/itrh-apb
Background

The aim of this project is to provide the evidence base required to position the Australian prawn farming industry to implement a major Career Development Program in future. The information from this project will inform the processes and procedures that will be needed to ensure the industry attracts and retains sufficient appropriately qualified people to fulfil on-farm higher level technical and managerial roles in the medium term.

Prior to funding this labour analysis project, AgriFood commissioned a scoping study to refine the focus. In May 2015, discussions were held with a number of key industry members and senior executives from APFA. Additionally, the views of several training providers active in the northern Australia aquaculture sector were sought in shaping the scope of this Career Progression Analysis project.

This consultation established the need to increase the attractiveness of the sector to new graduates of university and higher level Vocational Education Training (VET) programs by offering a clear career progression within the prawn farming industry. At the time, it was proposed that this could include the identification of a range of managerial and technical skills that are transferable across a range of other aquaculture and agribusiness sectors - enabling a mapping of the common areas of responsibility and the core skills required by those positions/functions.

It was hoped that this cross-sectoral approach would not only improve the economies of scale for the current small size of the prawn farming industry, it would also enable (often) remote regions to build and retain a skilled workforce and the ability to balance some of the peaks and troughs of the regional labour market. A related objective was to offer encouragement for professionals, para professional and technicians already in the industry to remain employed in the sector, while recognising that the current opportunities to advance to the position of manager of a prawn farm remain limited until growth plans are realised.

Consequently this project:

- reviewed existing information and data on the current and future skilling needs and contextual business framework for prawn farming, tropical aquaculture and selected agriculture industries (mainly irrigated horticulture) in Northern Australia,
- confirmed the skills, licenses and other attributes and knowledge required by the range of senior supervisor and manager roles on prawn farms, based on the assumption that these roles require the incumbent to possess skills and knowledge normally gained through completing a tertiary level qualification, and/or a diploma/advanced diploma from the VET sector, and/or long term on farm experience. This included consideration of the senior roles for prawn hatcheries, growout farms, processing and managerial/administrative functions.
- identified the key skills required in similar roles in the broader tropical aquaculture and agriculture industries and attempted to map the commonalities across the sectors,
- considered the future roles and scenarios that the prawn farming industry (and where relevant, other horticultural sectors) is likely to need the skills to address, as it grows over the next three years.

The project recommendations, if implemented will:

- Provide a road map to encourage all training providers (VET sector, schools and universities) to work more effectively and collaboratively with each other, and with non-teaching
research institutions, government and industry to deliver flexible, customised courses and programs that are best suited to meet the higher level technical and management needs of prawn farmers and other regional agribusiness sectors and ensure that new R&D and technology is incorporated quickly into training programs to build competitive advantage and support industry growth; and

- Result in a significant and coordinated contribution to support future targeted workforce development projects in communities in northern Australia that will foster the attraction and retention of highly skilled, innovative people who can see a long term career pathway within the North, based on interesting, diverse employment opportunities.

Methods

Advisory Groups and Project Promotion

Two advisory groups (an external group and a project advisory team) were established to ensure the project was industry-led and, given the broad scope, guided by relevant stakeholder expertise. The two groups included representation from: Agrifood, the Fisheries Research and Development Corporation (FRDC), the prawn farming industry - including the peak body the Australian Prawn Farmers Association (APFA), a Registered Training Organisation (RTO), and a multidisciplinary team from James Cook University.

An explanatory email outlining the aims of the project was sent via the APFA Executive Officer to all members of the APFA at the beginning of the project. In addition a presentation was made to both the APFA and the Australian Barramundi Farmers Association (ABFA) annual meetings on the Gold Coast at the end of July 2015 to provide an overview of the project and an opportunity for industry stakeholders to discuss the project with the core project team. Prior to recruiting non-aquaculture sector participants for the focus groups, an email outlining the project and the cross-sectoral elements was sent to the two production horticulture industry workforce development coordinators in northern Queensland.

Desktop Review

The project began mid-June 2015 with a desktop review designed to identify key points around business intelligence and workforce development that was pertinent to the scope of the study (both for agribusiness and for Northern Australia specifically) from several recent reports and publications. Due to the breadth of content covered, information in the review was aggregated into key business areas beginning at a macro scale down to a micro scale across general workforce and business trends, agribusiness and then specific information from several recent tropical aquaculture reports. The full desktop review is provided at Appendix 1.

Online Survey

Along with input from the two advisory groups, the review assisted in developing the online survey questions (Appendix 2). The survey was posted online for a month and participants were recruited via email circulations of an information sheet (Appendix 3) sent via the APFA and the ABFA
membership email network as well as from industry and FRDC members of the two Advisory Groups. This email notified members about the aims of the project and encouraged them to participate in the survey. Given the APFA membership includes approximately 22 prawn farming businesses and there are about 10 Barramundi farming businesses aligned with the ABFA, the total sample population of genuine Full Time Equivalent (FTE) workers (not including seasonal casuals) is estimated at about 22011 FTEs across both industries. The number of FTEs holding management or high end technical positions is estimated at about 70 FTEs across both industries. The target population for the survey is predominantly the latter group. Surveys of this nature expect about a 30% response rate. The study was conducted under James Cook University Human Ethics Approval H6245 granted on the 5th August 2015.

Of the 39 people who responded to the survey, 1 response was removed due to missing data. This resulted in the final sample consisting of 27 men and 11 women who ranged in age from 21-60yrs (Mean age=35.88yrs, SD=10.62). This represents a participation rate of approximately 54 per cent of the target population across the APFA and the ABFA. Participants had been working in the industry from as little as a month to up to 30 years (M=9.66; SD=8.12) and had been working at their current place of employment for approximately 5.23yrs (SD=4.87; Range=0.1-15yrs).

The type of aquaculture business that participants worked at was mainly prawn farms (71%) and some Barramundi farms (13%). Most of the farm operations included saltwater ponds (68%), hatcheries (55%) and processing (24%). Farm production size ranged from 0 hectares to 191 hectares, with the majority of participants indicating between 98 and 100 hectares (34%; M=79.71, SD=53.38). Most farms were less than 200 km from a major urban area (74% were less than 100km and 18% were located 100-200km from a major urban area).

Most participants were managers (55%) and technicians (32%) with the remaining participants including educators and administrators. The specific job roles that participants were responsible for predominantly included General Hand (21%), Algal Technician (29%), Technician (32%), Grow-out Manager (16%) and Hatchery Technician (16%)12. A definition of each of these roles, based on feedback from industry, is provided at Appendix 4.

The survey asked participants about their workplace including the type of aquaculture business, the type of product, the size of farm and the participant’s roles and responsibilities within the business13. Further, participants were asked to indicate on Likert scales ranging from 1 to 4 what they thought were:

- the main barriers for workers receiving training (1-Not a barrier to 4-Extreme barrier);
- the most beneficial forms of training (1-Not a benefit to 4-Extreme benefit);
- most beneficial forms of prior learning (1-Not a benefit to 4-Extreme benefit);
- the most responsible for attracting, retaining and training skilled workers in the industry (1-Not responsible to 4-Extremely responsible);

11 Based on consultation with industry and interpolation from the most recent industry figures from the QLD DAF report ‘Aquaculture Production Summary Report 2013-14’ https://publications.qld.gov.au/dataset/aquaculture/resource/ef87c0a7-3933-4f9b-aa02-af8dec1d95dd
12 Noting that many participants selected multiple job roles – see Appendix 6 for details
13 Full information on responses to the online survey is provided in Appendix 6
• the main barriers to attracting and retaining skilled staff (1-Not a barrier to 4-Extreme barrier);
• what strategies they thought would be most effective to attract and retain skilled staff to the industry (1-Not effective to 4-Extremely effective).

Interviews and Focus Groups

Results from the survey were further explored through face-to-face interviews and focus groups. The theoretical framework used with interviews and focus groups was ‘Interpretive Phenomenological Analysis’ which is based on the ‘lived experience’ (Smith, Flowers & Larkin, 2009). The information collected was analysed using thematic content analysis, noting that all information was de-identified. The sampling technique for this type of qualitative research is less concerned with the number of participants interviewed and more focused on reaching ‘saturation’ – where no new ideas emerge as more interviews or focus groups are completed.

A total of 6 focus groups (range of 2 to 6 people) and 8 interviews were conducted (N=38). Participants were recruited from across Queensland and the Northern Territory, representing family businesses, small companies, large companies and education and training organisations. Main produce types included prawns (including hatcheries), pearls, Barramundi as well as horticulture and agriculture crops. Job positions included technicians, managers, owners, trainers and educators.

Interview data was analysed via six steps which were completed in an iterative process where each of the steps could be returned to and repeated if necessary (Braun & Clarke, 2006). The first step involves knowing the data such as through reading and re-reading the data. Next, the initial codes were created by coding interesting features systematically. Initially, 337 codes were generated from the transcripts, grouped under 18 main codes (Appendix 5). In the third step the codes were organised into potential themes (see Results for further details). Next, these themes were reviewed to ensure their fit with all of the data. The fifth step involved defining the themes by refining the specifics of each theme thus generating clear definitions and names. The final step was the production of the report of the analysis.

Contextual Meetings

Contextual meetings were conducted also in person or by telephone to provide an additional means to place the desktop review in context with the prawn farming industry and to provide examples or case studies to support the recommendations in the final report. Consultations included advice from both Project Advisory groups as well as specific discussions with a broad range of stakeholders across the Prawn and Barramundi farming sectors, including existing senior managers; ex-managers; Charles Darwin University’s Director of the Northern Institute and the Primary Industries RTO Manager; The Executive Officer of the NT Farmers Association; The Director General of the NT Department of Primary Industries; Queensland Department of Agriculture and Fisheries (QDAF), Fisheries senior staff; QDAF Principal Project Manager - Workforce Planning Resources, Planning and Skills Strategic Policy & Planning; QDAF Far North Queensland Regional Workforce Development Officer for Production Horticulture; Queensland Department of Education and Training (DET), Training Manager North Queensland Region; James Cook University’s Head of Aquaculture.
The results from the survey and the face-to-face consultations were then contextualised against this information and the emerging trends in the desktop review to develop the recommendations for the final project report.

Results

Desktop Review

Any consideration of developing effective strategies for workforce development to support growth in prawn farming specifically and tropical agribusiness more generally must be viewed in the context of the factors that are shaping the industry’s future. This includes a scan of the international horizon, how this impacts on national enablers and barriers to business growth and profitability, and the issues and capacity of the prawn farming industry itself given it is a small industry that currently only supplies a portion of the domestic market. The full desktop review is provided at Appendix 1 with key points outlined below.

External factors

Economic and market trends

The extraordinary growth in the Asian middle classes and recent Asian food safety scares are driving demand for safe, secure, high quality food (Anon., 2015a). This plays to Australia’s strengths in producing high quality, high value traceable food for niche markets. Australia’s falling dollar means that exports are considerably more attractive to small business (SMEs) and the three new Free Trade Agreements (FTAs) signed recently with Japan, Korea and China provide preferential access to about 1.5 billion people. The challenge for the SMEs will be to unlock the value of the FTAs by becoming export ready, culturally literate and market savvy (Anon., 2015a).

The 72% domestic food retail duopoly is driving a knock-on restructure in domestic agribusinesses forcing a differentiation into either ‘niche’ or ‘volume’ suppliers. Both strategies require increasingly sophisticated business skills at the enterprise level (Anon., 2015a; Nous Group, 2015). Those small businesses in the middle will need help to understand the business tools available to them and to change their models to achieve economies of scale or greater cooperation with other SMEs (Nous Group, 2015).

Digital connectivity and disruptive technology

The Agrifood industry in future will be dominated by technicians and technologists, astute marketers and innovative product developers (Anon., 2015a). Reskilling and upskilling will be needed for the current workforce; however clever thinking will be needed for the future workforce and to resolve persistent skills shortages in remote areas. The global digital economy is growing exponentially with 40% of the world’s population already connected to the internet (Anon., 2015a). Social media is a significant part of this growth as it provides a new low cost way to engage directly with consumers if businesses have staff with the skills and confidence to do so (Anon., 2015a; Nous Group, 2015).

As digital products and systems become more reliable and the value proposition for decision support tools is better understood, new skill sets also will be required to address both the opportunities and risks. Big data and data analytics will provide the means to bench-mark, monitor and measure core aspects of enterprise level business activity and systems (Anon., 2015a). This should bring significant improvement to productivity and profitability, regardless of location as rural and remote parts of Australia become more digitally connected (Anon., 2015a; CEDA, 2015). However the flipside of this
is that an estimated 40% of all Australian jobs will be lost to automation unless they feature non-routine cognitive skills such as problem solving (CEDA, 2015).

**Overarching National agrifood policy**

The Federal government has recently released two new policies: the *Developing Northern Australia White Paper* 14 and the *Agricultural Competitiveness White Paper* 15. These provide good foundations for sectoral and regional change for agribusiness in northern Australia, however, there are many obstacles yet to be resolved before the benefits will be realised.

The *Industry Innovation and Competitiveness Agenda* 16 released by the Federal government in late 2014 also focused on Food and Agribusiness as one of the 5 ‘pillars of the national economy’. This Agenda brings significant reform for all areas of business including establishing new funding drivers for industry Research and Development (R&D) and major changes to VET sector training (Anon., 2105a). A consistent theme across both the Federal and the Queensland State Governments is the need to improve enterprise level business and management skills to foster business resilience and drive future growth and sustainability – particularly of the agribusiness sector.

Another significant policy adjustment from the current government is the implementation of the new Federal *Biosecurity Act 2014* this will enable better risk management on farm to support the sustainability and growth of agricultural businesses, as a core element of Australia’s future economic success 17.

Specifically related to Aquaculture policy – the *National Aquaculture Statement* was released in mid-2014 as a prelude to developing the *National Aquaculture Strategy*. The strategy is being developed in consultation with industry and will identify a number of agreed, achievable actions that should be undertaken by government and/or industry to support the growth of a strong, competitive, resilient, profitable and ecologically sustainable aquaculture industry 18. Following the release of the *Pivot North Report* (the final report of the Joint Parliamentary Select Committee enquiry into the Development of Northern Australia) in September 2014 19, a related Joint Parliamentary Select Committee is now specifically considering *Opportunities for Expanding the Aquaculture Industry in Northern Australia* – consultations for this inquiry have now closed but a final report has not yet been released 20.

**Agrifood R, D & E**

In general, Australian agribusiness SMEs are failing to invest in R&D because they can’t afford to (Nous group, 2015); in contrast R&D appears to be easier for larger companies to access and they often do their own in-house research 21. The *Industry Innovation and Competitiveness Agenda* seeks to change aspects of this issue for SMEs through tax breaks for R&D, ensuring that research projects are industry-driven (and access to research funding is contingent on having industry partners) and by establishing industry ‘Growth Centres’ (including one for Food and Agribusiness - see link in

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14 http://northernaustralia.infrastructure.gov.au/white-paper/ which included the announcement of a new CRC for Developing Northern Australia
17 However there remains concern amongst prawn farmers that the Australian government response to biosecurity is still more focused on dealing with incursions when they happen rather than preventing them happening.
20 http://www.aph.gov.au/Parliamentary_Business/Committees/Joint/Northern_Australia/Aquaculture
21 While some R&D collaboration has occurred across the industry – for major research investment this tends to be done through individual enterprise partnerships with research providers.
footnote) where industry-relevant research is commercialized and rolled out as quickly as possible in partnership with industry.22

Over recent years extension models have changed with the decreasing size of public sector investment in R&D – increasingly extension services for most agricultural sectors are delivered privately (either via private agronomists, subsidized training through RTOs, or product sales representatives) and can come with significant other agendas. Some government funded training around best-practice strategies for land-based agribusiness is delivered by Natural Resource Management (NRM) groups23. Government funded extension is increasingly predicated on the concept of being provided only where there is overt market failure. Yet extension remains a significant weakness in agrifood; it could deliver a step change in productivity if it was possible to improve the way that knowledge is shared so it leads to adoption (Anon., 2014b).

Broad workforce demographics particularly for youth (15-24 year olds)
The recent report on the ‘New Work Order’ commissioned by the Foundation for Young Australians found that 70% of current young Australians are getting their first jobs in roles that will look different or be completely lost in 10-20 years’ time due to increasing automation. Further, it also noted that 50% of all future jobs will require significant digital skills yet these skills are not being taught in schools (AlphaBeta, 2015). As such it is important that clear career pathways are developed and skill training is adjusted to support the rapidly changing needs of regional industries like prawn farming.

Demographics for the regional agrifood workforce
The literature consistently points to Australian agribusiness having an ageing workforce – with nearly half the industry older than 55 years (Anon., 2015b). Much of the on-farm work in agriculture is also seasonal or part-time and located in rural and remote regions so it can be hard to attract and retain workers and there is heavy reliance on grey nomads, backpackers and, in some areas, on 457 or seasonal migrant worker visas to meet the workforce needs. In the short-term, in more remote areas, this approach may need to continue (Anon., 2015b; Anon., 2015c; Taylor et al., 2015).

As previously noted, increasing automation will require employees with different ways of thinking and multiple skill sets – underpinned by literacy and numeracy skills, innovation experience and entrepreneurial flair (in agribusiness this is summarized by some using the acronym ESTEAM24) (CEDA, 2015; Nous Group, 2015). At the same time, by 2020 the majority of the workforce in Australia will be Gen Ys (the current 18-34 year olds). As this group will be our future leaders and managers there is an urgent need to engage them now, if businesses are to remain relevant and profitable. This will be an even greater challenge for agribusinesses especially in remote locations, as survey responses show that only 16% of Gen Ys prefer to live away from urban areas (Anon., 2015b). However certain characteristics of Gen Ys will help employers to target their attraction and retention strategies – they want to be inspired by the organization they work for and they seek out businesses that foster innovative thinking and develop their employee’s skills (AlphaBeta, 2015; Anon., 2015b; CEDA, 2015). Flexibility of work conditions (hours/locations), an inclusive employment culture and a varied professional role also hold great appeal to Gen Ys.

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22 Noting that the APFA, despite being a small organization with limited resources, does set annual R&D priorities and does have a compulsory R & D levy paid by members to Levies Revenue Collection Services. .364 cents /kg of GVP is collected and then leveraged up through the FRDC.


Training and Education

New models for training and education are required to proactively develop the agrifood workforce of the future. As workforce characteristics change the skill sets to support these also need to change to remain relevant (Anon., 2014; Anon., 2015a; Nous Group, 2015). Training for agrifood sectors has been seen as the domain of the VET sector with very little connection or integration between High School, VET, and higher education25. There has been even less explicit connection between research and training, consequently new technology is not being adopted fast enough to provide a step change for the industry (Miller et al., 2013).

There is a growing need for recognition that jobs of the future in a technology driven world will require deeper knowledge, high level technical skills and significant practical experience (CEDA, 2015). This can best be delivered via an integrated, flexible delivery platform that can be distributed across industry workplaces, schools, VET and higher education institutions (Anon., 2015). Exposing young people in school to the new National Curriculum for Food and Fibre (implemented in 2014) will also provide a foundation for changing the negative public image of agriculture and demonstrate the diverse range of career pathways available (Anon., 2014).

Internal factors – enterprise level issues for agribusiness

Significant growth and securing market access in agribusiness will come down to the individual capabilities of each business and its workforce (Anon., 2014; Anon., 2015a; Nous Group, 2015). Operating in an environment of ever increasing risk and complexity (due to climate volatility, water security issues, biosecurity, new technology, policy reforms and layers of bureaucracy) mean that new and more diverse skill sets will be required to be successful (Nous Group, 2015). Agribusinesses will need to reinvent themselves and rise to the challenge by embracing a culture of professional development, along with better strategies to deal with debt, drought and succession planning (Anon., 2014).

Social license to operate, particularly around animal welfare and environmental management, is becoming extremely important for producers as an increasing proportion of consumers are driving demand for differentiated products (Nous Group, 2015). Social media is a significant tool in the social license debate and if not well managed by producers it allows rapid, emotive and large scale actions on issues, with often very negative consequences for both individual businesses and sectors (Nous Group, 2015).

Focusing on becoming an ‘employer of choice’ and maximizing remuneration and lifestyle benefits will need to be key strategies to attract and retain Gen Ys to highly skilled roles, especially in remote locations (Anon., 2012; Anon., 2015b; CEDA, 2015; Nous Group, 2015). Flexible hours, family friendly benefits, free or subsidized housing, longer annual leave, professional development support and generous superannuation could be considered in the mix of an employment package (Anon., 2015b).

Online Survey Results (results in full at Appendix 6)

Upskilling and training

In summary, participants in the online survey thought that there were some, or moderate, significant barriers and challenges for existing workers seeking to upskill or engage in more training

25 Though a few universities (e.g. University of New England; Charles Sturt University and Central Queensland University) are establishing hybrid undergraduate degree programs that incorporate and embedded competency-focussed diploma and industry mentoring components aimed at improving this situation.
in the aquaculture industry. Participants reported (in order of significance) the main barriers to upskilling/training as the lack of clear career pathways, lack of funding opportunities to pay for training, the high cost of training, lack of awareness of available courses, and a lack of time to commit to training. Participants’ suggestions for factors that would facilitate workers engaging in training predominantly included remuneration, established clear career pathways, worker ambition or motivation\(^{26}\) and personal or job satisfaction.

**Training Structures and Delivery**

Participants reported that the most beneficial types of training for those seeking to enhance technical and managerial skills included on the job training by a supervisor, short courses delivered at the workplace, demonstrations by experts at a farm and visits to other farm or research facilities (Table 1 below).

**Table 1. Beneficial types of training for managers and technicians (Scaled 1 to 4).** Source Table 3

<table>
<thead>
<tr>
<th>Training Type</th>
<th>Not a Benefit (1)</th>
<th>Extreme Benefit (4)</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>On the job training by a supervisor</td>
<td>2.6%</td>
<td>52.6%</td>
<td>3.47</td>
<td>.65</td>
</tr>
<tr>
<td>Short courses delivered at workplace</td>
<td>2.6%</td>
<td>47.4%</td>
<td>3.29</td>
<td>.80</td>
</tr>
<tr>
<td>Demonstration by experts at a farm</td>
<td>0%</td>
<td>36.8%</td>
<td>3.21</td>
<td>.70</td>
</tr>
<tr>
<td>Visits to other farms or research facilities</td>
<td>0%</td>
<td>39.5%</td>
<td>3.21</td>
<td>.74</td>
</tr>
<tr>
<td>Full-time or part-time on the job certificate/diploma courses</td>
<td>0%</td>
<td>44.7%</td>
<td>3.18</td>
<td>.83</td>
</tr>
<tr>
<td>Mentoring program</td>
<td>0%</td>
<td>34.2%</td>
<td>3.16</td>
<td>.72</td>
</tr>
<tr>
<td>Masterclasses delivered by experts</td>
<td>5.3%</td>
<td>34.2%</td>
<td>3.13</td>
<td>.81</td>
</tr>
<tr>
<td>Short courses delivered external to workplace</td>
<td>2.6%</td>
<td>31.6%</td>
<td>3.00</td>
<td>.84</td>
</tr>
<tr>
<td>Full-time or part-time external or online certificate/diploma courses</td>
<td>2.6%</td>
<td>21.1%</td>
<td>2.74</td>
<td>.83</td>
</tr>
<tr>
<td>Online workshops or courses</td>
<td>10.5%</td>
<td>5.3%</td>
<td>2.29</td>
<td>.73</td>
</tr>
<tr>
<td>Webinars</td>
<td>13.2%</td>
<td>10.5%</td>
<td>2.26</td>
<td>.83</td>
</tr>
</tbody>
</table>

Participants reported that the most beneficial types of prior learning for new workers in a managerial role were having a university degree in industry specific knowledge (e.g. aquaculture specific animal husbandry), having a university degree in general business knowledge (e.g. business, marketing or economics) or having an aquaculture-specific vocational institution diploma (Table 4, Appendix 6). Beneficial type of prior learning was rated similarly for new workers in a technical role. This prior learning included having a university degree in industry specific knowledge (e.g. animal husbandry), having an aquaculture-specific vocational institution diploma or having an aquaculture-specific vocational institution certificate (e.g. general hand) (Table 4, Appendix 6).

\(^{26}\) Noting that employees need to have some degree of ambition and motivation but employers also need to value and nurture their workforce which in turn can enable stronger feelings of motivation.
Participants were asked to indicate who they thought was responsible for ensuring that a future workforce would be aware of career opportunities in the aquaculture industry as well as who was responsible for ensuring that this future workforce was adequately trained. Participants rated industry, individual farms/enterprises and universities as most responsible for ensuring that a future workforce was aware of career opportunities and for training this future workforce (Table 5, Appendix 6).

**Attraction and Retention**

Participants reported that the key barriers to attracting skilled staff to the aquaculture industry were the unattractive remuneration packages, the lack of awareness of career opportunities and that there was no established pathway for career advancement. Remuneration packages and career pathways were also identified as key barriers to retaining skilled staff to the industry (See Table 2 below - for full results see Table 6, Appendix 6).

**Table 2. Barriers to attracting and retaining skilled staff to the aquaculture industry (Scaled 1 to 4).**

<table>
<thead>
<tr>
<th></th>
<th>Attraction</th>
<th></th>
<th></th>
<th>Retention</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not a Barrier (1)</td>
<td>Extreme Barrier (4)</td>
<td>Mean</td>
<td>Std. Dev.</td>
<td>Not a Barrier (1)</td>
<td>Extreme Barrier (4)</td>
</tr>
<tr>
<td>Remuneration packages are not attractive</td>
<td>7.9%</td>
<td>52.6%</td>
<td>3.34</td>
<td>.88</td>
<td>7.9%</td>
<td>55.3%</td>
</tr>
<tr>
<td>Lack of awareness of career opportunities in the aquaculture industry</td>
<td>0%</td>
<td>31.6%</td>
<td>3.11</td>
<td>.73</td>
<td>21.1%</td>
<td>21.1%</td>
</tr>
<tr>
<td>No established pathways for career advancement and opportunity</td>
<td>2.6%</td>
<td>31.6%</td>
<td>3.05</td>
<td>.80</td>
<td>2.6%</td>
<td>31.6%</td>
</tr>
<tr>
<td>Limited social opportunities outside of work due to isolation</td>
<td>7.9%</td>
<td>23.7%</td>
<td>2.82</td>
<td>.89</td>
<td>13.2%</td>
<td>13.2%</td>
</tr>
<tr>
<td>Lack of lifestyle friendly rosters</td>
<td>10.5%</td>
<td>21.1%</td>
<td>2.71</td>
<td>.93</td>
<td>13.2%</td>
<td>18.4%</td>
</tr>
<tr>
<td>Limited access to services (education, healthcare and social facilities) and job opportunities for spouse and family</td>
<td>7.9%</td>
<td>15.8%</td>
<td>2.63</td>
<td>.85</td>
<td>13.2%</td>
<td>15.8%</td>
</tr>
<tr>
<td>Limited opportunities for leadership development</td>
<td>10.5%</td>
<td>10.5%</td>
<td>2.55</td>
<td>.83</td>
<td>5.3%</td>
<td>18.4%</td>
</tr>
<tr>
<td>Low job security due to seasonality of work</td>
<td>15.8%</td>
<td>13.2%</td>
<td>2.47</td>
<td>.92</td>
<td>21.1%</td>
<td>7.9%</td>
</tr>
<tr>
<td>Limited access to services and amenities outside of work due to isolation</td>
<td>15.8%</td>
<td>10.5%</td>
<td>2.47</td>
<td>.89</td>
<td>18.4%</td>
<td>7.9%</td>
</tr>
</tbody>
</table>
Limited support provided to new workers to fulfil work roles 

<table>
<thead>
<tr>
<th>Not Effective</th>
<th>Extremely Effective</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.4%</td>
<td>5.3%</td>
<td>2.21</td>
<td>.81</td>
</tr>
<tr>
<td>13.2%</td>
<td>5.3%</td>
<td>2.24</td>
<td>.76</td>
</tr>
</tbody>
</table>

The career or image of the career is unattractive 

<table>
<thead>
<tr>
<th>Not Effective</th>
<th>Extremely Effective</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>28.9%</td>
<td>2.6%</td>
<td>2.03</td>
<td>.82</td>
</tr>
<tr>
<td>39.5%</td>
<td>0%</td>
<td>1.86</td>
<td>.82</td>
</tr>
</tbody>
</table>

They do not become a part of the local community 

<table>
<thead>
<tr>
<th>Not Effective</th>
<th>Extremely Effective</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>31.6%</td>
<td>7.9%</td>
<td>2.11</td>
<td>.97</td>
</tr>
</tbody>
</table>

Participants reported that strategies that would be effective in attracting and retaining skilled staff included providing pathways for career development, providing or subsidizing housing as a part of the remuneration package, offering financial incentives for time spent at business, considering flexible work arrangements, offering tuition reimbursement and professional development benefits and facilitating attendance at national and/or international conferences (see Table 3 below – for full results see Table 7, Appendix 6).

Table 3. Strategies for attracting and retaining skilled staff to the industry (Scaled 1 to 4).

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Not Effective</th>
<th>Extremely Effective</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide pathways for career development within the industry</td>
<td>2.6%</td>
<td>65.8%</td>
<td>3.58</td>
<td>.68</td>
</tr>
<tr>
<td>Provide or subsidise housing as part of remuneration package</td>
<td>0%</td>
<td>47.4%</td>
<td>3.39</td>
<td>.64</td>
</tr>
<tr>
<td>Offer financial incentives for time spent at business</td>
<td>5.3%</td>
<td>36.8%</td>
<td>3.11</td>
<td>.86</td>
</tr>
<tr>
<td>Consider flexible work arrangements</td>
<td>5.3%</td>
<td>28.9%</td>
<td>3.08</td>
<td>.78</td>
</tr>
<tr>
<td>Offer tuition reimbursement and professional development benefits</td>
<td>0%</td>
<td>26.3%</td>
<td>3.05</td>
<td>.69</td>
</tr>
<tr>
<td>Facilitate attendance at national and/or international conferences</td>
<td>0%</td>
<td>23.7%</td>
<td>3.03</td>
<td>.68</td>
</tr>
<tr>
<td>Offer longer annual leave</td>
<td>5.3%</td>
<td>34.2%</td>
<td>2.95</td>
<td>.93</td>
</tr>
<tr>
<td>Include childcare/school fees/tutoring as part of remuneration package</td>
<td>5.3%</td>
<td>31.6%</td>
<td>2.92</td>
<td>.91</td>
</tr>
<tr>
<td>Look for skills that are transferable (i.e. applicable to broader agricultural positions) to increase possibility for career advancement across industry</td>
<td>5.3%</td>
<td>23.7%</td>
<td>2.82</td>
<td>.87</td>
</tr>
<tr>
<td>Provide access to cross-industry skill training to encourage workers to remain in region</td>
<td>7.9%</td>
<td>28.9%</td>
<td>2.79</td>
<td>.96</td>
</tr>
<tr>
<td>Offer generous superannuation</td>
<td>5.3%</td>
<td>15.8%</td>
<td>2.76</td>
<td>.79</td>
</tr>
<tr>
<td>Look into employment opportunities for spouse or partner</td>
<td>15.8%</td>
<td>26.3%</td>
<td>2.61</td>
<td>1.05</td>
</tr>
<tr>
<td>Loosen the selection criteria and address skill gaps through training</td>
<td>15.8%</td>
<td>7.9%</td>
<td>2.45</td>
<td>.86</td>
</tr>
</tbody>
</table>
Use visa incentives to bring in skilled migrants from overseas  
Target new migrants who are keen to gain new work skills

| Use visa incentives to bring in skilled migrants from overseas | 28.9% | 15.8% | 2.23 | 1.05 |
| Target new migrants who are keen to gain new work skills | 31.6% | 7.9% | 2.00 | .91 |

Participants reported seeing a moderate (34.2%) or extreme (55.3%) benefit in a program that established cross industry training for common skills at managerial and technical staff levels to help attract and retain staff to agricultural and aquaculture industries. However, participants saw less benefit in a program where business co-shared a workforce to retain skilled workers within a region (moderate benefit = 44.7%, extreme benefit = 23.7%). Common skills were suggested to be managerial skills, animal husbandry, leadership skills, data collection, mechanical skills, human resource management, operating machinery, business skills, food safety, quality testing, laboring skills and biosecurity management.

Participants reported on their current levels of qualifications in the online survey – 87% of respondents had a university degree; 53% had VET qualifications and 40% had both VET and university qualifications. Of the 38 participants only 18% had a mix of both business and science qualifications (for a detailed breakdown of this information see Table 8, Appendix 6).

Interviews and Focus Groups

**Major Themes**

Key factors emerged from the data when identifying issues in attracting and retaining skilled staff to the prawn and aquaculture industry, and these were consistent with issues identified in broader agriculture and horticulture focus groups. These attraction and retention issues included positively associated individual characteristics and attitude (work and lifestyle enjoyment, commitment); whether there were appropriate career opportunities and pathways; locality issues such as isolation and climate; the quality of remuneration and non-monetary benefits (lifestyle friendly rosters, accommodation); and a realistic understanding of working on a farm.

Participants indicated that government, industry, individual enterprises and education/training organisations were responsible for facilitating stability (attraction and retention) of skilled staff to the industry. Similarly, effective training and education of skilled staff needed to be coordinated and facilitated by individual enterprises, government and training or education organisations.

Participants responses indicated that key skills or knowledge required for a worker to be successful as a skilled manager or technician included the ability to apply their formal course knowledge to farm practice; to have effective coping skills (time management, prioritizing) and work attitude; to have a broad base of practical skills and education; to have effective interpersonal communication and management skills; and to have a good understanding of the systems associated with the farm on which they were employed.

As such, formal training content needed to be an effective integration of highly technical skills/knowledge, practical skills (plumbing, mechanics) and attitude development (coping skills, work ethic, ‘openness’ to learning). Responses from participants suggested that delivery of content needed to be a flexible but integrated mode of delivery that included cross-sector partnerships.
(between schools, industries, universities, vocational institutions and individual enterprises) and ‘on the job’ training.

Facilitating a Stable Skilled Workforce: Attraction and Retention

Attitudinal and Individual Characteristics
One of the core reasons that attracted participants to their career, and then helped them to stay, were individual and attitudinal characteristics. Specifically, people worked in aquaculture and broader agriculture because they enjoyed growing things and working with plants or animals, often specifically aquatic animals. Participants indicated that they enjoyed the challenge and variety of their jobs and that it was important to be highly committed and passionate about the work. Predominantly, participants stayed in the industry because they loved the lifestyle that was associated with working in aquaculture (or agriculture). These lifestyle characteristics included working outdoors and working with fish or prawns and fishing. This love of lifestyle was for some participants a result of a passion for recreational aquatic pursuits (e.g. fishing/diving) or a history of farming in the family or living in rural areas.

Career Opportunities and Pathways
Participants indicated that the main challenge for attracting and retaining skilled staff to the aquaculture industry was limited employment opportunities, career advancement opportunities and unclear career pathways. This challenge was seen as being predominantly due to governmental regulations\textsuperscript{27} which participants reported as stagnating industry growth. Despite this, many of the participants started in the industry because of perceptions of potential industry growth and career opportunities. Regardless of industry growth issues, many participants reported that there was a lack of awareness from a young age of education pathways and career opportunities in aquaculture (or agriculture), potentially contributing to difficulties in attracting young people to the industry.

With these career path challenges in mind, participants indicated that a more positive image of aquaculture and/or agriculture needed to be promoted, particularly towards young people. This positive image included promoting that it is a challenging and interesting industry; that employees develop a wide variety of skills; that the industry is proud of its aims for sustainability and food security; that it is a highly technological and innovative industry; and that you have a great work environment that includes lifestyle characteristics such as being outdoors, fishing and nature. Particularly, participants reported that it was educational institutions such as schools and universities that were responsible for promoting this positive image. For instance, participants thought that aquaculture and/or agriculture should be a part of the national curriculum and that there should be programs that help raise awareness of food production and career opportunities in primary production industries\textsuperscript{28}.

Participants were also asked whether they thought sharing a skilled workforce across industries within a region would be an effective strategy for retaining skilled people to aquaculture industries. Predominantly participants reported that this strategy would only be effective in sharing under/low

\textsuperscript{27} Environmental planning and development regulations across multiple layers of government

\textsuperscript{28} AgriFood Skills Australia is participating in an Australian Government Agriculture in Education Program which will produce a suite of resources for use in schools across Australia. These resources will align with the Australian curriculum and also reflect the knowledge and skills viewed as critical to the future of the agricultural industry. \textit{Innovation in Aquaculture} has been identified as a suitable context for agriculture related learning and understanding. These resources will target Year 9-10 Design and Technologies students. Further details www.agrifoodskillsaustralia.com.au.
skilled workers (e.g. labourers) or generic business skills. Participants’ responses indicated that sharing skilled workers across industries could be problematic due to a potential loss of intellectual property, seasonality of crops and a lack of interest in working with land-based crops or livestock. For example, technicians enjoyed working with aquatic animals and in aquatic environments and therefore had little interest in shifting to a land-based product. Participants suggested that continuing to engage in entrepreneurial consultancy would be more appropriate, but that this career path also needed to be promoted.

**Farming Reality and Locality**

One particular factor that influenced both attraction and retention was the geographical location of farming workplaces and the associated environmental and climatic conditions. Participants indicated that workers needed to be able to cope with relative isolation, such as isolation from services. However, the isolated location could be particularly challenging if the worker had a family, particularly if there was a lack of employment, social and educational opportunities for the family. Further, participant responses suggested that feelings of isolation were compounded in communities that had highly transient workforces/populations. Participants reported that there would be greater success if workers were recruited locally, but this was not necessarily the case for all regions. Northern Australia’s harsh climatic conditions was seen as a substantial challenge to attracting and retaining staff, particularly for those who had never worked in farming or outdoors before. Consequently, participants often indicated that for new workers and new graduates there was a dissonance between their expectations of work and the realities of farm work. For instance, the hard labour, long hours and harsh environment that is implicit in the job regardless of qualifications and role, was not what many were expecting. Participant responses suggested that one of the only ways this could be counteracted was with substantial remuneration package benefits.

**Remuneration**

Participants indicated that one of the largest barriers to addressing the aforementioned challenges to attraction and retention of skilled staff was remuneration. Participant responses indicated that there was an effort-reward imbalance in the expected level of education and skill in return for a low income. Yet it was recognised that this was often beyond the control of the individual business due to market and government factors. The impact of the low wages or salary was in some cases compounded by high costs of living. Nonetheless, participants had suggestions on how to increase the attractiveness of the remuneration package by including other benefits such as free on-farm housing or subsidised housing; flexible work rosters to increase family time; longer paid leave in the off season; offering paid training and education as an incentive; and introducing FIFO structures for some workers to allow for extended periods of time away from the farm, particularly for those in very isolated areas. Other benefits were based on positive work environments that provided job security, good managers who communicated well, and having good working relationships with other workers.

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29 For providing specialist services, e.g. pump servicing, pond construction etc.

30 This is seen as a mix of external factors affecting profitability and fundamentally the industry award conditions – particularly for entry level roles resulting in very low pay levels for the skills required
Training and Course Content

Key Skills
Participants reported that key skills for a successful manager or technician included the ability to effectively apply their knowledge and education to farm practice. It was indicated by participants that new graduates often had good technical and scientific knowledge but did not necessarily understand how this knowledge should be incorporated into daily farm practice, particularly across many areas simultaneously. Some participants thought that this lack of ‘hands-on experience’ and more particularly the lack of a reasonable degree of functional competence across multiple content areas was a key gap in new graduates training and education.

Participants also indicated that particular attitudes and coping skills were very important for a new worker to possess, with many participants indicating that they would prefer to hire for attitude and train for skill. These attitudes and coping skills included being adaptable and resilient, having a good attention to detail, being committed, possessing a good work ethic, and being able to multi-task, problem-solve, manage time and work independently.

Overwhelmingly, participants indicated that the best workers were those who, regardless of tertiary training and farm role, also possessed practical skills and experience\textsuperscript{31}. Practical skills included having basic mechanical and plumbing skills, foundational education (e.g. mathematics), basic knowledge base in aquaculture, and a range of tickets and licenses (e.g. forklift, confined space, quad bike/all-terrain vehicles).

One of the skills or job components that participants felt was most challenging was any role involving managing and communicating with other staff. This included having to work effectively in a team, being diplomatic in managing interpersonal differences, managing language barriers, motivating workers, accommodating different learning styles and employing workers with appropriate work ethic\textsuperscript{32}.

The final key skill identified by participants was that of understanding farm system specifics. This skill could only be learnt on farm and required the understanding that each farm operated differently. Therefore, new workers needed to have an attention to detail within that system in order to preempt problems. Participants also reported that all management should have a bottom-up understanding of the farm so that they had the best insight into how to develop workers, maintain worker satisfaction and have the farm operating efficiently.

Multifaceted Skill Training
The above key skills identified by participants are also consistent with their recommendations that course content should be multifaceted. Specifically, an integrated model should be employed in tertiary training that also includes practical skill and attitudinal development training. As stated above, practical skills include, for example, basic mechanical and plumbing skills whilst attitudinal development includes work ethic, interpersonal communication skills and commitment. Attitude was consistently emphasized by participants as a key feature of a successful worker, as evidenced by

\textsuperscript{31} Because even for the most skilled roles on farm – it is seen as essential that employees have core practical skills as at times everyone will be required to pitch in and do these practical jobs.

\textsuperscript{32} Many of these job components are covered in the Certificate IV VET course ‘BSB40812 Frontline Management’ or in various university-level business courses.
the phrase “hire for attitude, train for skill”. Part of this development relied on understanding the
day to day running of a farm so as not to develop unrealistic expectations of post-education
employment.

Delivery of Training

In order to address gaps in skills such as practical skills and increase new graduate understanding of
the realities of working on a farm, participants thought an integrated training model would be
appropriate. This model needed to be flexible and include cadetships, on farming short courses,
minimization of online delivery and increasing partnerships between industry/enterprises and
educational institutions such as universities. Cadetships, internships or graduate programs were
perceived to facilitate the application of knowledge to practice for new workers or new graduates. Participant responses suggested that there needed to be greater collaboration between education and industry stakeholders such as having farmers speak at university or VET courses or having hatcheries run by universities to increase student experience. For the most part, participants did not think that online training was desirable and may only be applicable for generic business courses. Participants perceived this to be the case as they reported that the most effective type of training was on-farm training as workers can see the immediate and practical application of knowledge or theory. Further, participants reported that if the course was delivered on farm, the quality of the content and deliverer was thought to be more appropriate. Delivery on farm also meant that there was a reduced impact on the business due to associated costs of sending workers away for training and having their workers roles temporarily covered by other time-poor workers. This was particularly an issue for those farms that were reasonably isolated. Above all, the mode of delivery was recommended by participants to be flexible to account for differences between different enterprises including seasonality, affordability and time constraints.

Responsibility for Facilitation

Participants reported that government, industry, education sector and individual enterprises were
responsible for facilitating a stable skilled workforce. Specifically, government had a responsibility to
address challenging regulations that inhibited industry growth and wage structures. Government
funding bodies (across at least two levels of government) also have a responsibility to reassess
funding opportunities for businesses to train staff. Industry and particularly schools had a
responsibility to increase awareness, attract young people to aquaculture and establish clear
education and training pathways. Further training and educational institutions were responsible for
ensuring that the quality of content being delivered was relevant, current and appropriate.
Businesses had a responsibility to be innovative in their strategies to attract and retain skilled
workers as this was seen as part of being an effective and successful business. For instance, owners
and managers perception of the importance and necessity of training was one of the main drivers in
workers accessing training.

33 While the industry as a whole has not previously embraced cadetships, traineeships or graduate programs and there has been no
culture of professional development, it appears that the prospect of industry growth means there is a much greater willingness to consider
doing this now.
34 An ancillary benefit of encouraging more upskilling of the existing workforce on-farm is that this may enable RTOs to do some
recognition of prior learning (RPL) assessments at the same time
35 Noting that, the Federal Government has an Industry Skills Fund for co-funding all levels of skills/courses that are linked to growth
opportunities.
Discussion

Scope of the study and what was achieved

**Cross sectoral career progression pathways**

The results of this study have delivered the majority of the outcomes intended. However, the original proposal ‘to develop a cross-sectoral agribusiness career progression pathway for managerial and high level technician roles in remote regions’ was comprehensively rejected during the face-to-face industry consultations. While survey participants identified common skill sets for management and higher level technical roles across agricultural and aquacultural sectors and indicated some potential benefit in co-sharing a workforce in a region, this did not hold true when examined more closely in the interviews and the focus groups. The reasons for this related primarily to the way in which existing workers identified with the career they had chosen. Managers and technical specialists working in aquaculture were passionate about working with water and being outdoors, identified strongly with working with fish or prawns and fishing, and loved the lifestyle – a memorable quote was “soil is slow, water is fast - I like things dynamic and would get bored working with soil”. Horticultural workers also expressed a passion for being outside and working on the land and showed little interest in working in the aquaculture sector.

Participants in the focus groups and interviews were resistant to the concept of a shared workforce even for more generic roles such as managing HR in some of the larger companies. Concerns were expressed by all sectors about the risk of losing IP to competitors or having staff poached by other businesses. It was also stated by prawn farm workers that the seasonal nature of production in most growing areas, together with the intensity of activity when a prawn crop is underway mean that highly skilled people are likely to be employed fulltime during the production period and therefore would not be available to work with anyone else in the same sector. When asked as individuals if they would take a role in another agribusiness sector to progress their careers into higher level roles, prawn farming participants indicated they were more likely to work in other tropical aquaculture sectors if they could not progress in prawn farming. This suggests there would be value in developing an alliance of all tropical aquaculture sectors when planning and promoting future career pathways for prawn farming and also when looking at training and educational needs for an end-to-end approach (recommendations 1.1.1 and 2.1.1-2.3.1).

For accessing some highly technical skills, there was recognition across all sectors for the role of outsourcing services to specialist private consultants at a regional scale, though consultants (e.g. private agronomists) were more commonly used in the horticulture sector and the development of this approach is likely to be market driven. Though outside the original scope of this study, there was also strong and consistent interest in maintaining and further developing a shared operational workforce of casual employees for harvesting and processing periods across the prawn and sugarcane farming sectors. These industries are often regionally co-located and have complementary harvest times and similar low level skill requirements – taking a more strategic approach would require some regional brokerage.

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36 There has been an ‘alliance’ of tropical aquaculture in Queensland – QAIF, the Queensland Aquaculture Industry Federation (Inc.) previously but it has been inactive for some time.
An example of highly effective regional brokerage was provided by participants from the production horticulture focus group. In the North Queensland Tablelands the regional workforce development coordinator has been in place for 2 years - building relationships with individual businesses, identifying training needs (in the broadest sense) and brokering specific training delivery for multiple businesses at a regional scale, with great success. This approach warrants further consideration for the tropical aquaculture sector given that the Queensland Government’s trial scheme for the horticulture WFD project (see Appendix 7 for a summary) is about to be expanded (~$3M for 3 years) to agriculture more broadly, under the Rural Jobs Initiative. This scheme will be administered by QDAF with advice from an Alliance of industry peak bodies.

Core requirements for success in senior supervisor/manager level roles in prawn farming

While there was a preference for workers in more senior on-farm roles in the prawn industry to be university graduates or to have at least completed higher levels of VET training (Certificate IV or Diploma courses)\(^{37}\), this was entirely contingent on the workers also having a good attitude and work ethic, and a solid range of practical skills and experience. Several senior managers emphasised that new employees, regardless of their level of training, took between 1-3 years to be fully competent with their farm system to work unsupervised let alone supervise others. Consequently ‘on the job’ training features heavily in all current businesses. In every interview a variation on the phrase “hire for attitude and train for skill” was often repeated. Indeed, passion for and commitment to the industry were seen as the paramount traits for a successful career. The ability to consistently apply knowledge, education, and common sense to dynamic farm practice and work effectively with teams was seen also as very important.

The greatest area of need for upskilling and supporting the capacity of existing senior level workers was seen as improving business and frontline management skills. These results were consistent also with the findings of Ord and O’Sullivan (2010). Specific skill needs identified during interviews and focus groups are listed at Appendix 8.

For new workers wishing to progress their career to more senior roles in prawn farming it was identified that the best workers were those who had, regardless of their level of academic or VET training in aquaculture, practical skills and experience (including mechanical and plumbing skills) and a range of tickets and licences. These skill sets were seen as relevant for all workers involved in on-farm activities due to the relatively small workforce on most prawn farms, the remoteness of many and the need for all workers to be able to interchange roles at times during the 24/7 nature of the work during peak production periods. The desirability of being able to demonstrate attainment of various skill sets and relative competency, quickly and easily via a ‘logbook’ was also noted. Specific skill requirements are outlined in Appendix 8.

As outlined in the desktop review, the rate of change of technology; the rapidly growing community expectations around social licence and continuous improvement in environmental management; and the ever growing risks of disease mean that now, more than ever, management level employees need to continue their professional development. During interviews, a number of technical (evidence-based) short courses or master classes were identified as being needed to address

\(^{37}\) In relevant content areas
growing knowledge gaps. These included microbiology, water quality, environmental management and aquatic disease management (Appendix 8).

While the majority of Australian agribusinesses are seen as having an ageing workforce this does not appear to be a valid assumption for prawn farming businesses. Consultation during this project identified that the prawn farming industry is relatively young and that while business structures vary with farm size, on the larger farms most of the highly skilled technicians are considerably younger than 55 years. If anything, the workforce bottlenecks are characterised by a very stable workforce in these higher level roles, with little movement due to the lack of growth on the East Coast in the sector in the last decade. When there is more growth there will be more roles and more capacity for career progression.

Because there has been no growth, there has also been no promotion of career options in prawn farming, consequently when new skilled workers are periodically required some have been sourced from overseas by using 457 and other visa category workers for short periods (as needed) in hatcheries or as an ongoing employees. Throughout all interviews the challenges of managing and communicating effectively with other staff, in time-limited situations, was raised as one of the major issues facing technical supervisors and managers. When this also needs to accommodate team members with English as a second language, the challenge to safely and efficiently manage on-farm operations can be much greater. While it is not immediately clear how this could be resolved in remote places, this is an area that requires some consideration if overseas workers continue to be an important part of the workforce (recommendation 1.2.5).

Training the next generation workforce

Clearly evident during this study was the lack of deep engagement or integration between industry and the various stakeholders involved in current research, higher education or VET training delivery in tropical Aquaculture – so it is unsurprising that adoption of the new technology needed, that could drive further increases in productivity and profitability, has been slow. A biennial national two-day workshop (AquaEd), run in conjunction with the Australasian Aquaculture Conference is the only time that trainers and educators currently get together (this includes most VET providers, some High Schools and a limited number of universities, noting this is normally held in a southern capital city) – so there is scope for greater integration across all stakeholders going forward.

The world is a rapidly changing place particularly in terms of digital connectivity and disruptive technology. This will bring both challenges and opportunities requiring different and more hybridised skill sets. Future workers will need to be agile in respect to their careers with a real need for ‘lifelong learning’. Increasingly learners will require courses to be ‘interoperable’ across different academic and training institutions, able to be delivered in a variety of ways (including in much smaller chunks) and when required. It will be increasingly important to maintain a seamless record of all training undertaken.

The vast majority of the material available for review for the desktop review dealt only with VET level training for aquaculture (noting this is the mandate of the various industry skills councils such as AgriFood Skills Australia), with little mention of the role of higher education in planning and

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38 Because the tropical aquaculture training sector can be viewed as a ‘thin market’, there needs to be much greater specialisation along with greater collaboration to deliver high quality training of highly technical skills.
implementing career pathways. Australian prawn farming (and tropical aquaculture in general) still needs both higher education and VET training delivery to develop a future workforce with appropriate specialist skills and practical experience. However there appears to be little or no enabling governance mechanism at the Federal or State level to integrate both VET and Higher Education to deliver the customised ‘hybrid’ training that is clearly required to help the industry grow in future. This may require some proactive leadership on the part of higher education to help bring together the various stakeholders to overcome this structural obstacle.

The prawn farming industry sits on the cusp of significant growth that could bring real benefit flow to many of the coastal communities in Northern Australia. It is already world’s best practice with more technological innovation in the pipeline, yet its training culture is underdeveloped and its change management skills are non-existent due to the lack of growth to date. Its small size and scattered distribution means that there are limited training providers available and few specific materials developed to meet its current or future needs. This presents an excellent opportunity to trial the development of an end-to-end approach to customising and targeting workforce development to underpin and run in parallel to the planned growth in the next 5 years.

Contextual conversations with a wide range of stakeholders including industry, training, higher education, research, northern regional high schools and government (NT and QLD) representatives indicate great willingness to explore this concept via an initial workshop with a view to implementing, collectively, a range of measures that would deliver a resilient industry and a stable, highly-skilled workforce for the future.

However, the success of such a proposal going forward will depend entirely on the willingness of the tropical aquaculture industry to embrace the opportunity and be an equal collaborator in the process - a point noted by Conn (2010) in the research report prepared to underpin an Aquaculture Skills Formation Strategy that was not brought to fruition. Assuming there is widespread industry buy-in, the proposed collaborative model could be developed from the ideas and/or experiences of several previous, current or emerging initiatives such as aspects of the Queensland Aquaculture Skills Formation Strategy (2010); the Future Skills for North Queensland Strategy (currently in development by the Queensland Department of Education and Training. This project is investigating the possibility of taking an ‘ecosystem’ approach to regional work force development based on ESTEAM principles and the idea of ‘iteams’ – see Case study box below), and the 2013-15 Queensland Production Horticulture Workforce Development Project (Appendix 7).

One way to deliver this project could be as a pilot project leveraging the involvement of all the stakeholders through the education and workforce development theme in the new CRC for Developing Northern Australia. If successful, this model could be applied to a range of other industry sectors in Northern Australia (several recommendations around developing the next generation

39 Noting that James Cook University is the only university located in the tropics that currently delivers a comprehensive range of tropical aquaculture training at both an undergraduate and postgraduate level so as a training institution it already has the greatest footprint with greater capability for providing leadership. Other training stakeholders for tropical aquaculture are likely to include Charles Darwin University’s aquaculture VET program, along with several TAFE equivalents across northern Australia and a couple of private RTOs.
40 While WA was not explicitly included in this study due to time and financial limitations – it is anticipated that both government and industry stakeholders from WA would be key partners in a potential CRC for DNA workforce development program following on from this project.
41 http://apfa.com.au/?s=Aquaculture+Skills+formation+strategy
workforce are identified at recommendations 2.1.1-2.3.1, and working with the new CRC to deliver a workforce development model, at recommendation 2.1.2).
Case Study


The Queensland Department of Education and Training (DET) and consultant Bronwyn Voyce are leading the development of the *Future Skills for North Queensland Strategy* on behalf of the Regional Economic Development Sub-Committee of the Regional Organisation of Councils for North Queensland (REDROC; councils are: Townsville, Hinchinbrook, Palm Island, Charters Towers and Burdekin). In developing the strategy, DET is exploring a possible new approach to workforce development and a new skilling agenda. It aims to ignite a discussion around the future workforce paradigm; bring together previously disconnected strategies; and develop a new model for a coordinated, collaborative and innovative path forward for the region. It also recognises the mounting evidence that suggests an enterprising culture underpinned by skills in science, technology, engineering, the arts and mathematics will prove to be a critical enabler of unprecedented opportunities for regions as they navigate their way through expedited disruption synonymous with the digital era.

The strategy recommends the establishment of an ‘iteam’ (innovation team - see: http://www.theiteams.org), a new kind of experimental unit within government to drive an ecosystem approach to regional talent development focusing on ESTEAM (Entrepreneurship, Science, Technology, Engineering, Arts & Mathematics).

If the strategy is adopted, the iteam would support sub-regional workforce development clusters to implement a five pillar strategy which is underpinned by initiatives that nurture and reposition the workforce with the skills of the future. The Future Skills for North Queensland iteam would be charged with:

- Building an innovative team that leads the ESTEAM agenda for North Queensland and coordinates and collaborates to inspire new thinking around workforce development;
- Identifying opportunities to enhance the education and training ecosystem so that it better delivers a wide range of high-quality learning opportunities for all skill levels and future industry demands;
- Developing new platforms to increase industry involvement in building the region’s expertise and adopting twenty-first century business and technology skills; and
- Developing new opportunities to enable individuals to make informed ESTEAM learning and career choices.

The iteam would oversee the implementation of the overarching strategy to build capacity and enable greater workforce participation; ensure workers have the appropriate skills required by industry; and facilitate greater efficiencies and effectiveness in matching skilled workers with employment opportunities provided by employers. The iteam would be charged with bridging the gap between the public and private systems, the community and the workforce whilst sharpening the region’s focus on a new ESTEAM agenda.

The iteam would essentially connect systems in an entrepreneurial way: failing small, fast and often. By undertaking pilot activities and initiatives that can be quickly validated, pivot if need be and implemented promptly on a lean scale; the iteam would lead by example and empower stakeholders within the workforce development ecosystem to innovate and adapt more quickly so that the region can achieve a more rapid transformation by responding to the barriers and challenges to workforce development identified within this strategy with greater agility and speed. The iteam, which is currently being tested with key regional stakeholders, would seek to leverage funding from public and private partners to achieve maximum efficiency and effectiveness across the region both in terms of initiative delivery and outcomes achieved.

Training structures and Delivery

Course completion rates in the VET sector are generally poor and they decline with remoteness in regional Australia. Learning preferences for existing agrifood industry workers are widely recognised as being incremental, socially embedded and on an ‘as needs’ basis – this was no different in our study. Participants both in the survey and face-to-face ranked ‘on the job training by supervisors’, short courses at the workplace or other forms of short duration ‘show and tell’ to be the most preferred and effective. Frequent comments about training delivery, noted during this study, were focussed on the need to ‘not be sitting still for long’, the need to ‘appeal to active/practical people’ and the desire to ‘try things hands on and get feedback’ as a skill is being learned. If training material is to be delivered on-farm then trainers and lecturers need to be familiar with local on-farm processes and material needs to be contextualised as much as possible; there is a strong need also for more ‘train the trainer’ training (details in Appendix 8).

Future Workers – strategies to deliver customised training of the next generation are outlined in recommendations 2.1; making information about the range of training options available and as widely accessible as possible is the basis for recommendation 3.1.2.

Attracting and retaining the workforce going forward

Most people are not aware of the potential for a career in prawn farming and for those who know it exists, the two most significant barriers to attracting and retaining good people to the industry are the lack of clear career pathways and the unattractive remuneration packages. Part of the reason for the lack of awareness about career possibilities is the small size and profile of the industry and the generally negative image projected by people in agribusiness about their industry. Findings from a recent Victorian study (Anon., 2012) encouraged the collaborative promotion of positive messages about the Agrifood industry, rural lifestyles and the attributes that define a diverse, challenging and fun career suited to innovators and problems solvers (see recommendation 3.1.3).

Some of the issues around remuneration could be addressed by enabling the prawn farming industry to grow so it can reach greater economies of scale and profitability which could lead to better pay and/or remuneration packages. The impact of the mining boom, in terms of high wages and competition for workers is now declining – which eases some of the pressure on finding employees. But regardless of this, or the small scale of the industry, attracting and retaining workers into the future will mean that employers will need to take a more innovative approach to HR and IR matters. Creating a culture of striving to be an ‘employer of choice’, rewarding and nurturing good employees, and providing remuneration packages with a mix of financial and other features that appeal to Gen Y will be critical (recommendations 3.3.1 and 3.3.2).

With this in mind and knowing the characteristics of Gen Y, a somewhat different approach is required to attract the attention of young people so they even consider a future career in prawn farming. This study proposes that, to overcome the challenges of developing an effective career progression project for prawn farmers (with anticipated, but as yet unrealised, future growth), that a tropical aquaculture alliance is formed. Such an alliance could broaden the scope for career progression pathways and could include both pond-based aquaculture (prawns, Barramundi and potentially red claw) and inshore coastal marine aquaculture (Barramundi, pearls and sea
cucumber). This could provide economies of scale across northern Australia and enable a mix of targeted regional skill development as well as developing a pipeline of Queensland workers to potentially support growth in a number of sectors in the Northern Territory and north western Western Australia (recommendation 1.1.1).

By promoting multiple tropical aquaculture sectors it would be possible to develop some great promotional messages and perhaps a fast paced Youtube clip focussed primarily on young people – using a ‘day in the life’ approach similar to the Australian Defence recruitment strategy. This approach could build on the lifestyle and adventure messages to appeal to the outdoor passionate types who are less likely to be put off by the climate in the north (recommendation 3.1.4).

This study identified that greater retention was achieved when local workers were recruited to prawn farms. Anecdotally this related to a worker’s existing affinity to the area and lifestyle, tolerance to the climate, and having a reason to stay (i.e. existing family and friends). Therefore the proposed Youtube clip could be a means to target engagement with a few local high schools (particularly their grade 9-10 students, prior to subject choices being made) in the vicinity of existing tropical aquaculture enterprises. Providing student tours and work experience may enable both students and employers to determine if a career in aquaculture might be a good fit for them (recommendation 3.1.4 and see also general approach in 2.3.1 – some schools will be interested in providing Certificate courses in relevant subjects for a future in Aquaculture).

Participants in this study came from prawn and Barramundi farming (or horticulture) businesses located within 200km of major urban centres and these businesses still had problems with attracting and retaining skilled workers. Some of the proposed prawn farm developments will be very remote which poses some significant challenges for both attraction and retention of future staff. Taylor et al. (2015) noted that the population in the far north has been built on boom and bust mining cycles – where the upcycles increase the cost of living significantly in the region, and the down cycles mean that skilled workers who are able to leave, do so. Consequently the workforce for non-mining activity is increasingly dependent on external and often short-term mobile labour (such as backpackers and 457 and other working visa categories). A range of strategies will need to be considered to address these issues for future growth of the prawn industry. For example, establishing a ‘training pipeline’ of workers from North Queensland who are able to tolerate the heat and even harsher climate further north and perhaps some FIFO work teams with onsite accommodation, as currently occurs with pearl farming (see also further examples in recommendation 2.3.1).

**Cross Sectoral and General Issues**

A range of cross-sectoral issues were identified during the consultations with various aquaculture and horticulture enterprises. While these were beyond the immediate scope of this project, they were seen by respondents as inhibiting growth in northern Australian aquaculture and agribusinesses so they have been included here as a prompt for future consideration (potentially through the new CRC for Developing Northern Australia), with the exception of the first point which has been included in recommendation 1.1.2. These include:

42 Noting that current work on sea cucumber in the Northern Territory is being done as a public/private development partnership in collaboration with some of the Tiwi Islands Indigenous communities
• better coordination of cross sectoral training delivery in a region;
• advocating for better broadband in the bush to improve access to better business management tools (noting that the NBN sky muster satellite was successfully launched on 1 October 2015 which should make a significant difference to digital connectivity for all of northern Australia by mid-2016);
• encouraging government assistance or facilitation so that existing successful businesses can grow to the next level – rather than major government support being provided only for greenfields projects, as this is likely to do more for significantly growing regional jobs, increased productivity and profitability than major (but risky) green-fields projects
• the need to look at ways to harmonise legislative implementation across different jurisdictions to reduce the inconsistency of costs to business
• the need to look at short term improvements to managing the 457 visa issue particularly in the Northern Territory for recent changes to different categories of priority workers
• the need to explore new business models around collectively owning or co-accessing large infrastructure e.g. hatcheries
• Looking at revisiting the industry award to improve the entry level remuneration rates.

Recommendations

1. UPSKILLING AND TRAINING – EXISTING PRAWN FARMING WORKFORCE

1.1 Mechanisms for funding and customising existing workforce development needs:

1.1.1 Sectoral - Investigate forming a tropical aquaculture alliance across all tropical aquaculture sectors to develop critical mass, gain a united voice and collectively develop a proposal for co-funding for aquaculture-specific training content based on the growth prospects and skilling needs of the alliance.

1.1.2 Place-based - Investigate forming a series of regional, place-based alliances with other agricultural sectors to develop proposals for cross-industry training packages to maximise access to funding opportunities across the Federal and State/Territory governments. The Queensland Production Horticulture WFD project (Appendix 7 provides an example of how this could work.

1.1.3 Targeted - Investigate developing a pilot workforce development program for the North Queensland region under either or both the expanded Queensland DAF Rural Jobs Initiatives Program and the Queensland DET Future Skills for North Queensland Strategy.

1.1.4 Core elements - Investigate delivering training for existing workers that is:
• Onsite and ‘hands on’ as much as possible
• Incorporates lecturers and trainers who are familiar with local farm technology and processes
• Contextualised so that training material can be applied immediately on farm, practiced and feedback received at the time of training to build functional capacity.
• Focused on more ‘train the trainer’ type training as much of the existing workforce is trained ‘on the job’ by their supervisors.
1.2 Developing content:

1.2.1 Investigate ways to customise content and provide access to more professional development focused on **business skills and frontline management**. For details around specific content needs, as identified by industry, please see Appendix 8.

1.2.2 Investigate ways to increase access to **general/practical training** (including for managers and technicians) that is customised to some degree for aquaculture. Investigate also the value in using logbooks to document accumulation of training and experience across various skill sets related to practical training. For specific content needs please see Appendix 8.

1.2.3 Investigate ways to access or customise the development of **specialist, short courses/masterclasses** in a range of high level technical areas. For specific content needs please see Appendix 8.

1.2.4 Investigate ways to:

- Develop targeted **business coaching and mentoring programs** for senior managers and supervisors to improve and professionalise their core business capabilities, and
- Access **rural/agricultural leadership programs** that will expand the vision of the tropical aquaculture sector and increase their regional influence around place-based economic development and community resilience e.g. the ARLP and Nuffield programs.  

1.2.5 Investigate effective ways for some existing **international workers to improve English language capability** (e.g. originally from 457 and other types of working visas) as the ability to communicate to a high technical standard with on-farm teams is critical for the efficient operation of farms.

2. **TRAINING FOR GROWTH - NEXT GENERATION WORKFORCE**

2.1 **Mechanisms for developing and delivering integrated future workforce training**

2.1.1 Develop a funding proposal to run a two-day workshop to bring together and better integrate the activities of industry, regional high schools, RTOs, universities and researchers to ensure that a coordinated, end-to-end approach is taken to training the future workforce for this industry. The aim is:

- For the industry/educational & research stakeholders to map career progression pathways across tropical aquaculture and investigate how to develop customised, consistent content and collaborative, interoperable delivery mechanisms, and
- To get appropriate representatives from the three northern governments to join the meeting to identify how government can support targeted regional workforce development and also enable/encourage the sustainable growth of the aquaculture industry in Northern Australia (which in turn will create more regional jobs).

2.1.2 Develop a specific project to comprehensively address workforce development needs for growing tropical aquaculture in the education and workforce development theme of the new CRC for Developing Northern Australia. The proposal would build on the outcomes of this project, could be scoped at the proposed workshop at

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recommendation 2.1.1, and should also consider the outcomes from the inquiry into *Opportunities for Expanding the Aquaculture Industry in Northern Australia*, when that report is available.

2.1.3 Ensure that training and education delivery methods keep up with contemporary expectations, including: Youtube clips (using young people as the main informers in the Video clips); short intensives onsite on the farm; bringing in industry leaders as guest lecturers or participants; more opportunities for Work Integrated Learning (WIL).

2.2 Developing content

2.2.1 Customise future training and education programs to meet existing industry needs by taking account of recommendations A2.1-2.4 and content identified in Appendix 8, in conjunction with the material identified during the proposed workshop, at recommendation 2.1.1.

2.2.2 Develop future training and education content to meet the evolving needs of industry (driven by increasing mechanisation, digital connectivity – enabling social media, big data and analytics, and developing new and/or export markets) based on the outcome of recommendation 2.1.1. For specific content details please see Appendix 8.

2.3 Developing relationships and engagement

2.3.1 Investigate how to enhance or build the following relationships to drive significant gains in WFD outcomes:

- Linking more of industry into new research projects so the projects are industry-driven and there is greater ownership of both the process and the research outcomes; as well as greater understanding and exposure of researchers to on-farm processes and needs
- Linking RTOs and Universities with researchers and industry so that new technology or procedures are incorporated quickly into training and education programs to drive adoption and continual improvement of on-farm production and profitability
- Link training providers in Australia and overseas to provide opportunities for students to access training that includes a practical component or placement at a commercial scale overseas to broaden exposure and knowledge of global approaches to tropical aquaculture so they can value-add to Australian systems.

3. ATTRACTION AND RETENTION

3.1 Specific sectoral-level strategies for attraction

3.1.1 Develop and promote clear career pathways in tropical aquaculture, more broadly, as prawn farming is currently too small and not yet expanding fast enough to exclusively focus on prawns. As the industry grows this could change.

3.1.2 Make information about existing and future training options more accessible for people interested in careers in tropical aquaculture – perhaps via targeted information on the APFA, ABFA, FRDC, AgriFood skills Australia, relevant universities and RTO’s websites. Also ensure this information is available for northern regional high school career advisors.
3.1.3  Promote a more positive image in the media of the tropical aquaculture industry (and tropical agriculture and rural life in general) including focusing on the following messages:

- **Lifestyle and adventure** – its outside and hands on – not stuck in an office or traffic jams everyday
- **Job diversity** – challenging and fun, uses lots of different skills, is best suited to ‘practical problem solvers’ and ‘innovators’
- **Pioneering new systems and using innovation and cutting edge research results** – prawns are a fast crop so suit people who like the satisfaction of seeing their work produce rapid results
- **Located near water** – often beautiful locations and generally where there is great fishing
- **Appealing to the aspirational side of Gen Y** - helping feed the world with sustainable healthy food
- **Connectedness of regional communities and agriculture** – it is not just about what happens on farm – successful prawn farms support regional business diversity across all elements of the supply chain. It is important to remind people of the off-farm career opportunities in aquaculture as well.

3.1.4  Develop a funding proposal to produce a short video (Youtube clip) about a ‘day in the life of’ tropical aquaculture. Use a similar approach to that used by the Australian Defence Department in their marketing and recruitment ads and promote via social media. The aim of this Youtube clip is to be a first point of attraction for young people (Gen Y) so it is critical it is fast paced, with minimal talking and includes mainly young people. Young people have to be able to imagine themselves ‘in the picture’ and see the industry as a ‘sunset industry’.

3.1.5  Investigate developing a migration pathway for growth with the Federal government to address significant workforce expansion in very remote locations. As outlined in the White Paper for Developing Northern Australia this could include attracting a proportion of the expansion workforce through Designated Area Migration Agreements, Working Holiday Visa and Seasonal Worker programs.

3.2  Specific enterprise level attraction strategies

3.2.1  Actively seek employees from local regions as it is more likely to result in employees who have experience of agriculture, are comfortable living in the tropics, understand hard work outside and have a reason to want to be there through their family and friends. This may benefit from relationship building and engagement, particularly with regional schools, as identified in recommendation 2.3.1.

3.2.2  Farms in remote locations requiring large numbers of staff may need to consider a mix of local and FIFO workers including international or North Queensland people who have experience in tropical aquaculture to support growth plans for their businesses.

3.3  Strategies for retention

3.3.1  Investigate, at an enterprise level, ways to create attractive remuneration packages that are relevant to staff interests. ‘Remuneration’ includes both money and ‘benefits’ that

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44 Recognising the existing industry video (funded by AgriFood Skills and available on the APFA website) is very useful as a more in-depth reference for industry but suffers from a lack of visibility of young people in the story line and images.
workers want around flexible hours and lifestyle (including longer paid leave). It could also include professional development via paid training; bonuses to stay; subsidized or free on-site accommodation; a car/or fuel package; internet access at remote locations; support for families e.g. employment locally, school support etc.

3.3.2 Create an enterprise-level culture of being an ‘employer of choice’ – where staff feel valued and understand and embrace the company values and goals.

3.3.3 Investigate, at a regional scale, developing more formal links across agribusiness sectors to share casual operational staff where the seasonality of the harvest work is complementary. This would require some regional brokerage but could improve enterprise level operational efficiencies and enable greater delivery of cross-industry training packages to regions.
References

AlphaBeta, 2015. The New Work Order: ensuring young Australians have skills and experience for the jobs of the future, not the past. Foundation for Young Australians, pp. 50.


42

Appendices

Appendix 1: Desktop Review
Project Title: Career Progression Analysis - Prawn Farming Sector

The aim of this project is to provide the evidence base required to position the Australian prawn farming industry to implement processes and procedures to ensure the industry attracts and retains sufficient appropriately qualified people to fulfil on-farm higher level technical and managerial roles.

As background for the project, the desktop review has identified key points around agribusiness intelligence and workforce development (both for agribusiness and for northern Australia specifically) from several recent reports and publications. The desktop review is not exhaustive nor is the referencing comprehensively annotated (this will be done in the final report). The review aims to provide a snapshot of the consistent aspects of current or recent knowledge. Along with input from the project’s advisory groups this review assisted in developing the survey questions and, following industry consultation, will be used to contextualize the results.

Due to the breadth of content covered, information has been aggregated into key areas beginning at a macro scale down to a micro scale across general workforce and business trends, agribusiness and then specific information from several recent tropical aquaculture reports.

External factors for Australian agribusiness

Economic and market trends

At an international level a significant driving force for new or expanding agribusiness opportunities is recognized as being the extraordinary growth in the number of people in the Asian middle classes and their growing affluence. This is driving demand for safe, healthy, high quality food along with a willingness to pay a higher premium for quality assured products. Recent food safety scares in Asia are accelerating this trend.

Globally Australia’s high cost and inflexible labour market for production and manufacturing continues to reduce our ability to supply low cost high volume food competitively so there is an increasing need to play to our strengths in producing high quality, high value niche food and products that capitalize on our safe, secure, traceable ‘Australian’ branding. Although this means that Australia will not be the ‘food bowl’ of Asia there is still an opportunity to help enable future food security for the less affluent through exporting expertise (as services and training) in environmental management and the breeding of species for improved disease resistance, growth and resilience (particularly in the face of changeable and/or extreme environments).

The three recently completed Free Trade Agreements (FTAs) with Japan, Korea and China (if supporting legislation can be passed in Australia before the end of 2015) also present new agribusiness opportunities as they will provide preferential market access to about 1.5 billion people. Combined with the falling Australian dollar, this makes targeting export markets much more attractive in the near term for the many Small to Medium Enterprises (SMEs) in the Australian agribusiness sector. The challenge for the SMEs will be to unlock the value of the FTAs by becoming export ready, culturally literate and market savvy.

In terms of national retail food distribution the Australian food retail duopoly holds one of the greatest market shares of domestic markets globally at 72.4%, compared with UK, France and the US where the top two grocery retailers have less than 50% share in each case. This retail concentration is setting the scene for the future of small agribusinesses in Australia by squeezing out all but the niche or volume producers, because the majority of small businesses have not differentiated their products (niche) and cannot meet minimum sales thresholds (e.g.

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45 Industry consultation suggests there is some resistance from the prawn farming sector to this approach as it as seen as direct competition with domestic production.
46 Noting that at this stage most Australian product from prawn or tropical finfish farms is not exported.
year round supply, high quality and safety standards supported by sophisticated IT systems and market support) or negotiate attractive trading terms. This results in a growing trend for only two viable business strategies going forward – niche and volume. The current literature suggests the major policy imperative in the near term will be to help businesses in the middle ground change their business models and move to either end of the system. A key gap appears to be the lack of understanding of the range of business tools to drive cooperation and efficiency and achieve economies of scale to tap into new domestic (or export) markets without necessarily becoming ‘corporate farms’ – in addition further research may be required to develop new business models to enable greater cooperation amongst SMEs.

Digital connectivity and disruptive technology[1,2,7,8]

The rapidly growing literature on the global digital economy indicates that 40% of the world’s current population is connected to the internet, of these 41% (the majority) are in Asia. In Australia 69% of the population are on social media but only 36% of SMEs and 48% of mid-sized businesses have a social media presence. Social media is an area that is growing extremely fast and one that provides new low cost ways to engage directly with consumers if businesses have staff with the skills and confidence to do so.

Another area of rapid growth is the enterprise level use and application of so-called ‘Big data’ and data analytics - increasingly these are seen as critical drivers of business success. Measuring, monitoring and benchmarking core aspects of business activity or systems allows significant improvement in business decision making which can drive very rapid increases in productivity and profitability. This is becoming the industry standard in most sectors and will come also to agriculture in the North as digital connectivity (access to the internet), reliability and the ‘fit for purpose’ status of digital products/systems improves.

Research has already demonstrated that for every ten percentage point increase in broadband penetration, GDP increases by 1%; noting the value of the internet to the Australian economy already rivals iron-ore exports[47]. New skills sets will be required to manage the opportunity provided by digital connectivity as well as the risks associated with disruptive technologies. CSIRO predicts that net-enabled technologies could increase productivity by up to 50% over the next two decades if the risks are managed.

New and emerging technologies relevant for agribusiness include: air, soil & crop sensors; vehicle and equipment telematics, livestock biometrics, geolocation technologies to manage input application at micro scales, rapid iteration selective breeding including algorithms, precision agriculture in all its forms and robotic farm swarms of ‘agbots’. Up to this point adoption of these existing technologies has been uneven and limited, and is rarely cost effective or integrated. However this is changing rapidly and will dramatically increase within 5-10 years as products and systems become more cost effective and the value proposition is understood. In future this means that “any job or function that can be readily converted to an algorithm (because it is repetitive, routine and does not require complex thought) will be replaced by technology”.

The 2015 CEDA report estimates that 40% of all existing Australian jobs are at risk of being automated. While this may appear a daunting statistic it does provide opportunities for a reinvention of the economy into jobs with new skill areas that complement the machines. Economists predict that tasks requiring non-routine cognitive skills including problem solving, creative and social intelligence will be very difficult to automate.

Consequently, industry in future will be dominated by technicians and technologists, astute marketers and innovative product developers. Reskilling and upskilling will be needed for the current workforce; however clever thinking will be needed for the future workforce and to resolve persistent skills shortages in remote areas.

Overarching agrifood policy[1,2,3]

In the current term of the Federal government there is a sharpened focus on policy reform in the agribusiness and regional economic development space with two new overarching policies: the Developing Northern Australia

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White Paper,\textsuperscript{48} and the Agricultural Competitiveness White Paper\textsuperscript{49}. These provide good foundations for sectoral and regional change, however, there are many obstacles yet to be resolved before the benefits will be realised. The Industry Innovation and Competitiveness Agenda \textsuperscript{50} released by the Federal government in late 2014 also focused on Food and Agribusiness as one of the 5 ‘pillars of the national economy’. This Agenda brings significant reform for all areas of business including establishing new funding drivers for industry R&D and major changes to VET sector training.

Another significant policy adjustment from the current government is the implementation of the new Federal Biosecurity Act 2014 – this revision represents the greatest overhaul in 100 years and is intended to enable better risk management to support the sustainability and growth of agricultural businesses, as a core element of Australia’s future economic success\textsuperscript{51}.

Under the previous government, a key objective of the Intergovernmental Agreement on National Drought Program Reform (signed in 2013 and valid until 2018) was building a ‘Primary Management Skill Set’ (developed through extensive consultation with agribusiness) to be delivered across Australia through the VET system with the intention of building business management skills at the enterprise level to play a significant role in moving the agricultural industry from drought assistance to drought resilience. While drought resilience may seem distant to the needs of the aquaculture sector the policy theme of improving enterprise level business and management skills to foster business resilience is relevant to the future growth and sustainability of the sector\textsuperscript{52}.

Agrifood RD&E\textsuperscript{[1,3]}

In the last few decades there have been massive changes in global knowledge generation and innovation in agriculture. The current levels of digital connectivity mean that enormous amounts of information are freely available online but often there is no-one to filter, translate and disseminate this knowledge so adoption levels of relevant information may be low. For older farmers who lack computer skills or those in remote areas where digital access is problematic this may also restrict access to and uptake of new knowledge.

In general, the literature shows that Australian agribusiness SMEs are failing to invest in R&D because they can’t afford to; in contrast R&D appears to be easier for larger companies to access and they often do their own in-house research. The Industry Innovation and Competitiveness Agenda seeks to change aspects of this issue for SMEs through tax breaks for R&D, ensuring that research projects are industry driven (and access to research funding is contingent on having industry partners) and by establishing industry ‘Growth Centres’ (including one for Food and Agribusiness - see link in footnote) where industry relevant research is commercialized and rolled out as quickly as possible in partnership with industry.\textsuperscript{53}

Over recent years extension models have changed with the decreasing size of public sector investment in R&D – increasingly extension services for most agricultural sectors are delivered privately (either via private agronomists, subsidized training through RTOs, or product sales representatives) and can come with significant other agendas\textsuperscript{54}. Government funded extension is increasingly predicated on the concept of being provided only where there is overt market failure. Yet extension remains a significant weakness in agrifood; it could deliver a step change in productivity if it was possible to improve the way that knowledge is shared so it leads to adoption.

Broad workforce demographics particularly for youth (15-24 year olds)\textsuperscript{[8]}

The recent Foundation for Young Australians report on the ‘New Work Order’ shows that employers report mismatches in the skills young people are being trained in compared with the skills industry currently requires.

\textsuperscript{48} http://northernaustralia.infrastructure.gov.au/white-paper/
\textsuperscript{49} http://agwhitepaper.agriculture.gov.au/
\textsuperscript{50} http://www.industry.gov.au/industry/Pages/Industry-Innovation-and-Competitiveness-Agenda.aspx\#header
\textsuperscript{51} However there remains concern amongst prawn farmers that the Australian government response to biosecurity is still more focused on dealing with incursions when they happen rather than preventing them happening.
\textsuperscript{52} Noting that the APFA, despite being a small organization with limited resources, does set annual R&D priorities and does have a compulsory R & D levy paid by members to Levies Revenue Collection Services. .364 cents /kg of GVP is collected and then leveraged up through the FRDC.
\textsuperscript{53} This has been very evident during industry interviews and contextual meetings for this project.
\textsuperscript{54} Some government funded training for land-based agribusiness is delivered by NRM groups.
More alarmingly, 70% of current young Australians are getting their first jobs in roles that will look different or be completely lost in 10-20 years’ time due to increasing automation. It also noted that 50% of all future jobs will require significant digital skills yet these skills are not being taught in schools.

Young people already struggle with finding pathways into meaningful work and increasing automation will impact most on young people as it will remove many of the entry level jobs they start with in retail, admin and laboring. The report found that it is this early experience in junior roles where young people ‘learn to work’. In contrast, less than 20% of young people are employed in more ‘secure’ occupations such as managers and professionals. Without clear career pathways and entry level work experience there will be even less ability to attract and retain skilled people who also have broad work experience and ‘employable skills’.

The largest area of growth in jobs globally since the global financial crisis has been in flexible work (part-time, temporary or self-employed). The increasing trend towards automation, globalization and flexible work will see the increasing demise of fulltime workers on indefinite contracts. Consultancy and flexible service provision jobs also assume prior experience and will require the individuals themselves to invest in their own training needs. For young people this will be even more challenging as nearly 1 in 3 are currently unemployed or underemployed (doing 1 or more hours of work per week).

Technology change over the last few decades has been very rapid and for the existing Australian workforce has seen the significant rise of skilled workers and a greater participation by women for all ages (15-64) of workers. Unfortunately it has also seen the loss of 25% of unskilled men from the national workforce – one in ten of these have lost their jobs at some point during this time and not returned to the workforce in any capacity. These statistics have serious implications for policy and decision makers around how to build youth skills and experience and map effective career pathways moving forward in the face of rapidly changing labour markets.

**Demographics of the current Northern Australian population**[9,10]

The White Paper on Developing Northern Australia outlined an aspiration for several northern cities to have populations of more than 1 million by 2060 with a total population of 4-5 million in the North (from a total Northern Australia population base of 1.3 million in 2014). It was anticipated this would be achieved by growing urban populations in the north, improving interstate migration and increasing international migration. A 2015 report by Charles Darwin University’s Northern Institute identified that in northern Australia net migration flows are male based (especially amongst overseas migrants), the north is not good at retaining teenage women and women in their early 20s or pre and post retirement and the workforce in the north is increasingly dependent on external labour (457 visas and backpackers). In addition the north has an ageing population and recently an overall decline in the indigenous population which represents a big issue in terms of taxable income in terms of the consequences to regional capacity to support those not in the workforce. Traditionally, indigenous residents in the north have low labour force participation rates (50% not in the workforce, 41% employed and 9% unemployed) compared to the rest of Australia (45% not in the workforce, 46% employed and 9% unemployed).

Current populations in far northern Australia appear to have been built and maintained around specific economic activities (especially mining) which may be temporary and just reinforce existing population imbalances across the northern jurisdictions, which in turn drives the increasing dependence on externally sourced labour and capital. Simplistically, the discrete boom and bust cycles both attract and then repel the increased numbers of affluent men. Women are less likely to tolerate the resulting strong male bias during boom cycles, plus up cycles increase the cost of living, especially housing, which is a primary factor motivating people to leave the region. The report describes also a brain drain as young people migrate to southern universities in larger cities – resulting in the loss of the next generation of innovative capacity. The questions remains - how to attract and retain skilled staff? And, who is likely to be left once those who can migrate, do so?

Current policies and initiatives tend to focus on supporting growth driven by externally sourced labour and capital and by sending goods and services overseas. Taylor et al propose that an effective solution to the problem of long term growth in the north would be to attract and retain more women though they do not suggest any strategies to do so.
The ‘Labour Demand for Northern Australia’ 2015 report by the Federal government shows the labour market conditions in 2014/15 experienced a significant increase in unemployment over the last year. Despite this, employers in Darwin and remote locations reported difficulty in recruiting for and retaining staff in higher skilled jobs. Even when there was competition for vacancies it was hard to find staff with the right skills and experience. The Northern Territory also experienced difficulty in filling vacancies for lower skilled staff. Across all remote locations in the north (outback Queensland, Outback NT and the Kimberley) attracting and retaining local staff was extremely difficult and as a consequence many employers relied on labour from outside the area such as backpackers. Townsville, Cairns, Mackay and Rockhampton were found to have soft and deteriorating labour markets with high unemployment and in these places employers had much less difficulty filling positions.

**Demographics for the regional agrifood workforce**[1,2,3,4,6,11]

The literature consistently points to the fact that the broad agricultural workforce in Australia is ageing – with nearly half the industry older than 55. Also much of the work in agriculture is seasonal or part-time and located in rural and remote regions so it can be hard to attract and retain workers and there is heavy reliance on grey nomads, backpackers and, in some areas, on 457 or seasonal migrant worker visas to meet the workforce needs. In the short-term, in more remote areas, this approach may need to continue. However, consultation with prawn and barramundi farmers in this project indicates that the assumption of ageing workforce issues in their industry may not be valid. Several people interviewed observed that much of the industry was established less than 30 years ago and the business structures across the industry vary; at least in the larger farms most of the higher skilled technicians and managers are considerably younger than 55. If anything, the workforce pinchpoints are characterized by a stable workforce in these higher level jobs, with little movement due to the lack of growth on the East Coast in the sector in the last decade.

Considerable commentary has been made about the mismatch in availability of a local workforce with any form of agricultural work and the consequent need to rely on external labour markets. This mismatch has been related to: competition with other sectors (e.g. mining), low pay, poor perception about career prospects in agriculture, and a ‘disconnect’ between tertiary educators (including universities and VET sector) and industry, all of which is exacerbated by the lack of focus on ongoing professional development in agrifood.

As previously noted, increasing automation will require employees with different ways of thinking and multiple skill sets – underpinned by literacy and numeracy skills, innovation experience and entrepreneurial flair. At the same time, by 2020 the majority of the workforce in Australia will be Gen Ys (the current 18-34 year olds). As this group will be our future leaders and managers there is an urgent need to engage them now, if businesses are to remain relevant and profitable. Several reports noted that this will be an even greater challenge for agribusinesses especially in remote locations, as survey responses show that only 16% of Gen Ys prefer to live away from urban areas.

All available information points to the fact that Gen Ys are rewriting the rules of employment and it will be critical to work with this knowledge to attract and retain the evolving workforce for agrifood. Several reports describe Gen Y as being the best educated and materially endowed generation ever. Noting that at work they are a multi-tasking, multi-channeling group that want to be inspired and motivated by the organisations they work for. They want a great work—life balance (they work to live rather than live to work), flexibility of work conditions (hours/locations), an inclusive employment culture and a varied professional role. They seek out businesses that make a positive contribution to society, foster innovative thinking and develop their employee’s skills.”

A recent Victorian survey of Gen Y’s found that features that might attract young workers to agriculture (specifically) could include building on their desire to: be their own boss; be part of ‘feeding the nation’; benefit from good career opportunities and a healthy lifestyle; and being part of farming best practice in a dynamic and diverse industry.

**Training and Education**[1,2,3,4,5,6,11]
Education and training for agriculture has been perceived in the wider community as being primarily led by the VET sector. However in recent times agricultural colleges have been closing, there has been low agrifood industry demand for formal training and cross-industry coordination of workforce development has been inconsistent or lacking. In addition there appears to have been limited on-ground connection between Higher Education, VET sectors and High Schools and the current federal governance arrangements for training and education do not encourage this.

It is clear also that there has been even less connection between researchers, VET sector and Industry – so it is unsurprising that extension has not delivered the necessary adoption rates of new technology that could drive widespread increases in productivity and profitability. Currently for the fisheries and aquaculture industries a national two-day workshop every two years (AquaEd – which is run in conjunction with the Australasian Aquaculture Conference) is the only time that all the different levels of training and education get together. A limited number of universities, most VET providers and some High Schools attend but there is scope for much greater integration across all stakeholders in future.

The current VET sector approach to training is still focused strongly on the current (as opposed to preparing for future) needs for the agrifood industry re job roles and the defined competency units for each role. There is no consensus amongst RTOs as to whether the current framework is too prescriptive or not prescriptive enough; yet on the other hand ‘learners’ also have diverging views about whether they want qualifications to prepare them for specific jobs or qualifications that prepare for occupations in a broad sense so skills are portable across agribusiness sectors. While aquaculture VET qualifications do have scope for considerable flexibility (the average Certificate III in aquaculture is made up of 18 units but there are 137 units to potentially chose from that cover a wide range of areas from business through to general agriculture) most RTOs do not offer a wide range for students to consider and the more remote the location the smaller the choice of RTOs available.

It is worth focusing on some key VET student demographics: agrifood training mainly occurs in Victoria, NSW and QLD; 54% of learners are 25 years or older; 84% of delivery is at Cert III or below; 56% are defined in socio-economic terms as being in quintiles 1&2; 80% study part time; 8% are indigenous; 67% are males; 32% are trainees or apprentices. Currently there appear to be very few opportunities for ‘traineeships’ on prawn farms.

The culture of incremental learning is prevalent in regional Australia but it is also clear that course completion rates in the VET sector are poor and they decline with increasing remoteness. Generally, while only 30% who enrolled in VET courses go on to graduate, at least 86% confirmed they mostly achieved their main reason for doing the training.

In the agrifood workforce sector the learning preferences are: incremental, socially embedded and occur throughout a person’s working life. With the existing agricultural workforce this seems to be partly driven by their previous experience of on-farm extension services and the need for employers to get a quick return on investment when training takes staff away from the job. Consequently upskilling the existing workforce in remote and regional areas means that delivering full qualifications is neither convenient nor easy to do. In the case of tropical aquaculture there are very few RTOs who are available to do any training in the North let alone provide remote on farm delivery of full training.

Current VET reforms have opened up the whole sector to private RTOs resulting in concerns about transparency and performance in some sectors and regions (which may not be so relevant in the North and agrifood as ‘thin markets’ seem to be a bigger issue). Employers are increasingly looking at ‘ratings systems’ to report on the training they or their employees are receiving. One of the new federal VET reforms – the ‘unique student identifier’ may make a more seamless transition/articulation between VET and Higher education possible through an ‘e-portfolio’, by maintaining a single authoritative record of a student’s incremental learning experience that can be added to at any time.

At a high level the language around training and education is changing and there seems to be strong theoretical interest in the concept of agrifood cadetships (an employment-based training approach) and the concept of ‘skills ecosystems’ (regionally sustainable skilled labour pools capable of withstanding seasonality and varying
business cycles\textsuperscript{55}. Early work by Agrifood Skills Australia has suggested this approach can improve productivity of the local labour force by 3.2\% and reduce net migration of workers by 33\%.

Across agribusiness there is growing recognition that more jobs are emerging that will require deeper knowledge and higher level skills in sustainable practice, water management and irrigation, precision agriculture, animal performance, breeding and nutrition but some studies argue that science and technology is no longer the sole domain of universities and there is greater scope for ‘blurring the boundaries’ of education and training provision.

Until recently the Higher Education sector had experienced many years of declining enrolments in agrifood courses – the current small upswing may in part be due to the growing efforts nationally to promote agriculture as an attractive career option. Redefining agriculture and food and its importance to all Australians will be assisted by the new ‘Food in the Australian Curriculum’ program introduced nationally for all schools in 2014. The changing face of Higher education (and its need to be more relevant to industry) may also drive greater pathway flexibility with the VET sector, despite current differences in teaching and learning environments in each sector.

A recent Victorian government study found that the ability to attract and retain young people in rural Victoria is impeded by the negative image of agriculture and that most of that negative image is provided by the rural communities themselves. It recommended that all sectors of agriculture, government and community (led by industry) need to work together to improve the image of agriculture, including by celebrating agricultural and rural successes. The report identified that students need to hear positive messages about agrifood and have exposure to agriculture and the breadth of agricultural career pathways prior to or while making subject choices about future career options.

**Internal factors – enterprise level issues for agribusiness**

**Securing market access\textsuperscript{[1,2,3,5]}**

There is considerable evidence to suggest that the next ‘super-growth wave’ in agribusiness will come down to the individual capabilities of each business and its workforce – this in turn will require the increasing professionalisation of agribusiness SMEs. However at this time, it appears that most are currently focused on staying in business in the face of challenging operating environments, rather than on future growth or investment.

**Social license\textsuperscript{[1,2,3,5]}**

Social license - particularly around animal welfare and environmental management is becoming extremely important as an increasing proportion of consumers are driving demand for differentiated products. Social media is a significant tool in the social license debate and if it is not well managed by producers (i.e. if producers don’t have the skills to use social media effectively to connect with the general public/consumers, or the facts independently available to back up their assertions) it allows rapid, emotive and large scale actions on issues, with often very negative consequences for both individual businesses, and sometimes whole sectors.

**Increasing risk and complexity\textsuperscript{[1,2,3,5]}**

Agribusinesses are currently operating in an environment of ever increasing risk and complexity due to: climate volatility and water security issues, biosecurity, new technology, policy reforms and layers of bureaucracy across all levels of government. Consequently managers of agribusiness enterprises require different and more diverse skillsets including business skills, people skills and greater technical knowledge to be successful.

**Reduced profitability, enterprise level debt and succession planning\textsuperscript{[1,3,5]}**

Farmgate profitability for agricultural commodities continues to decline for most sectors yet input costs (especially power and transport costs in remote/rural regions) continue to rise. It will be a challenge for managers of SMEs to re-invent themselves to achieve productivity gains when there is little or no culture of professional

\textsuperscript{55} Though note that during consultation this concept was only supported by APFA farmers for casual operational staff not as a means of building shared regional resources around people with high level technical or managerial skills.
development and they are also struggling (in many regions) with the impacts of drought, significant enterprise level debt and inadequate approaches to succession (particularly given the ageing workforce).

Workforce access[1,2,3,4,5,6]

In a landscape of fiscal constraint, with ageing producers and often remote locations – attracting and retaining Gen Y workers to specialized regional agrifood roles will be a particular challenge unless businesses can define what they offer in more appealing ways to suit the interests of Gen Y. SMEs operating in isolation to access skilled workers will continue to struggle to build an enduring and suitably skilled workforce at an enterprise let alone a sectoral level.

Focusing on becoming an ‘employer of choice’ and maximizing remuneration and lifestyle benefits will need to be key strategies to attract and retain appropriately skilled managers and higher level technicians, especially to remote locations. Flexible hours, family friendly benefits, free or subsidized housing, longer annual leave, professional development support and generous superannuation could be considered in the mix of an employment package.

Aquaculture & prawn-specific industry workforce snapshot (based on two reports)

1. Miller et al., 2013. Linking careers, research and training – a pilot for the seafood industry[3] looked at workforce challenges for 5 aquaculture sectors in Australia, including the prawn farming sector. Contributing factors were: ageing workforce, competition for labor with other industries, seasonal and casual nature of the work, lack of skilled workers, poor education and training culture in the seafood industry, lack of succession planning strategies combined with mismatches with training systems (which were either too generic or irrelevant) and lack of coordination with industry. This FRDC study began in 2009 and was focused primarily on the VET sector (including for higher level technical and management roles) and looked at developing career pathways with linked training programs.

General findings included:

- At the start of the study there were no clear career pathways and there was a need to promote an industry image that was contemporary, as well as being focused on science and technology. Clear pathways were created as a pilot in the study but it required considerable effort to redefine roles to be based on needs for education, skills, experience and formal accreditation (roles were then matched against a wish list of competency units and training levels from Cert I to Diploma level to create career pathways).
- Of the three RTO’s surveyed none of them accessed research information, reports or publications (even from the FRDC or Seafood CRC websites) when preparing training materials for the aquaculture sector – instead they incorporated existing standard operating procedures in the industry with advice from fellow RTOs[56]. Results from the study suggested there was limited contact between trainers and industry unless they were regionally co-located and RTOs expressed concern about their ability to accommodate rapid changes in the industry without more regular contact.[57]
- There was a need for systemic improvement in the (at the time) ad hoc nature of connections between researchers, industry and trainers – it was recommended that the VET sector should be involved wherever possible, even though there was no requirement to do so[58].
- As the seafood sector expands and contracts in operation over time, transferable skills could be deployed between sectors – helping to retain workers across the seafood industry, particularly with mariculture which also requires boat and diving licences[59].

Findings specifically about the prawn industry:

[56] Consultation in August 2105 with northern RTOs indicates this is not the current approach – several new units for the Certificate III and Diploma in Aquaculture have been developed based on the findings of the Seafood CRC.

[57] Given the current registration requirement for RTOs to be regularly engaged with industry and the audits required to maintain registration it is unlikely this is still the case.

[58] This is still the case currently.

[59] Consultation with industry noted that prawn farmers share seasonal operation level workers with the cane industry in several regions due to the complementary harvest seasons in the two sectors.
The prawn farming industry is a relatively large aquaculture sector (in Australia) with about 300 FTE workers and farm sizes ranging from 5-100 workers. The Australian Prawn Farmers Association (APFA) represents most farmers in the industry (about 25 companies). Farms are located mainly in Queensland along the East coast with a few in northern NSW. Attraction - prawn farmers were reported to struggle to get casual workers during harvest and maintenance times and as a consequence relied heavily on the backpacker workforce to do the seasonal work. Workers appeared to be generally attracted to companies with good reputations locally. Seasonal vacancies were often advertised through word of mouth, and in many regions prawn businesses were competing with mines and other agribusiness for workers. Retention - prawn farmers also struggled to retain staff. University-trained staff had to be retrained on arrival on farm to work in a commercial environment. Many companies had opted for flatter management structures with fewer highly trained technical staff and more labourers and in many businesses staff began as casuals and became fulltime contracted employees only after an induction period. As with other sectors – prawn farmers found upskilling existing staff challenging though they did rely on in-house training by supervisors and they periodically accessed on-farm skills-based training delivered by RTOs. In regard to RD&E – it was reported that most companies do their own 'research' so at the time of the study there was no high end extension required from trainers. It was noted though that there was a need for people in research and training to bridge the information and language gap between industry and research; to assist with this occurring, industry encouraged researchers and trainers to spend more time on prawn farms to understand operational activities.

2. Ord & O’Sullivan, 2010. Training needs analysis – Hatcheries sector of the Australian Aquaculture industry. The report focused on the training needs for management and technician level in this sector because in the 2010 Environmental Scan “genetics, selective breeding and biotechnology” was one of eight new and emerging skills needed by the seafood industry.

Survey results:
- ‘Business management tasks’ were found to be the key areas requiring more training – specific tasks included developing strategic business plans, analyzing business performance, developing and maintaining QA procedures and risk management plans; also HR recruiting and understanding IR laws
- Preferred methods of learning in these management and technicians roles were found to be visits to other hatcheries (92%), demonstration by experts at a hatchery (82%); short courses delivered off-work (73%); short courses delivered at hatchery (34%); on the job training by supervisor (26%) and e-learning (26%).
- Additional areas of professional development which were of interest for technicians included: communication and leadership skills; workplace training (train the trainer); use of computers and functional literacy e.g. interpreting technical publications and regulatory documents.
- Though managers found that tertiary qualifications were desirable for technicians – the report identified that some managers tended to focus on finding recruits who had an affinity for the work, good work ethics, previous exposure to this kind of work and an ability to learn quickly and then they train them up (even though they recognized that there was no room within the hatchery environment for them to ‘get it wrong’). These managers identified the need for a suite of training tools to train their workers on the job and their suggestions included using youtube clips, skype with experts, and CDs.

General observations
- The report identified that green credentials and social license will become more important; and managers need a better understanding of water management and energy reduction to be cost effective.
competitive; there was also a need for more skills to analyse ‘what if scenarios’; along with a recognized need for more automation and mechanization.

- Challenges and how industry can advance:
  - There was a strong focus on future RD&E along with recognition of the need for better sharing of research outcomes and more focus on extension. In addition R&D for the industry must aim to have commercial outcomes and research publications need to be timely or the benefits will be lost. Some of industry felt there was a need for greater focus on developing higher level technology to advance the industry as the current [in 2010] R&D focus was just on conventional breeding technology.
  - Other areas identified that would support industry advancement included: academics need to be more aware of industry requirements and more involved ‘on-farm’; there is a need for more technicians and the retention of skilled workers; a need for more capability to predict variations in environmental factors and conditions; and a significant need to reduce energy costs to improve profitability.

References

8. AlphaBeta, 2015. The New Work Order: ensuring young Australians have skills and experience for the jobs of the future, not the past. Foundation for Young Australians, pp. 50

Additional References reviewed but not explicitly referenced

Appendix 2: Survey Questions

Attraction and Retention of Skilled Staff

Welcome!

We would like to invite you to participate in a study about the challenges in attracting and retaining skilled workers in the prawn farm industry. The prawn farm industry in Australia is set to undergo rapid expansion, however key to making this a successful and sustainable industry is increasing the stability of the industry workforce. This project is being conducted by researchers from James Cook University (Ms Margaret Atkinson, Dr Connar McShane, Professor Allan Dale, Professor Dean Jerry and Professor Marcus Lane) in conjunction with the Australian Prawn Farmers Association’s Executive Officer Ms Helen Jenkins.

If you agree to be involved in the study, you will be invited to complete a questionnaire. The questionnaire asks about what you think the key challenges are to attracting and keeping skilled workers in the prawn farm industry. This questionnaire should take no longer than 15 minutes to complete.

By completing the questionnaire, you are indicating that you consent to participate in this research.

Taking part in this study is completely voluntary and you can stop taking part in the study at any time without explanation or prejudice.

If you know of others that might be interested in this study, can you please either forward the link to the questionnaire or pass on the information sheet to them so they may contact me to volunteer for the study.

Your responses and contact details will be strictly anonymous. As participation is anonymous, withdrawing unprocessed data is not possible. The data from the study will be used in research publications and reports to the Australian Prawn Farmers Association. You will not be identified in any way in these publications.

If you have any questions about the study, please contact Dr Connar McShane or Ms Margaret Atkinson

Connar McShane
College of Healthcare Sciences
James Cook University
Phone: 4781 6879
Email: connar.mcsheane@jcu.edu.au

Margaret Atkinson
Research and Innovation Division
James Cook University
Phone: 4781 4248
Email: Margaret.atkinson@jcu.edu.au

If you have any concerns regarding the ethical conduct of the study, please contact:

Human Ethics, Research Office
James Cook University, Townsville, Qld, 4811
Phone: (07) 4781 5011 (ethics@jcu.edu.au)
1) CONSENT STATEMENT As stated, by completing the questionnaire you are implying consent to participate. Consent involves indicating that you understand the aims of the research (explore the challenges in attracting and retaining skilled workers in the prawn farm and broader aquaculture industry) and that participation involves completing a questionnaire. You also acknowledge that taking part in this study is voluntary and you are aware that you can stop taking part in it at any time without explanation or prejudice and that participation is anonymous. If you agree with this consent statement and wish to participate in the questionnaire, please click/check “yes” below.*

( ) Yes
( ) No

A little bit about you and where you work

2) What type of aquaculture business is your workplace? Tick as many as are applicable.

[ ] Freshwater ponds  [ ] Sea ranching  [ ] Recirculating Aquaculture Systems
[ ] Processing  [ ] Sea cages  [ ] Hatcheries
[ ] Subsurface lines  [ ] Surface lines
[ ] Saltwater ponds  [ ] Racks
[ ] Other:

3) What is the main type of food/aquaculture product produced?

( ) Prawns
( ) Barramundi
( ) Other:

4) If it is a farming enterprise, what is the size of the total production area of the farm in hectares?

5) What is the approximate distance of the farm that you work at to a major urban area?

( ) Less than 100km
( ) 100-200km
( ) 200-400km
( ) More than 400km
6) What is your job position?

( ) Owner
( ) Manager
( ) Technician (algal, hatchery, etc)
( ) Labourer
( ) Other - Write In:

7) Please tick the roles that you fulfil as a part of your position. You can select more than one option.

**Farming and Fishing**

| [ ] Deckhand | [ ] Cleaner | [ ] Hatchery Manager |
| [ ] Boat Operator | [ ] General Hand | [ ] Hatchery Technician |
| [ ] Net repairer | [ ] Algal Technician | [ ] Other: |
| [ ] Assistant Farm Manager | [ ] Technician | [ ] Growout Manager |
| [ ] Farm Manager |

**Processing and Maintenance**

| [ ] Process Worker | [ ] Plant Supervisor | [ ] Aerator Technician |
| [ ] Leading Hand | [ ] Loading Supervisor | [ ] Maintenance or Construction Manager |
| [ ] Process Supervisor | [ ] Data Coordinator | [ ] Electrician |
| [ ] Truck Driver | [ ] Factory Operations Manager | [ ] Other: |

**Human Resources & Administration**

| [ ] Administration Officer | [ ] Compliance Officer | [ ] Workplace Health & Safety officer |
| [ ] Data Coordinator | [ ] Administration Manager | [ ] Other: |
| [ ] Payroll Admin Officer | [ ] Human Resources Manager | [ ] Financial Controller |
| [ ] Accounts Officer (Payable & Receivable) | |

8) How long (in years) have you been working in the aquaculture industry?
9) How long (in years) have you been working at your current place of employment?

10) What are your qualifications (i.e. tickets, certificates, degrees, diplomas)?

11) What is your age in years?

12) What is your gender?

( ) Male
( ) Female
Upskilling and Training

The following questions are about what you think the challenges are for workers receiving more training in the aquaculture industry.

13) Do you think there are significant barriers and challenges for workers seeking to upskill or engage in more training in the aquaculture industry?

( ) No barriers  ( ) Moderate barriers
( ) Some barriers  ( ) Extreme barriers

14) What do you think are the main barriers or challenges for workers receiving more training or upskilling?

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<tr>
<th></th>
<th>Not a barrier</th>
<th>Somewhat of a barrier</th>
<th>Moderate barrier</th>
<th>Extreme barrier</th>
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<tbody>
<tr>
<td>Owner/manager does not see it as necessary</td>
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<tr>
<td>The worker does not see it as necessary</td>
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<tr>
<td>Lack of training providers</td>
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<tr>
<td>Lack of high quality training</td>
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<td>Lack of relevant training packages or courses</td>
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<tr>
<td>Lack of awareness of programs and courses available</td>
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<td>High cost of training</td>
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<td>Lack of funding opportunities to pay for training</td>
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<tr>
<td>Lack of clear and established career pathways</td>
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<td>Lack of time to commit to training</td>
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<tr>
<td>Lack of support from co-workers and/or senior management to attend training</td>
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</table>
15) What do you think are the key factors that encourage workers to upskill or engage in further training in the aquaculture industry?

16) What types of training/learning would be most beneficial for workers seeking to enhance technical (i.e. algal, animal, aerator, data) or managerial skills in the aquaculture industry?

<table>
<thead>
<tr>
<th>Training Type</th>
<th>Not a benefit</th>
<th>Somewhat of a benefit</th>
<th>Moderate benefit</th>
<th>Extreme benefit</th>
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<tr>
<td>Visits to other farms or research facilities</td>
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<tr>
<td>Demonstration by experts at a farm</td>
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<tr>
<td>Short courses delivered external to workplace</td>
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<tr>
<td>Short courses delivered at workplace</td>
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<tr>
<td>On the job training by a supervisor</td>
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<tr>
<td>Online workshops or courses</td>
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<tr>
<td>Full-time or part-time external or online certificate/diploma courses</td>
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<tr>
<td>Webinars</td>
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<td>Masterclasses delivered by experts</td>
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<tr>
<td>Full-time or part-time on the job certificate/diploma courses</td>
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<tr>
<td>Mentoring program</td>
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</table>
17) What type of prior learning is most beneficial in preparing a new worker for the requirements of a TECHNICAL (i.e. algal, animal, aerator, data) role in the aquaculture industry?

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<thead>
<tr>
<th>Type of Prior Learning</th>
<th>Not a benefit</th>
<th>Somewhat of a benefit</th>
<th>Moderate benefit</th>
<th>Extreme benefit</th>
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<tbody>
<tr>
<td>University degree – general business/marketing/economic knowledge</td>
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<tr>
<td>University degree – industry specific knowledge such as animal husbandry or breeding to achieve genetic improvement</td>
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<tr>
<td>General TAFE/Private vocational institution diploma level graduate</td>
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<tr>
<td>Aquaculture specific TAFE/Private vocational institution diploma level graduate</td>
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<tr>
<td>A trade level qualification eg mechanic, diesel fitter, carpenter</td>
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<tr>
<td>General TAFE/Private vocational institution certificate level graduate</td>
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<tr>
<td>Aquaculture specific TAFE/Private vocational institution certificate level graduate (general hand)</td>
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</table>

18) What type of prior learning is most beneficial in preparing a new worker for the requirements of a MANAGERIAL role in the aquaculture industry?

<table>
<thead>
<tr>
<th>Type of Prior Learning</th>
<th>Not a benefit</th>
<th>Somewhat of a benefit</th>
<th>Moderate benefit</th>
<th>Extreme benefit</th>
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<tbody>
<tr>
<td>University degree – general business/marketing/economic knowledge</td>
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<tr>
<td>University degree – industry specific knowledge</td>
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knowledge such as animal husbandry or breeding to achieve genetic improvement

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<thead>
<tr>
<th>Qualification</th>
<th>Not responsible</th>
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<td>General TAFE/Private vocational institution diploma level graduate</td>
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<td>Aquaculture specific TAFE/Private vocational institution diploma level graduate</td>
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<td>A trade level qualification eg mechanic, diesel fitter, carpenter</td>
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<td>General TAFE/Private vocational institution certificate level graduate</td>
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19) Given the need to attract and retain highly skilled workers to the aquaculture industry, who do you think is responsible for ensuring that a future workforce is aware of career opportunities within the aquaculture industry?

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<tr>
<th>Organization</th>
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<td>TAFE/Vocational training institutions</td>
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<td>Private vocational training companies</td>
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<td>Industry</td>
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<tr>
<td>Farms/enterprises</td>
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</table>
20) Given the need to attract and retain highly skilled workers to the aquaculture industry, who do you think is responsible for ensuring that a future workforce is ADEQUATELY TRAINED?

<table>
<thead>
<tr>
<th></th>
<th>Not responsible</th>
<th>Somewhat responsible</th>
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<tbody>
<tr>
<td>Universities</td>
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<tr>
<td>TAFE/Vocational training institutions</td>
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<tr>
<td>Private vocational training companies</td>
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<td>Schools</td>
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<td>Government</td>
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<td>Farms/enterprises</td>
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<td>Individual workers</td>
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Attracting and Retaining Staff

The following questions ask what you think the major challenges are to keeping skilled staff within the region or aquaculture industry.

21) What do you think the main barriers are in ATTRACTING skilled staff to the aquaculture industry?

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<th></th>
<th>Not a barrier</th>
<th>Somewhat of a barrier</th>
<th>Moderate barrier</th>
<th>Extreme barrier</th>
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<tbody>
<tr>
<td>Lack of awareness of career</td>
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</table>

62
opportunities in the aquaculture industry

<table>
<thead>
<tr>
<th>Lack of lifestyle friendly rosters</th>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Low job security due to seasonality of work</td>
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</tr>
<tr>
<td>Remuneration packages are not attractive</td>
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<td></td>
</tr>
<tr>
<td>No established pathways for career advancement and opportunity</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Limited social opportunities outside of work due to isolation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited access to services and amenities outside of work due to isolation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The career or image of the career is unattractive</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Limited access to services (education, healthcare and social facilities) and job opportunities for spouse and family</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Limited opportunities for leadership development</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited support provided to new workers to fulfil work roles</td>
<td></td>
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</tr>
</tbody>
</table>

22) What do you think the main barriers are in RETAINING skilled staff to the aquaculture industry?

<table>
<thead>
<tr>
<th>Lack of awareness of career opportunities in the aquaculture industry</th>
<th>Not a barrier</th>
<th>Somewhat of a barrier</th>
<th>Moderate barrier</th>
<th>Extreme barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of lifestyle friendly rosters</td>
<td>( )</td>
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<tr>
<td>----------------------------------</td>
<td>-----</td>
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</tr>
<tr>
<td>Low job security due to seasonality of work</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Remuneration packages are not attractive</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>No established pathways for career advancement and opportunity</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Limited social opportunities outside of work due to isolation</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Limited access to services and amenities outside of work due to isolation</td>
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</tr>
<tr>
<td>The career or image of the career is unattractive</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Limited access to services (education, healthcare and social facilities) and job opportunities for spouse and family</td>
<td>( )</td>
<td>( )</td>
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<td>( )</td>
</tr>
<tr>
<td>Limited opportunities for leadership development</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Limited support provided to new workers to fulfil work roles</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>They do not become a part of the local community</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
</tbody>
</table>

23) Please rate each of the following in terms of its effectiveness as a strategy for attracting and retaining new technical and managerial workers to the aquaculture industry

<table>
<thead>
<tr>
<th>Loosen the selection criteria and address skill gaps through training</th>
<th>Not effective</th>
<th>Somewhat effective</th>
<th>Moderately effective</th>
<th>Extremely effective</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Action</td>
<td>()</td>
<td>()</td>
<td>()</td>
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</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Look for skills that are transferable (i.e. applicable to broader agricultural positions) to increase possibility for career advancement across industry</td>
<td>()</td>
<td>()</td>
<td>()</td>
<td>()</td>
</tr>
<tr>
<td>Target new migrants who are keen to gain new work skills</td>
<td>()</td>
<td>()</td>
<td>()</td>
<td>()</td>
</tr>
<tr>
<td>Use visa incentives to bring in skilled migrants from overseas</td>
<td>()</td>
<td>()</td>
<td>()</td>
<td>()</td>
</tr>
<tr>
<td>Provide or subsidise housing as part of remuneration package</td>
<td>()</td>
<td>()</td>
<td>()</td>
<td>()</td>
</tr>
<tr>
<td>Include childcare/school fees/tutoring as part of remuneration package</td>
<td>()</td>
<td>()</td>
<td>()</td>
<td>()</td>
</tr>
<tr>
<td>Offer longer annual leave</td>
<td>()</td>
<td>()</td>
<td>()</td>
<td>()</td>
</tr>
<tr>
<td>Consider flexible work arrangements</td>
<td>()</td>
<td>()</td>
<td>()</td>
<td>()</td>
</tr>
<tr>
<td>Offer generous superannuation</td>
<td>()</td>
<td>()</td>
<td>()</td>
<td>()</td>
</tr>
<tr>
<td>Offer financial incentives for time spent at business</td>
<td>()</td>
<td>()</td>
<td>()</td>
<td>()</td>
</tr>
<tr>
<td>Facilitate attendance at national and/or international conferences</td>
<td>()</td>
<td>()</td>
<td>()</td>
<td>()</td>
</tr>
<tr>
<td>Offer tuition reimbursement and professional development benefits</td>
<td>()</td>
<td>()</td>
<td>()</td>
<td>()</td>
</tr>
<tr>
<td>Look into employment opportunities for spouse or partner</td>
<td>()</td>
<td>()</td>
<td>()</td>
<td>()</td>
</tr>
<tr>
<td>Provide access to cross-industry skill training to encourage workers to remain in region</td>
<td>()</td>
<td>()</td>
<td>()</td>
<td>()</td>
</tr>
<tr>
<td>Provide pathways for career</td>
<td>()</td>
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<td>()</td>
</tr>
</tbody>
</table>
24) Can you see benefit in a program that established cross industry training for common skills at managerial and technical staff levels to help retain and attract staff to agricultural and aquaculture industry?

( ) No benefit
( ) Some benefit
( ) Moderate benefit
( ) Extreme benefit

25) Can you see benefit in a program in which different businesses (cross industry) in a region co-shared a workforce to help retain skilled staff to that region? For example, several businesses could reduce the impacts of seasonality by sharing a workforce.

( ) No benefit
( ) Some benefit
( ) Moderate benefit
( ) Extreme benefit

26) What do you think are the key skills or work functions undertaken within an aquaculture business that could be relevant to job positions within the broader agriculture industry?
Appendix 3: Information Sheet for industry explaining the project

**Career Progression Analysis – prawn farming sector**

The APFA and Agrifood Skills Australia have joined forces to commission a new workforce development applied research project for the prawn farming sector.

**Why?**
Prawn farmers have identified the need to build a reliable, highly skilled, regionally-based workforce to enable ongoing and significant expansion plans for the industry across northern Australia. To do this they need to increase the attractiveness of the sector to graduates of university and higher level VET training programs by offering a clear career progression within the prawn farming industry which includes the identification of a range of managerial and technical skills that are transferable across a range of other aquaculture and agribusiness sectors. It is hoped that this cross-sectoral approach will enable regions to build and retain a skilled workforce and the ability to balance some of the peaks and troughs of the regional labour market.

**What?**
The aim of the actual project is to provide the information needed by the APFA to develop and guide the implementation of effective workforce recruitment, pathway development and staff retention strategies for prawn farming businesses. The project consists of two parts:
- a desktop review of existing information relevant to attracting and retaining a suitable workforce for the future, and
- industry consultation – via an online survey, followed by face-to-face interviews or focus group sessions

**Who?**
The project will be done by a multidisciplinary James Cook University team (led by Margie Atkinson and Connar McShane) that includes industry representatives (Helen Jenkins and Mark Oliver). We are looking for owners/managers and higher level technicians from prawn farms and other aquaculture sectors who would like to provide input to the study through the online survey. We would then invite a smaller number to be interviewed individually to explore the survey results in greater detail. Several focus groups will be run for other agricultural sectors in the north to look for common skill needs across the different sectors

**When?**
The project has just started – the short survey will be available online soon and will be open for about a month; the research team will provide an overview of the project at the APFA conference (and be available to answer any questions); interviews and focus group sessions will be done during August (either via site visits or phone) and the final report will be submitted by the end of September.

If you would like further information in the meantime, please contact: Margie Atkinson (on 0438 387 303) or Helen Jenkins (on 0417 006 639).
Appendix 4: Definition of on-farm roles
Note these role descriptions were prepared in consultation with industry.

**General Hand** – this is an entry level, general labouring position. Tasks normally include assisting with maintenance, pond preparation, stocking and production grow out, under direction from more senior staff. This level of position does not make decisions, requires supervision and does not need formal training to begin. On the job training is normally provided to the level of between a Certificate II or III in Aquaculture.

**Technician** – this is similar to a general hand position but requires the employee to do more technical or important tasks in grow out operations. This level of position is expected to work independently at times, making decisions throughout the day without supervision and may, at times, be required to provide low level supervision of others. This role would normally have a few years of experience on farm and usually the person would have a high level VET qualification or a university degree (or the equivalent level of on-the-job training).

**Pond Manager** - this is a middle management level role for farms that are too large for the Grow-out manager to manage the farm alone. A pond manager will supervise a section of the farm, will be directly responsible for the day to day management of that section and the technicians and farm hands working on that section. The position does not involve higher level business and production planning tasks. This role requires a few years’ experience as a technician and usually the person would have a high level VET qualification or a university degree (or the equivalent level of on-the-job training). This is a hands-on role and many of the daily tasks performed by technicians are also performed by the pond managers.

**Grow-out Manager** – this is a senior role requiring experience in managing and coordinating all aspects of grow-out operations. The role also includes a significant level of business management and administration tasks that require broad experience in production planning, licensing compliance, dealing with production data and reporting, and assisting with recruiting and training staff. This role requires extensive experience and a university degree and it is important to note that grow-out manager’s need to have a very detailed and ‘hands-on’ grasp of the specific farm system so they can optimize managing not only the individual production and business elements but also the team of people doing the various jobs. On larger farms there is likely to be a General Manager role that is similar to the Grow-Out Manager but requires significantly more experience, is less ‘hands on’ and more focussed on co-ordinating activities across the full farming production system and on managing the whole business.

**Algal Technician** – this role is confined to hatcheries and is focused on growing the micro algae to feed the larval prawns. Experience and moderate to considerable levels of on-the-job training is required to become skilled. A university degree helps to understand the science behind algal culture but is not essential. Usually an employee in this role will have formal or on-the-job training equivalent to Certificate IV or Diploma in Aquaculture or a relevant university degree.

**Hatchery Technician** – this role is essentially the same as a grow-out technician but is confined to hatcheries. This level of position is expected to work independently at times, making decisions throughout the day without supervision and may, at times, be required to provide low level supervision of others. This role would normally have a few years of experience in a hatchery and usually the person
would have a high level VET qualification or a university degree (or the equivalent level of on-the-job training).

**Hatchery Manager** – this is a senior role requiring experience in managing and coordinating all aspects of hatchery operations. The role also includes a significant level of administration tasks that require broad experience in production planning, licensing compliance, dealing with production data and reporting, and assisting with recruiting and training staff. Depending on the organization the role may require business tasks such as budgeting. This role requires extensive experience and a university degree and it is important to note that hatchery manager’s need to have a very detailed and ‘hands-on’ grasp of the specific hatchery system so they can optimize managing not only the individual production and business elements but also the team of people doing the various jobs.
Appendix 5: Main groupings of codes for analysis of interview data

<table>
<thead>
<tr>
<th>Background</th>
<th>Training and Education</th>
<th>Attraction and Retention</th>
<th>Skills and Knowledge</th>
</tr>
</thead>
</table>
|            | • More Training for valuable skills  
• Delivery of courses  
• Barriers to engaging in training  
• Access to training | • Strategies  
• Retention  
• Attraction  
• Responsibility for stabilising skilled workforce | • Valuable skills  
• Prior education  
• Multi-skilled  
• Gaps in skills or knowledges  
• Easier skills  
• Challenging skills |
Appendix 6: Online Survey (full results)

Career Progression Analysis – Prawn Farming Sector

Online Survey Results

Participant Descriptives (Tables 1a & 1b)

Of the 39 people who responded to the survey, 1 response was removed due to missing data. This resulted in the final sample consisting of 27 men and 11 women who ranged in age from 21-60yrs (Mean age=35.88yrs; SD=10.62). Participants had been working in the industry from as little as a month to up to 30 years (M=9.66; SD=8.12) and had been working at their current place of employment for approximately 5.23yrs (SD=4.87; Range=0.1-15yrs).

The type of aquaculture business that participants worked at was mainly prawn farms (71%) and some barramundi farms (13%). Most of the farm operations included saltwater ponds (68%), hatcheries (55%) and processing (24%). Farm production size ranged from 0 hectares to 191 hectares, with the majority of participants indicating between 98 and 100 hectares (34%; M=79.71, SD=53.38). Most farms were either less than 100km (74%) or were between 100-200km (18%) away from a major urban area.

Table 1a. Inclusions in Aquaculture Business Operations

<table>
<thead>
<tr>
<th>Aquaculture Business Operations</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshwater Ponds</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>Processing</td>
<td>9 (23.7%)</td>
</tr>
<tr>
<td>Saltwater Ponds</td>
<td>26 (68.4%)</td>
</tr>
<tr>
<td>Sea Ranching</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>Surface Lines</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>Hatcheries</td>
<td>21 (55.3%)</td>
</tr>
<tr>
<td>Recirculating Aquaculture Systems</td>
<td>5 (13.2%)</td>
</tr>
<tr>
<td>Other:</td>
<td></td>
</tr>
<tr>
<td>Consulting</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>Subsurface &amp; Bottom</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>Training</td>
<td>3 (7.9%)</td>
</tr>
<tr>
<td>Prawn Processing</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>Feed Production &amp; Supply</td>
<td>1 (2.6%)</td>
</tr>
</tbody>
</table>

Most participants were managers (55%) and technicians (32%) with the remaining participants including educators and administrators. The specific job roles that participants were responsible for predominantly included General Hand (21%), Algal Technician (29%), Technician (32%), Growout Manager (16%) and Hatchery Technician (16%).
Table 1b. Role Responsibility of Respondent on Farm

<table>
<thead>
<tr>
<th>Roles</th>
<th>N(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Farming and Fishing</strong></td>
<td></td>
</tr>
<tr>
<td>Boat Operator</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>Assistant Farm Manager</td>
<td>2 (5.3%)</td>
</tr>
<tr>
<td>Farm Manager</td>
<td>3 (7.9%)</td>
</tr>
<tr>
<td>Cleaner</td>
<td>4 (10.5%)</td>
</tr>
<tr>
<td>General Hand</td>
<td>8 (21.1%)</td>
</tr>
<tr>
<td>Algal Technician</td>
<td>11 (28.9%)</td>
</tr>
<tr>
<td>Technician</td>
<td>12 (31.6%)</td>
</tr>
<tr>
<td>Growout Manager</td>
<td>6 (15.8%)</td>
</tr>
<tr>
<td>Hatchery Manager</td>
<td>3 (7.9%)</td>
</tr>
<tr>
<td>Assistant Hatchery Manager</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>Hatchery Technician</td>
<td>6 (15.8%)</td>
</tr>
<tr>
<td>(Other) Water Quality Technician</td>
<td>3 (7.9%)</td>
</tr>
<tr>
<td>(Other) Educator</td>
<td>2 (5.3%)</td>
</tr>
<tr>
<td>(Other) General Manager</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>(Other) Portfolio/Business Manager</td>
<td>2 (5.3%)</td>
</tr>
<tr>
<td>(Other) Quality Assurance</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>(Other) Husbandry Manager</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>(Other) Supplier/Consultant</td>
<td>2 (5.3%)</td>
</tr>
<tr>
<td><strong>Processing and Maintenance</strong></td>
<td></td>
</tr>
<tr>
<td>Data Coordinator</td>
<td>2 (5.3%)</td>
</tr>
<tr>
<td>Facility Operations Manager</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>(Other) Executive</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>(Other) Trainer</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>(Other) Quality Assurance</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td><strong>Human Resources</strong></td>
<td></td>
</tr>
<tr>
<td>Administration Officer</td>
<td>2 (5.3%)</td>
</tr>
<tr>
<td>Data Coordinator</td>
<td>4 (10.5%)</td>
</tr>
<tr>
<td>Payroll Administration Officer</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>Accounts Officer (Payable &amp; Receivable)</td>
<td>2 (5.3%)</td>
</tr>
<tr>
<td>Compliance Officer</td>
<td>2 (5.3%)</td>
</tr>
<tr>
<td>Administration Manager</td>
<td>2 (5.3%)</td>
</tr>
<tr>
<td>Human Resources Manager</td>
<td>3 (7.9%)</td>
</tr>
<tr>
<td>Financial Controller</td>
<td>3 (7.9%)</td>
</tr>
<tr>
<td>Workplace Health &amp; Safety Officer</td>
<td>2 (5.3%)</td>
</tr>
<tr>
<td>(Other) Systems Manager</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>(Other) Executive</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>(Other) Portfolio Manager</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>(Other) Trainer</td>
<td>1 (2.6%)</td>
</tr>
</tbody>
</table>
Upskilling and Training (Table 2)

Participants thought that there were some (47.4%) or moderate (42.1%) significant barriers and challenges for workers seeking to upskill or engage in more training in the aquaculture industry (M=2.51, SD=.65). Participants reported the main barriers to upskilling/training as the lack of clear career pathways (M=2.78, SD=.98), lack of funding opportunities to pay for training (M=2.73, SD=.73), the high cost of training (M=2.70, SD=.88), lack of awareness of available courses (M=2.68, SD=.81) and a lack of time to commit to training (M=2.54, SD=.84). Participants’ suggestions for factors that would facilitate workers engaging in training predominantly included remuneration, established clear career pathways, worker ambition or motivation and personal or job satisfaction.

Table 2. Barriers for workers seeking to upskill in the aquaculture industry (scaled 1 to 4).

<table>
<thead>
<tr>
<th></th>
<th>Not a Barrier</th>
<th>Extreme Barrier</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of clear and established career pathways</td>
<td>10.5%</td>
<td>26.3%</td>
<td>2.78</td>
<td>.98</td>
</tr>
<tr>
<td>Lack of funding opportunities to pay for training</td>
<td>2.6%</td>
<td>13.2%</td>
<td>2.73</td>
<td>.73</td>
</tr>
<tr>
<td>High cost of training</td>
<td>7.9%</td>
<td>18.4%</td>
<td>2.70</td>
<td>.88</td>
</tr>
<tr>
<td>Lack of awareness of programs and courses available</td>
<td>5.3%</td>
<td>15.8%</td>
<td>2.68</td>
<td>.82</td>
</tr>
<tr>
<td>Lack of time to commit to training</td>
<td>13.2%</td>
<td>7.9%</td>
<td>2.54</td>
<td>.84</td>
</tr>
<tr>
<td>Lack of high quality training</td>
<td>23.7%</td>
<td>10.5%</td>
<td>2.32</td>
<td>.97</td>
</tr>
<tr>
<td>Lack of relevant training packages or courses</td>
<td>18.4%</td>
<td>10.5%</td>
<td>2.32</td>
<td>.91</td>
</tr>
<tr>
<td>Lack of training providers</td>
<td>15.8%</td>
<td>5.3%</td>
<td>2.22</td>
<td>.79</td>
</tr>
<tr>
<td>The worker does not see it as necessary</td>
<td>28.9%</td>
<td>5.3%</td>
<td>2.05</td>
<td>.88</td>
</tr>
<tr>
<td>Owner/manager does not see it as necessary</td>
<td>31.6%</td>
<td>7.9%</td>
<td>2.03</td>
<td>.93</td>
</tr>
<tr>
<td>Lack of support from co-workers and/or senior management to attend training</td>
<td>26.9%</td>
<td>5.3%</td>
<td>1.97</td>
<td>.77</td>
</tr>
</tbody>
</table>
Training Structures and Delivery (Tables 3, 4 & 5)

Participants reported that the most beneficial types of training for those seeking to enhance technical and managerial skills included on the job training by a supervisor (M=3.47, SD=.65), short courses delivered at the workplace (M=3.23, SD=.80), demonstrations by experts at a farm (M=3.21, SD=.70) and visits to other farm or research facilities (M=3.21, SD=.74).

Table 3. Beneficial types of training for managers and technicians (Scaled 1 to 4).

<table>
<thead>
<tr>
<th>Training Method</th>
<th>Not a Benefit (1)</th>
<th>Extreme Benefit (4)</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>On the job training by a supervisor</td>
<td>2.6%</td>
<td>52.6%</td>
<td>3.47</td>
<td>.65</td>
</tr>
<tr>
<td>Short courses delivered at workplace</td>
<td>2.6%</td>
<td>47.4%</td>
<td>3.29</td>
<td>.80</td>
</tr>
<tr>
<td>Demonstration by experts at a farm</td>
<td>0%</td>
<td>36.8%</td>
<td>3.21</td>
<td>.70</td>
</tr>
<tr>
<td>Visits to other farms or research facilities</td>
<td>0%</td>
<td>39.5%</td>
<td>3.21</td>
<td>.74</td>
</tr>
<tr>
<td>Full-time or part-time on the job certificate/diploma</td>
<td>0%</td>
<td>44.7%</td>
<td>3.18</td>
<td>.83</td>
</tr>
<tr>
<td>courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mentoring program</td>
<td>0%</td>
<td>34.2%</td>
<td>3.16</td>
<td>.72</td>
</tr>
<tr>
<td>Masterclasses delivered by experts</td>
<td>5.3%</td>
<td>34.2%</td>
<td>3.13</td>
<td>.81</td>
</tr>
<tr>
<td>Short courses delivered external to workplace</td>
<td>2.6%</td>
<td>31.6%</td>
<td>3.00</td>
<td>.84</td>
</tr>
<tr>
<td>Full-time or part-time external or online certificate/diploma courses</td>
<td>2.6%</td>
<td>21.1%</td>
<td>2.74</td>
<td>.83</td>
</tr>
<tr>
<td>Online workshops or courses</td>
<td>10.5%</td>
<td>5.3%</td>
<td>2.29</td>
<td>.73</td>
</tr>
<tr>
<td>Webinars</td>
<td>13.2%</td>
<td>10.5%</td>
<td>2.26</td>
<td>.83</td>
</tr>
</tbody>
</table>

Participants reported that the most beneficial types of prior learning for new workers in a managerial role were having a university degree in industry specific knowledge (e.g. animal husbandry) (M=3.41, SD=.72), having a university degree in general business knowledge (e.g. business, marketing or economics) (M=3.19, SD=.74) or having an aquaculture-specific vocational institution diploma (M=2.92, SD=.95).

Beneficial type of prior learning was rated similarly for new workers in a technical role. This prior learning included having a university degree in industry specific knowledge (e.g. animal husbandry) (M=3.42, SD=.79), having an aquaculture-specific vocational institution diploma (M=3.34, SD=.71) or having an aquaculture-specific vocational institution certificate (e.g. general hand) (M=3.24, SD=.72).
Table 4. Beneficial Types of prior learning for managers and technicians (scaled 1-4).

<table>
<thead>
<tr>
<th>Prior Learning for Manager</th>
<th>Prior Learning for Technician</th>
</tr>
</thead>
<tbody>
<tr>
<td>University degree (industry specific knowledge such as animal husbandry or breeding to achieve genetic improvement)</td>
<td>0%</td>
</tr>
<tr>
<td>University degree (general business/marketing/economic knowledge)</td>
<td>0%</td>
</tr>
<tr>
<td>Aquaculture specific TAFE/Private vocational institution (diploma level graduate)</td>
<td>7.9%</td>
</tr>
<tr>
<td>Aquaculture specific TAFE/Private vocational institution (certificate level graduate - general hand)</td>
<td>13.2%</td>
</tr>
<tr>
<td>General TAFE/Private vocational institution (diploma level graduate)</td>
<td>21.1%</td>
</tr>
<tr>
<td>A trade level qualification (eg mechanic, diesel fitter, carpenter)</td>
<td>34.2%</td>
</tr>
<tr>
<td>General TAFE/Private vocational institution (certificate level graduate)</td>
<td>34.2%</td>
</tr>
</tbody>
</table>
Participants were asked to indicate who they thought was responsible for ensuring that a future workforce would be aware of career opportunities in the aquaculture industry as well as who was responsible for ensuring that this future workforce was adequately trained. Participants rated industry (M=3.84, SD=.37; M=3.51, SD=.65, respectively) individual farms/enterprises (M=3.61, SD=.59; M=3.63, SD=.49, respectively) and universities (M=3.23, SD=.71; M=3.42, SD=.64 respectively) as most responsible for ensuring that a future workforce was aware of career opportunities and for training this future workforce.

Table 5. Responsibility for raising awareness of career opportunities and adequately training the future workforce (Scaled 1 to 4).

<table>
<thead>
<tr>
<th></th>
<th>Awareness of Career Opportunities</th>
<th>Adequately trained</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not Responsible</td>
<td>Extremely Responsible</td>
</tr>
<tr>
<td>Industry</td>
<td>0%</td>
<td>84.2%</td>
</tr>
<tr>
<td>Farms/enterprises</td>
<td>0%</td>
<td>65.8%</td>
</tr>
<tr>
<td>Universities</td>
<td>0%</td>
<td>36.8%</td>
</tr>
<tr>
<td>Government</td>
<td>2.6%</td>
<td>47.4%</td>
</tr>
<tr>
<td>TAFE/Vocational</td>
<td>0%</td>
<td>23.7%</td>
</tr>
<tr>
<td>training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>institutions</td>
<td>7.9%</td>
<td>21.1%</td>
</tr>
<tr>
<td>Private vocational</td>
<td></td>
<td></td>
</tr>
<tr>
<td>training</td>
<td>7.9%</td>
<td>15.8%</td>
</tr>
<tr>
<td>companies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schools</td>
<td>7.9%</td>
<td>13.2%</td>
</tr>
<tr>
<td>Individual workers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Attraction and Retention (Tables 6 & 7)

Participants reported that the key barriers to attracting skilled staff to the aquaculture industry was the unattractive remuneration packages (M=3.34, SD=.88), the lack of awareness of career opportunities (M=3.10, SD=.73) and that there was no established pathway for career advancement (M=3.05, SD=.80). Remuneration packages (M=3.38, SD=.89) and career pathways (M=3.08, SD=.78) were also identified as key barriers to retaining skilled staff to the industry.

Table 6. Barriers to attracting and retaining skilled staff to the aquaculture industry (Scaled 1 to 4).

<table>
<thead>
<tr>
<th></th>
<th>Attraction</th>
<th>Retentions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not a Barrier (1)</td>
<td>Extreme Barrier (4)</td>
</tr>
<tr>
<td>Remuneration packages are not attractive</td>
<td>7.9%</td>
<td>52.6%</td>
</tr>
<tr>
<td>Lack of awareness of career opportunities in the aquaculture industry</td>
<td>0%</td>
<td>31.6%</td>
</tr>
<tr>
<td>No established pathways for career advancement and opportunity</td>
<td>2.6%</td>
<td>31.6%</td>
</tr>
<tr>
<td>Limited social opportunities outside of work due to isolation</td>
<td>7.9%</td>
<td>23.7%</td>
</tr>
<tr>
<td>Lack of lifestyle friendly rosters</td>
<td>10.5%</td>
<td>21.1%</td>
</tr>
<tr>
<td>Limited access to services (education, healthcare and social facilities) and job opportunities for spouse</td>
<td>7.9%</td>
<td>15.8%</td>
</tr>
<tr>
<td>Limited opportunities for leadership development</td>
<td>10.5%</td>
<td>10.5%</td>
</tr>
<tr>
<td>Low job security due to seasonality of work</td>
<td>15.8%</td>
<td>13.2%</td>
</tr>
<tr>
<td>Limited access to services and amenities outside of work due to isolation</td>
<td>15.8%</td>
<td>10.5%</td>
</tr>
<tr>
<td>Limited support provided to new workers to fulfill work roles</td>
<td>18.4%</td>
<td>5.3%</td>
</tr>
<tr>
<td>The career or image of the career is unattractive</td>
<td>28.9%</td>
<td>2.6%</td>
</tr>
<tr>
<td>They do not become part of the local community</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Participants reported that strategies that would be effective in attracting and retaining skilled staff included providing pathways for career development (M=3.58, SD=.68), providing or subsidizing housing as a part of the remuneration package (M=3.39, SD=.64), offering financial incentives for time spent at business (M=3.11, SD=.86), considering flexible work arrangements (M=3.08, SD=.78), offering tuition reimbursement and professional development benefits (M=3.05, SD=.69) and facilitating attendance at nation and/or international conferences (M=3.03, SD=.68).
Table 7. Strategies for attracting and retaining skilled staff to the industry (Scaled 1 to 4).

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Not Effective (1)</th>
<th>Extremely effective (4)</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide pathways for career development within the industry</td>
<td>2.6%</td>
<td>65.8%</td>
<td>3.58</td>
<td>.68</td>
</tr>
<tr>
<td>Provide or subsidise housing as part of remuneration package</td>
<td>0%</td>
<td>47.4%</td>
<td>3.39</td>
<td>.64</td>
</tr>
<tr>
<td>Offer financial incentives for time spent at business</td>
<td>5.3%</td>
<td>36.8%</td>
<td>3.11</td>
<td>.86</td>
</tr>
<tr>
<td>Consider flexible work arrangements</td>
<td>5.3%</td>
<td>28.9%</td>
<td>3.08</td>
<td>.78</td>
</tr>
<tr>
<td>Offer tuition reimbursement and professional development benefits</td>
<td>0%</td>
<td>26.3%</td>
<td>3.05</td>
<td>.69</td>
</tr>
<tr>
<td>Facilitate attendance at national and/or international conferences</td>
<td>0%</td>
<td>23.7%</td>
<td>3.03</td>
<td>.68</td>
</tr>
<tr>
<td>Offer longer annual leave</td>
<td>5.3%</td>
<td>34.2%</td>
<td>2.95</td>
<td>.93</td>
</tr>
<tr>
<td>Include childcare/school fees/tutoring as part of remuneration package</td>
<td>5.3%</td>
<td>31.6%</td>
<td>2.92</td>
<td>.91</td>
</tr>
<tr>
<td>Look for skills that are transferable (i.e. applicable to broader</td>
<td>5.3%</td>
<td>23.7%</td>
<td>2.82</td>
<td>.87</td>
</tr>
<tr>
<td>agricultural positions) to increase possibility for career</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>advancement across industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide access to cross-industry skill training to encourage workers</td>
<td>7.9%</td>
<td>28.9%</td>
<td>2.79</td>
<td>.96</td>
</tr>
<tr>
<td>to remain in region</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offer generous superannuation</td>
<td>5.3%</td>
<td>15.8%</td>
<td>2.76</td>
<td>.79</td>
</tr>
<tr>
<td>Look into employment opportunities for spouse or partner</td>
<td>15.8%</td>
<td>26.3%</td>
<td>2.61</td>
<td>1.05</td>
</tr>
<tr>
<td>Loosen the selection criteria and address skill gaps through training</td>
<td>15.8%</td>
<td>7.9%</td>
<td>2.45</td>
<td>.86</td>
</tr>
<tr>
<td>Use visa incentives to bring in skilled migrants from overseas</td>
<td>28.9%</td>
<td>15.8%</td>
<td>2.23</td>
<td>1.05</td>
</tr>
<tr>
<td>Target new migrants who are keen to gain new work skills</td>
<td>31.6%</td>
<td>7.9%</td>
<td>2.00</td>
<td>.91</td>
</tr>
</tbody>
</table>

Participants reported seeing a moderate (34.2%) or extreme (55.3%) benefit in a program that established cross industry training for common skills at managerial and technical staff levels to help attract and retain staff to agricultural and aquaculture industries. However, participants saw less benefit in a program where business co-shared a workforce to retain skilled workers within a region (moderate benefit=44.7%, extreme benefit=23.7%). Common skills were suggested to be managerial skills, animal husbandry, leadership skills, data collection, mechanical skills, human resource management, operating machinery, business skills, food safety, quality testing, laboring skills and biosecurity management.
Qualifications of Survey Respondents

The majority of participants (71.1%) had at least one university degree in an aquaculture or marine science related area. Participants were likely to report having an aquaculture related diploma (13.2%) or certificate (23.7%). As can be seen in the table below, most types of qualifications sought/acquired were those specific to aquaculture or science. Additionally, 7 participants also reported tickets, such as boat licenses or forklift tickets, as a part of their qualifications. Examples of common university degrees reported included Bachelor of Science (Aquaculture) and Bachelor of Marine Science (Aquaculture). Examples of common vocational qualifications include Certificate 3 or Diploma in Aquaculture.

Table 8. Qualifications of respondents

<table>
<thead>
<tr>
<th>Qualification Type</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>University degree – general business/marketing/economic knowledge</td>
<td>6</td>
<td>15.8</td>
</tr>
<tr>
<td>University degree – industry specific knowledge such as animal husbandry</td>
<td>27</td>
<td>71.1</td>
</tr>
<tr>
<td><strong>Total with University Qualification</strong></td>
<td>33</td>
<td>86.8</td>
</tr>
<tr>
<td>General TAFE/Private vocational institution diploma level graduate</td>
<td>4</td>
<td>10.5</td>
</tr>
<tr>
<td>Aquaculture specific TAFE/Private vocational institution diploma level graduate</td>
<td>5</td>
<td>13.2</td>
</tr>
<tr>
<td>A trade level qualification eg mechanic, diesel fitter, carpenter</td>
<td>1</td>
<td>2.6</td>
</tr>
<tr>
<td>General TAFE/Private vocational institution certificate level graduate</td>
<td>1</td>
<td>2.6</td>
</tr>
<tr>
<td>Aquaculture specific TAFE/Private vocational institution certificate level graduate (general hand)</td>
<td>9</td>
<td>23.7</td>
</tr>
<tr>
<td><strong>Total with Vocational Qualification</strong></td>
<td>20</td>
<td>52.6</td>
</tr>
<tr>
<td><strong>Total with Mix of University and Vocational Qualifications</strong></td>
<td>15</td>
<td>39.5</td>
</tr>
<tr>
<td><strong>Total with Mix of Business and Science Qualifications</strong></td>
<td>7</td>
<td>18.4</td>
</tr>
<tr>
<td><strong>Total with either Mix of Uni and Voc OR Bus and Sci</strong></td>
<td>11</td>
<td>28.9</td>
</tr>
</tbody>
</table>
Queensland Production Horticulture

WORKFORCE DEVELOPMENT PROJECT


Project Officer: Michelle Templin
State Workforce Development Coordinator
Growcom
E: mtemplin@growcom.com.au
T: 07 3620 3844
GRANT RECIPIENT AND FUNDED ACTIVITY DETAILS

RECIPIENT ORGANISATION

Organisation name: Queensland Fruit and Vegetable Growers, trading as Growcom Australia

Details of contact person/project manager
Name: Michelle Templin
Telephone: Work (07) 36203844
Fax: (07) 36203880
Email: mtemplin@growcom.com.au Website address: www.growcom.com.au

RECIPIENT ADDRESS

Suburb/town: Fortitude Valley
State: QLD
Postcode: 4006
Postal address: PO Box 202
Suburb/Town: Fortitude Valley
State: QLD
Postcode: 4006

PROJECT SCOPE

Region: Queensland-wide, with state-funded workforce development officers based in Brisbane, Toowoomba, Bowen, Bundaberg and Mareeba servicing production horticulture throughout Queensland’s key growing areas.
Industry: Production Horticulture
Production horticulture is the most labour intensive of all agricultural industries and offers a diversity of skilled and unskilled, permanent and casual employment opportunities. It is the only agricultural sector to consistently achieve strong growth over the past five years and currently contributes more than $2.7 billion to the Queensland economy annually. In recognition of the valuable role that the sector plays in both the local and national economy, and as part of the Newman Government's commitment to support a better workforce for production horticulture, the Queensland Government funded the development of a three year (2013 – 2015) workforce development plan for the production horticulture industry.

The state’s peak production horticulture industry body, Growcom Australia, was contracted to develop the Plan in consultation with the industry’s key stakeholders including individual producers, regional industry groups, industry development officers, gateway school representatives, registered training organisations, labour hire companies, Primary Industries Education Foundation, Rural Skills Australia, Whitsunday Marketing and Development, AUSVEG, and representatives from key state government departments including Queensland Departments of Agriculture and Fisheries (QDAF), and Education and Training (DET).

The Plan tackles the major challenge in our industry of attracting, retaining and developing a skilled workforce and focuses on improvements to support the sector meet present and future workforce development challenges. In so doing, it aims to lay the foundations for improved profitability, competitiveness and resilience.

To progress priorities identified in the Plan a state-funded Production Horticulture Workforce Development Team was established in late 2013. The Team comprises a Brisbane-based state coordinator and four regional workforce development officers based with grower organisations in Mareeba, Bowen, Bundaberg and Toowoomba. All four regional officers developed tailored Regional Workforce Development Plans and established regional industry, education and training networks that feed into a state Industry Education and Training Network (IETN). These networks provide a chance to discuss regional and statewide workforce issues and constraints, and to identify opportunities for stakeholders to collaborate on initiatives that can help drive genuine outcomes for Queensland’s production horticulture industry.

The Team has provided a much-needed conduit between growers, the training and employment sectors and government, and achieved significant outcomes in a relatively short period. Greater collaboration between key stakeholders has resulted in notably increased awareness of careers within production horticulture, improved training offerings and increased engagement in accredited and non-accredited training, all of which is supporting enhanced workforce capacity.

The following report provides an overview of the important advancements achieved by the Team over the past two years (August 2013 – August 2015).
Purpose of the Plan:

To optimise the supply and retention of appropriately skilled workers and thereby ensure that Queensland’s production horticulture industry has access to labour that is equipped with the best possible knowledge and skills to sustainably increase productivity and profitability.

Implementation framework:

A key aspect of the Plan was the recommendation to appoint five industry-based officers to progress priority actions. The Production Horticulture Workforce Development Team members are:

- **Michelle Templin**, State wide Workforce Development Coordinator (Growcom Brisbane)
- **Janne Dipple**, Granite Belt and Southern Darling Downs Region (Growcom Toowoomba)
- **Greg Weir**, Wide Bay Burnett (Bundaberg Fruit and Vegetable Growers)
- **Bianca Fullarton**, Bowen (Bowen Gumlu Growers Association) and
- **Leanne Kruss**, Far North Queensland (Mareeba District Fruit & Vegetable Growers Association).

These five officers are funded by the state government and form the core of a Queensland Industry Education and Training Network (IETN) for production horticulture, which also has representatives from relevant state and federal agencies. The industry officers work collaboratively to deliver the Plan in accordance with the production horticulture sector’s framework of priorities and by:

- engaging with growers to determine services, programs and training required to address their workforce needs
- ensuring relevant industry groups and state and federal government departments have a robust collaborative approach to ascertaining and addressing training and employment needs
- increasing engagement with the sector’s Industry Skills Council Agrifood Skills Australia and registered training organisations to improve training offerings and the delivery of training programs
- ensuring a coordinated industry approach to addressing sector-wide issues (e.g. training policy; vocational education funding arrangements) that are adversely impacting on the sectors’ ability to optimise and maintain an efficient, available workforce.
Key benefits:
The Team has delivered significant benefits for a wide range of stakeholders including growers, industry groups, training and education providers and government. Importantly many of these benefits will continue to have a positive impact long after the current funded program has ended.

**KEY GOALS**

- **Improved promotion and awareness of the production horticultural industry and careers within it:** This program has given industry a platform to showcase the diversity of careers within the industry. It has brought together competing training and education providers (high schools, registered training providers and universities) for the greater good of promoting the industry to prospective students and job seekers. Prospective students and employees have not only gained an improved awareness of the variety of career options within the industry but also the choice of entry pathways; i.e. vocational, academic or skills sets.

- **Increased knowledge of workforce development issues and improved training offerings:** Increased information sharing has resulted in a significantly improved understanding of the diverse workforce training needs across the varying areas of production horticulture. This has enabled industry to provide valuable feedback to the sector’s Industry Skills Council (Agrifood Skills Australia), government funding bodies and registered training providers (RTOs), which in turn has driven improved training offerings and more flexible funding for training; e.g. funding of skill sets.

- **Improved information sharing:** Adopting a more strategic and collaborative approach to addressing training and employment needs within the production horticulture industry has been central to the program’s success. Industry, government and education and training providers have willingly provided their time and resources to maximise opportunities to create greater awareness of careers within the industry and to upskill the workforce. This partnership approach has reduced a duplication of efforts and laid a solid foundation for continued momentum for years to come.

- **Improved workforce capacity:** As a direct result of collaborative partnerships and robust information sharing about training and funding opportunities, the Team has supported a noteworthy number of production horticulture employees throughout Queensland obtain skills through non-accredited training and accredited training in skill sets and full qualifications.

84
GOAL: IMPROVED AWARENESS OF CAREERS AND THE INDUSTRY

The Team exposed the industry to over 9,150 students and 270 career advisors/teachers via the following initiatives:

- 77 career presentations, 17 career exhibitions and 37 industry tours that included successful interactive work experience programs such as Ag Inspirations and Work Inspirations.
- 24 agricultural science presentations.
- 33 primary schools visited to promote curriculum resources.
- 18 career profiles produced and published.
- Participated in 10 Gateway Schools to Agribusiness professional development days and provided support for Home Hill State High and Proserpine State High to adopt and implement the Gateways Schools to Agribusiness program.
- Initiated and facilitated an interactive Seed, Grow and Show Program in Bowen and the Burdekin involving 127 students in 2014 and 210 students in 2015.
- Initiated and facilitated an interactive tour of Central Queensland University’s science laboratory to promote CQU’s Bachelor of Agribusiness involving 40 Bundaberg Christian College science students.
- Assisted Northern Gulf Resource Management Group with a three-day Youth in Sustainable Ag Camp for Year 10-12 students considering careers in sustainable agriculture and natural resource management.
- Assisted Mareeba Magistrates Court and Community Services Tablelands Inc to investigate work placement opportunities for 16 disengaged students and facilitated farm visits.
- Developed a job streams flyer that links in with career profiles to create greater awareness of the variety of jobs to suit different personality types.
- Participated in Solid Partners Solid Futures Industry Working Group meetings and the Annual Solid Partners Solid Futures Forum, which aim to help Aboriginal and Torres Strait Islander youth transition into employment.
- Promoted and helped facilitate take up of work experience opportunities, school-based traineeships, university internships, and QDAP’s Ag in Context grants.
- Promoted scholarships for students to pursue agricultural studies and assisted 7 students to apply for the Horizon Scholarship. Initiated sponsorship of a $2,500 bursary for a student interested in pursuing a career in an agricultural related field at a tertiary level.
- Provided support for the development of an interactive work experience portal for Far North Queensland schools and facilitated improved links between industry and schools.
- Provided input into the state government’s Blueprint for Agricultural Education in Queensland.
- Participated in Queensland Agricultural Educators’ Conference 2015 and James Cook University and University of Queensland’s Guidance Officers’ Conferences.
GOAL: IMPROVED TRAINING OFFERINGS

The Team consulted widely with growers to identify needs for specific skills that would support improved workforce proficiency and tackled market failure in current training programs and funding policies via the following initiatives:

- As a member of the Agrifood Skills Standing Committee for Rural and Related Industries the State Workforce Development Coordinator is consulting with growers and registered training organisations to provide industry intelligence to ensure continuous improvement of relevant training packages.

- Identified skill sets that would of benefit for key on-farm roles including farm managers, farm hands, administration officers, and farm and pack shed supervisors. Consequently 5 new skill sets were developed and submitted to Agrifood Skills for approval.

- Provided constructive input into the development of the Foundation Skills Training Package, Farm Business Management Skill Set, the federal government’s discussion paper on industry engagement in training package development, and the National VET Forum on the training package review to ensure industry has access to training that is relevant and meets its needs.

- Provided industry intelligence to registered training organisations, consultants and extension officers to raise awareness of what relevant accredited and non-accredited training is required to meet current and future training needs, and to highlight training delivery times that would fit in better with peak harvesting periods.

- Provided feedback to federal and state government training and education departments, and relevant government Ministers, on the need for more flexible funding to support production horticulture employees to acquire skill sets in addition to full qualifications. Both the federal and state government have taken this on board and improved access to subsided training by introducing funding for accredited skill sets.

- Participated in discussions with registered training organisations to determine improved methods of training suitable for the production horticulture industry, including supportive training other than vocational education.

- Beneficial links have been established with government agencies and not-for-profit organisations that deal with youth, unemployed and other disadvantaged groups, providing greater insight into the skills required and appropriate training methods to support employment in the industry.
GOAL: IMPROVED WORKFORCE CAPACITY

The Team facilitated training for over 1,260 production horticulture employees to obtain skills through non-accredited training and accredited vocational training in skill sets and full qualifications via the following activities:

- **Worked in partnership with a number of registered training organisations, consultants and extension officers to facilitate training** in skills including soil nutrition, irrigation, chemical management, biosecurity, technology (spray, drones and digital), energy efficiency, succession planning, leadership, risk management, mentoring, first aid, forklift, quad bike, tractor, chainsaw and HACCP accreditation. In many instances, the Team investigated and secured government funding / corporate sponsorship to subsidise the training. Examples include:
  - **Digital workshops** in Caboolture, Moreton Bay and Cairns funded by the Federal Government’s Digital Enterprise Program.
  - **Leadership and workforce planning** workshops in Stanthorpe and Gatton funded by the Queensland Department of Education Training and Employment, Federal Department of Employment and Regional Development Australia.
  - **Soil health forums** held in three locations in far north Queensland, involving funding from three different regional landcare groups.
  - **Succession planning workshop** held in Bowen with funding from Rabobank.
- **As part of Growcom’s Women in Horticulture Program** 9 workshops were held in key growing areas, covering topics such as marketing, branding, finance management, cloud accounting technology, work-life balance and risk resilience. Funding for these workshops was secured from corporate enterprises and local government.
- **Collaborated with Rural Training Queensland (RTQ) on a highly successful project that resulted in 21 women completing a Diploma in Agribusiness** with support from the National Workforce Development Fund.
- **Worked in partnership with a number of industry development officers to maximise promotion and uptake of state government funding for training via the Regional Workforce Development Initiative.** This collaborate approach reaped benefits, with strawberry, pineapple and macadamia growers in particular taking up the opportunity to access the funding. Some of the many skills that were funded were accredited qualifications in Agribusiness, Competitive Systems and Processes and Frontline Management, and a workforce development skill set.
- **Facilitated training through RTQ for 15 long-term unemployed workers** to assist in a flood recovery project to rehabilitate farms affected by the floods. The workers gained new skills that will enable them to potentially get jobs with growers in the future.
- **Growcom delivered 12 Workplace Essential Workshops** in key growing areas, increasing industry awareness about good labour engagement practices, employment law, workplace health and safety, inductions and sources of labour.
- **Assisted Bowen State High School and Rural Training Queensland to identify production horticulture units of competency that students could undertake to meet the skills required by growers in the region and thereby increase their employability.**
GOAL: IMPROVED INFORMATION SHARING AND COLLABORATION

The Team significantly improved information sharing with relevant stakeholders. This not only supported a more coordinated and co-operative approach across the state and reduced unnecessary duplication but it also helped to maximise awareness of the skills desired by industry and inform government policy development and investment in training.

• Established the Queensland production horticulture Industry Education and Training Network (IETN), which includes the Team and representatives from relevant state and federal agencies. The network provides an opportunity to discuss workforce issues and initiatives that are making a positive difference, and to share suggestions about employment / training programs that could be of potential benefit to the industry. It has also served as an opportunity for the Team to highlight funding policy constraints and offer suggestions for improvement.
• Established an industry, education and training advisory group in each region to discuss local workforce development challenges and identify opportunities to collaboratively tackle these.
• Acted as the key conduit for growers to access information related to training. Assisted with queries related to identifying training to meet specific skill needs, which RTOs could deliver the training, training costs and available funding. In some instances assistance was provided to complete funding applications. Also supplied information about employment options including the Seasonal Worker Program, university interns, traineeships and skilled worker visas.
• Participated in a number of information sharing forums / special interest group meetings aimed at identifying and addressing skill needs and improving workforce development opportunities in key growing areas. These included Ministerial Industry Commission (MIC) roundtable events, the Blueprint for Agriculture Education roundtable, Student Futures and Bundaberg Agricultural Training Group in Bundaberg, BEST in Toowoomba, SEQ Industry Development Officers Networking Group in Brisbane, the Industry Schools Forum and Whitsunday Agricultural Workforce Initiative in the Whitsunday region.
• Supported widespread promotion of the federal government’s Industry Skills Fund through media articles, the development of tailored fact-sheets mapping key skill needs to relevant training, and the delivery of presentations at a Citrus Australia Regional Forum in Gayndah and Women in Agribusiness workshop in Gatton.
• Partnered with Agrifood Skills to promote new curriculum resources and with Agforce’s Schools to Industry Partnership Program (SIPP) officers to deliver Ag Inspirations and Work Inspirations work experience programs in SE Queensland and Whitsundays region.
• Supported various RTOs to promote training and/or recognition of prior learning for qualifications including Certificate III in Production Horticulture, Certificate IV in Agribusiness and Certificate IV in Competitive Systems and Processes.
• Provided advice and letters of support to various community groups, such as the Lockyer Alliance, seeking information on skills and training that would assist indigenous Australians secure employment in agriculture.
• Produced two free e-newsletters: Smarter Business, which provides the latest news on training and funding opportunities and research and Workplace Essentials, which keeps industry abreast of industrial relations and workplace health and safety issues.
Major obstacles and risks associated with the project and how they were addressed

Lack of funding for non-accredited training:

As highlighted in the Plan, the most common factor deterring the uptake of training by the production horticulture sector is cost. In addition, the preference is for courses that provide practical information that is tailored to the industry by addressing specific skill and knowledge needs. Non-accredited training is overwhelmingly the preferred way for the production horticulture workforce to gain new skills that support greater profitability, productivity and sustainability.

Accredited training is the least favourable way of upskilling. For most of the project's duration federal and state funding for training has been based on accredited outcomes. More recently, the federal government made a positive step forward by introducing the more flexible Industry Skills Fund, which enables access to funding for non-accredited training if appropriate accredited training is unavailable.

The Team's challenge has been to obtain funding or sponsorship for non-accredited workshops. Securing funding has involved a lot of effort and time and has proved to be very difficult in the face of increasing fiscal tightening. That said, by developing mutually-beneficial collaborative partnerships the Team managed to acquire sponsorships for non-accredited workshop from a variety of sources including Agrifood Skills, AustSafe Super, Regional Development Australia, Rabobank, various regional councils and natural resource management groups.

Challenge to engage workforce in training:

While the Team made significant advances in terms of increasing grower engagement in training, attracting the production horticulture workforce to training events nevertheless continues to be a hurdle. Anecdotal evidence indicates that training is often held during times that are inconvenient i.e. during busy peak harvesting periods, and this limits attendance. The Team worked to increase awareness of peak periods among its networks however given that any one particular region consists of growers farming different crops with different peak seasons this will always remain a key challenge.

Many growers still do not recognise the value of an investment in training. In addition, many are unaware of government funding programs for training and/or find them difficult to grasp because the marketing material is typically written in technical "government speak". The Team adopted a variety of strategies to overcome this including:

- personally visiting growers to explain what training is available, how it can address their business’ skill needs and explaining, in simple layman’s terms, what funding is available and how it can be accessed
- building relationships with other industry stakeholders to cross-promote each others’ events and engage a wider audience
- sharing information with training providers servicing the industry to ensure that training workshops are not only tailored and relevant but, whenever possible, are also held at times and locations that are convenient to industry.

Difficulty attracting Australian residents into careers in production horticulture:

Most harvest workers are transient backpackers. Although this can be a good solution to 'top up' the workforce for a short period of time, they do not provide the long-term skilled workforce required by the industry. The Team has made considerable headway through participation in career days and industry tours for students and career advisors, however there are no short – term fixes. To bring about meaningful change will require a sustained concerted effort from numerous stakeholders to increase the profile of careers in production horticulture and make them more appealing.
**Recommendations**

- The State government give serious consideration to adopting the same flexible funding approach to non-accredited training as the federal government.
- Greater promotion of peak harvesting times to key stakeholders involved in training extension for agribusinesses.
- Sufficient government resources allocated to face-to-face promotion of any new training fund rather than relying purely on online marketing to engage agribusinesses.
- Greater collaboration between key stakeholders to raise awareness of the diversity and complexity of the industry and the various job streams available, with the aim of increasing job seekers and grower access to a continued supply of skilled and semi-skilled workers.

**Industry/community feedback regarding the funded activity**

The positive feedback on the value of the work done by the Team has been considerable.

In addition to formal written feedback, Team members have received numerous emails of appreciation from stakeholders, including growers who have been provided with information about training and subsequently taken advantage of funding opportunities; students and teachers who have been provided with greater insight into careers within the industry; and training and education providers that have expressed their appreciation for the input and support received for their training and careers programs. Below are excerpts from some of the many emails received:

“I just want to say thank you, yesterday was great. I always enjoy getting off the farm and have the opportunity to think further about what we do. You did a great job with organising such “top notch” speakers who really did provide relevant information. The hub is such a good venue and easy to access...Once again thank you and I will be in touch further as I’m interested in undertaking further training. I am certainly going to follow up with how I can get a professional in to help review our business and provide some pathways. Thanks Mandy”  (Mandy Schultz is a strawberry grower in Wamuran, Qld)

“Since the first stage of the Seed, Grow & Show for Home Hill High School Grade 7 students, we have received very positive feedback from parents, the wider community including many farmers, accountants, schools and many businesses. This program is providing great exposure for Agriculture for our younger generation and is a vital ingredient the agriculture Industry has been missing in the past. The reporting back to the students on the ‘growing phase’ of the program in May/June when the students will harvest the crops, will undoubtedly culminate in the students having a sounder appreciation for the importance of Agriculture. Not only are the students experiencing the physical components of what farming is about, but also touching on: the science behind it; soil health; the growing demand for food globally; the technical knowledge; the marketing skills required. Regards Sue” (Sue Malaponte, Branch Manager of Rabobank, Ayr, Qld - on behalf of Rabobank Ayr Client Council members)

“I found this workshop really useful and have put into place the cloud for my MYOB which has simplified things in the office with electronically paying employees and accounts. It was a bit of fiddling to start with but well worth the perseverance. I have also used the MYOB superannuation clearing account which makes this tedious job a lot simpler too. There was a huge amount of perseverance required for this one!!! But now all worth it – for the first time ever at this time of the year when we have been busy harvesting I am up-to-date with everything – what a great feeling!!! Regards, Kylie” (Kylie Collins is a fruit and tree nut grower in Dimbulah, Qld)
“I feel that you have been more than helpful to me and our faming business over the last few years. Your work in getting the Diploma in Agribusiness Management off the ground has proven to be invaluable to me. The skills that I have learned and honed in on through gaining this qualification, not to mentions the people I have met and the resources I have gained were an absolute necessity, and I am grateful to have someone like you in a position to make this happen. The other training workshops that you run have also been fantastic...I cannot express the importance of being able to get together with likeminded people in the same industry to learn new things and learn from each other. Things in our industry are changing all the time, and with our busy schedule on farm it is hard to keep up with it all. It is highly beneficial to have someone in a role such as yours to enable us to all learn of these changes and not get caught out. Agriculture is Australia’s most important industry as far as I am concerned, having some support to make sure that this industry continues at the highest level is equally important. Thanks, Tracey”
(Tracey Rieck is a carrot grower in Kalbar, Qld)

Key Learnings of the project

Production Horticulture is a highly labour intensive industry and extremely diverse, with around 120 different crop grown in a wide variety of locations using a range of production methods. All of this means that the industry is very specialised in its workforce requirements. As such, it is imperative that a voice for production horticulture remains, especially in the areas of employment and advice on suitable training.

The Queensland Production Horticulture Workforce Development Project, with its on-the-ground, regional approach, has proven to be a highly successful model. The Team has achieved a lot since it was first established but this momentum needs to be continued to bring about long-term positive change for the industry. The beneficial collaborative networks that have been established will provide the platform that is needed for sustained improvements.
APPENDIX 8: Content areas for upskilling and new training

Content and delivery mechanisms to consider in future workforce development programs, as identified through industry consultations.

Professional Development:

- Interpersonal communications – diplomacy and effective communication (especially for dealing with multicultural workers), handling conflict, negotiation
- Train the trainer
- Managing teams - dealing with poor performance and getting the best out of people
- Time management, planning & logistics
- Basic business procedures – budgeting & procurement (especially for remote locations)
- Leadership in a rural and business context
- Strategies for mentoring, coaching & peer support
- HR practices and HR & IR Law around hiring & firing and developing effective EBAs and ability to get best remuneration packages within the law that allow flexibility and workable outcomes that benefit all
- Accounting basics for managers and WFD implications – e.g. business size and payroll implications - tradeoffs
- Managing organizational change/growth
- Quality assurance, auditing & risk management
- Market research, strategic planning, direct distribution/sales, social media & marketing
- Modern recruitment and induction strategies especially for gen Y – how to understand barriers and motivators

Cross-industry and practical training:

- License plus hours (experience) in: forklift driving, cranes/hoists, manual cars/quad bikes and all-terrain vehicles
- Certificates for: confined spaces; working at heights/using ladders; working around water; WH&S; First Aid; food safety/HACCP
- Trades or partial trades (Certificates): maintenance, basic construction & engineering; mechanical training; basic electrical (break down and rewire paddle wheels\(^{63}\)) and plumbing (pumps and boilers) - at least need to be able to read electrical and plumbing plans
- Agricultural technology/automation/drones/digital connectivity – intranet vs internet on farm to run integrated farm management systems
- Computer skills

Specialist short courses/masterclasses:

- Microbiology
- Water quality
- Strategies for best practice environmental management for the industry
- Aquatic disease management, including best practice on-farm procedures

Specific new skilling needs for the evolving industry

\(^{63}\) Note work was done as part of the Aquaculture Skills Formation Strategy done by the QLD Government in 2009 to try and get access Restricted Electrical Licensing – at the time this was not successful with the Electrical Trade Union – but might be worth revisiting again to see if any precedents have been set by other sectors (e.g. Tag and Test) that might makes this possible now
• Greater digital literacy
• ‘Big’ data management, analytics and interpretation
• Logistics and supply chains
• Brokerage (sales/marketing/niche marketing)
• Highly developed business skills and internationalization including cultural literacy
• Product development

Delivery mechanisms to consider:

• Hybrid approach to education and training that blends technical knowledge with practical skills across the spectrum of existing VET skill packages, short unaccredited courses or master classes and subjects available through undergraduate or postgraduate Degree, Diploma or Certificate programs. As a minimum both VET and higher education training must deliver more hands-on WIL.
• Linking industry and universities so that there is industry buy-in to support more customized higher level training including industry commitment to a greater focus on ‘hands on’ Work Integrated Learning (WIL) – both formally through industry placements that are assessable as part of the university degree/Certificate/Diploma program as well as a range of industry-enabled parallel strategies such as: apprenticeships; internships; holiday employment; volunteering/ work experience; graduate programs etc.
• Link specific regional high schools into the approach (targeted based on proximity to existing industry clusters) to help develop regional pathways to encourage the retention of a regional workforce (note this will depend on demonstrated capacity for existing businesses to grow in those regions – otherwise this would raise expectations without being able to deliver the jobs).
• Link all levels of training providers to ensure the content is customized/agreed with industry and can be delivered to a consistent standard and could potentially be interoperable (i.e. articulated across all providers given the unique national student ID code exists across VET and higher education).
• Develop customised training packages for individual (large) aquaculture businesses with significant growth plans on an as-needs basis if it can be done cost effectively.
• Develop more industry- sponsored partial scholarships or internships (to apply during training or study) as well as sectoral sponsorship of places on student agribusiness leadership programs such as RIRDC’s Horizons program64.
• Provide aspects of student study and assessment that place value on and encourage the development of the following skills/capabilities: multitasking, problem solving and task prioritization under pressure – working through complex scenarios; taking a ‘systems approach’; working effectively in multidisciplinary teams and demonstrating effective interpersonal communication skills.