



Faculty of Arts and Social Sciences



Victoria's fisheries and aquaculture: economic and social contributions

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Kirsten Abernethy
Kate Barclay
Alistair McIlgorm
Patrick Gilmour
Nicholas McClean
Johnathon Davey



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Researcher Contact Details

Name: Prof Kate Barclay
Address: Faculty of Arts and Social Sciences, UTS, PO Box 123 Broadway, NSW 2007
Phone: +61 2 9514 1579
Email: kate.barclay@uts.edu.au

FRDC Contact Details

Address: 25 Geils Court, Deakin ACT 2600
Phone: 02 6285 0400
Fax: 02 6285 0499
Email: frdc@frdc.com.au
Web: frdc.com.au

In submitting this report, the researcher has agreed to FRDC publishing this material in its edited form.

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Acronyms and definitions

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABS	Australian Bureau of Statistics
Added value	Difference between the price of finished product and costs of inputs involved in making it
AFMA	Australian Fisheries Management Authority
AVG	Abalone Viral Ganglioneuritis
Beach price	Price of seafood at the first point of sale, may also be called 'landed' price, or 'farm gate' price for aquaculture
Capital	Assets or financial wealth that enable a business to perform economically
CATI	Computer-assisted telephone interviewing
Commonwealth fisheries	Wild-catch professional fishing managed by the federal Government, as opposed to state Government managed fisheries
Depreciation	Reduction in value of an asset over time, for example, due to wear and tear
Direct impact	The direct effects of business expenditures in a region
Fixed costs	A cost that does not increase or decrease with activity
FRDC	Fisheries Research and Development Corporation
FTE	Full-time equivalent (employment)
GRIT	Generation of Regional Input-Output Tables
Gross margin	Net sales revenue minus operating costs
Gross operating surplus	The surplus accruing from sales revenue less total expended costs (e.g., not unpaid labour)
Gross revenue	Total sales income (price times quantity sold)
GVA	Gross Value Added
GVP	Gross value of production, quantity produced multiplied by price at first point of sale
HI	Household Income
Household income	Combined incomes of people sharing a place of residence, including salaries, wages and pensions
HREC	Human research ethics committee
Indirect impact	Impacts arising from direct expenditure as local industries buying goods and services from other local industries
ITQ	Individual transferable quota
MAFRI	Marine and Freshwater Resources Institute (now VFA)
MoU	Memorandum of Understanding
MSC	Melbourne Seafood Centre
Multiplier	An economic factor by which the return deriving from an expenditure exceeds the expenditure itself

Net economic returns	The amount received after all costs, including economic opportunity costs have been paid
NGO	Non-government Organisation
Nominal	'Nominal' values are the dollar figure at the time of recording, as opposed to 'real' values, which are adjusted for inflation
OECD	Organisation for Economic Co-operation and Development
Post-harvest	Sectors of the seafood industry supply chain after catching or farming
Professional fishing	Fishing for commercial sale operating under State or Federal access licences or permits, in designated commercial fisheries
RA1	Restricted access fishery 1
RA2	Restricted access fishery 2
Rate of return	Net gain or loss on an investment over a period of time expressed as a percentage of the capital cost of the investment
Regional economics	A sub-discipline of economics that studies regions, including considerations of why and how economic activity happens where it does, and economic effects from the location of regional businesses
RLE	Southern rock lobster - Eastern Zone
RLW	Southern rock lobster - Western Zone
SAFS	Status of Australian Fish Stocks (report using available biological, catch and effort information to determine the status of Australia's key wild-catch fish stocks)
Seafood industry	All seafood sectors including wild-catch and aquaculture production, and post-harvest sectors along the market chain
SETFIA	South-East Trawl Fishing Industry Association
SESSF	Southern and Eastern Scalefish and Shark Fishery
SIV	Seafood Industry Victoria
TAC	Total allowable catch
Total costs	The sum of total fixed and total variable costs
UTS	University of Technology Sydney
Variable costs	An expense that increases or decreases with activity levels, such as boat fuel
VFA	Victorian Fisheries Authority
Victorian State fisheries	Wild-catch professional fisheries managed under the Victorian State Government
Wellbeing (material)	The resources people have and the extent to which their needs are met in terms of food, income and assets, access to services and environmental quality
Wellbeing (relational)	The extent to which social relationships enable people to achieve wellbeing, and affect their perceptions of wellbeing
Wellbeing (subjective)	The level of satisfaction with quality of life, as well as perceptions, values and beliefs that shape their experience of wellbeing
WRI	Western Research Institute

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Executive summary

This project was the first evaluation of the social and economic contributions of wild-catch professional fisheries and aquaculture of Victoria to the communities in which the industries are located and to the entire state. The research was conducted by a team of researchers, which was led by the University of Technology Sydney. Fieldwork for the project was conducted in 2018–19 and economic data from the 2016–17 financial year were used. The need for this project was identified by the Victorian seafood industry because existing figures for the economic value of their industry provided a narrow view, which did not include the economic contribution of businesses supplying or being supplied by seafood producers. Additionally, there was no evaluation of the social benefits of the industry. The researchers used economic analysis including input–output modelling and qualitative and semiquantitative social analysis, including interviews with seafood industry and community members and phone surveys of the general public and the tourism, hospitality and seafood wholesale, processing and retail sectors. The study to determine contributions made by the Victorian seafood industry was underpinned by the wellbeing approach. For the first time, seafood industry advocates have comprehensive information regarding the social and economic contributions their sector makes to community wellbeing, to help show the public and policymakers why it is important to support the sustainable development of seafood production in Victoria.

Background

Seafood production through professional wild-catch fishing and aquaculture contributes to communities in a range of ways. For example, local seafood producers make economic contributions through employment, income and economic activities, which are important for the stability and resilience of regional communities. Additionally, professional fishing and aquaculture industries make social contributions, including the direct contribution of providing fresh seafood to consumers, their interrelationships with other sectors such as tourism and recreational fishing, to the health and sustainability of aquatic environments as well as contributions to the identity and fabric of regional communities. Until now, limited data existed about the economic and social contributions of professional fisheries and aquaculture in Victoria. Existing data only calculated the gross value of production (i.e., beach/farm gate price by volume of seafood caught/produced), the number of fishing and aquaculture licence owners and an estimate of the number of seafood business owners or professional fisheries and aquaculture employees. There was no reporting of the broader (multiplier) economic or other effects, such as social and cultural benefits, in Victorian communities containing seafood businesses, nor the flow-on effects of the associated service industries or businesses through the seafood value chain. Until this study, the social and economic contributions arising from the professional fishing and aquaculture industries were not systematically evaluated in Victoria.

The lack of sophisticated information about the contributions made by seafood production to regional communities has placed the Victorian professional fishing industry at a disadvantage when advocating for a secure future and resource sharing. The Victorian aquaculture sector has experienced less obvious difficulties when making the case for expansion, although a lack of information about contributions has contributed to low social licence for the sector. Rigorous evidence presented in

this report about these contributions could be used to address the lack of community support for fisheries and aquaculture and consumer influence on the regulatory environment, which has grown to constitute a threat to the continued viability of seafood production in Victoria. Within the context of discussions regarding resource allocation, regional economic development and resilience, it is important to have a better understanding of these contributions in the Victorian context.

Research question and objectives

Research question:

How do professional fisheries and aquaculture contribute to the wellbeing of Victorian communities?

Objectives:

1. Evaluate the economic contributions of commercial wild-catch fisheries and aquaculture for seven regions of Victoria, including the regional economic impacts such as multiplier effects and employment, and contributions to related sectors within regions, which builds on previous Australian studies.
2. Evaluate the social contributions of commercial wild-catch fisheries and aquaculture for the same regions, including the social aspects of economic contributions, food provision, health and nutrition, services and infrastructure, interactions with tourism, consumers, and recreational fishers, contributions to community identities and heritage, and knowledge networks, which builds on previous Australian studies.
3. Develop and refine a methodology to be used for ongoing social and economic evaluations of industry as part of a FRDC national framework.
4. Disseminate findings that identify the social and economic contributions of seafood production for each study region, highlight threats to sustainability and viability, as well as opportunities in a form suitable for engaging local and state government agencies and the general public, to raise awareness of the role of professional wild-catch fisheries and aquaculture in Victorian communities.

Methodology

The approach taken was to evaluate the contributions made by seafood-producing industries to the following domains of community wellbeing:

1. Economic resilience and diversity

The most obvious contribution of the Victorian seafood industry is to regional and state economies. While economic contributions can be quantified to estimate number of jobs and dollars generated, it is also important to consider the quality of economic contributions, including how these contribute to the resilience of regional communities.

2. Food supply

The professional fishing and aquaculture sectors in Victoria are important suppliers of seafood to metropolitan and regional markets around the state. The nutritional benefits of fresh seafood are well established and Victorians consider local seafood to be an important part of their diet. The professional fishing industry provides access to a public food resource that would otherwise be unavailable to people who are not successful recreational anglers.

3. **Tourism and recreation**

Leisure and recreation are important aspects of human wellbeing, with tourism being a significant leisure activity and a significant industry in Victoria, especially along the coast. Recreational angling on the coast and along inland waterways is also an important leisure activity in Victoria. The professional fishing and aquaculture industries contribute to tourism and recreation through the provision of services and experiences.

4. **Environmental sustainability**

The health of the natural environment is foundational to human wellbeing. Seafood producers rely on natural systems for their businesses. There is an element of self-interest in terms of ensuring future prosperity and resource security. However, the existence of self-interest does not mean there is no altruism at play, nor does it negate the community wellbeing outcomes of their activities. Responsible seafood producers in Victoria contribute towards the maintenance of healthy ecosystem function in various ways and the beneficiaries include the Victorian public and communities of practice with interests in Victorian aquatic ecosystems, including fisheries managers, researchers and recreational users of aquatic systems and resources.

5. **Social fabric of communities**

The presence of professional fishing and aquaculture contributes to the sense of identity within communities regarding what makes their place special to them. This domain of community wellbeing is less tangible than other domains, but was revealed through interviews and surveys as being an important and distinct contribution made by Victorian seafood producers to the social fabric of their communities, including the identity and social cohesion of community residents and their sense of connection to the seafood industry and families.

The economic analysis was based on fisheries data from state fisheries and data on Commonwealth fisheries based in Victoria, in addition to new data collected from fisheries and aquaculture businesses via surveys on their inputs, outputs, costs and investments. The project built on existing gross value of production figures to calculate added value, household income and employment from seafood production through the use of input–output modelling.

The social analysis was based on 140 semi-structured qualitative interviews with seafood industry participants and community members across Victoria, phone surveys of the general public (1,154 respondents) and tourism, hospitality and seafood wholesale, processing and retail sectors (150 respondents). The interviews provided context and explanatory description for the economic analysis and data for the other domains of wellbeing. The phone surveys measured the extent to which the public, fishing community members and related business owners perceived how seafood production contributed to community wellbeing.

Results/key findings

Economic resilience and diversity

The economic contributions of professional fishing (state and Commonwealth fisheries operating in Victoria) and aquaculture to Victoria for the financial year 2016–17 were:

- \$155 m gross value of production (\$54 m State professional fisheries, \$48 m Commonwealth professional fisheries, \$48 m aquaculture)
- \$323 m of added value (\$112 m State professional fisheries, \$111 m Commonwealth professional fisheries, \$100m aquaculture)
- \$186 m of household income (\$55 m State professional fisheries, \$74 m Commonwealth professional fisheries, \$56 m aquaculture)
- 3,101 full-time equivalent jobs (909 State professional fisheries, 1,205 Commonwealth professional fisheries, 987 aquaculture).

The processing sector is estimated to contribute (from Victorian seafood production) \$37 m of added value and 645 full-time equivalent jobs. Ninety-four per cent of surveyed seafood wholesalers, processors and retailers claimed that Victorian product was important to the success of their business, and the majority said that past fishery closures have caused lost jobs, profits and customers for the sector.

Regional modelling confirmed the importance of professional fishing to regional Victoria for the financial year 2016–17:

- Far East Coast (East Gippsland)—\$76 m of added value, 810 full-time equivalent jobs.
- Near East Coast (Gippsland and Mornington Peninsula)—\$26 m of added value, 298 full-time equivalent jobs.
- Melbourne area (Melbourne and Geelong)—\$28 m of added value, 276 full-time equivalent jobs.
- Near West Coast (Bellarine Peninsula and Great Ocean Road)—\$22 m of added value, 198 full-time equivalent jobs.
- Far West Coast (west of Warrnambool)—\$42 m of added value, 352 full-time equivalent jobs.

Regional modelling confirmed the importance of aquaculture to regional Victoria for the financial year 2016–17:

- Coastal aquaculture: \$35 m of added value, 427 full-time equivalent jobs.
- Inland aquaculture: \$52 m of added value, 447 full-time equivalent jobs.

Contributions to economic wellbeing were rated as being the most important of the five domains of wellbeing contributions to Victorian regional communities in the interviews and phone surveys.

Key contributions to community economic wellbeing that were not captured in the economic modelling analysis emerged during the social analysis, including:

- Seafood production adds to the diversity of economic opportunities, which is critical for economic resilience in regional towns, especially in places where there are few alternative industries and where it can alleviate dependence on large sectors and companies.

- Fishing and aquaculture contributes to the economic stability of communities because they provide a year-round baseline of activity, which keeps local regional economies ‘ticking over’ when other industries (e.g., tourism) operate seasonally or intermittently.

The seafood industry contributes to the types and nature of employment opportunities in regional communities:

- There is a diversity of jobs in fisheries and aquaculture production, business types that provide inputs into production, and post-harvest businesses including those jobs associated with transport, processing, wholesaling, and retailing Victorian seafood. The professional fishing and aquaculture industries consciously make efforts to support local businesses in the region they operate.
- Employment in seafood production requires a diverse and often high-level specific skillset, but also provides entry-level jobs.
- The seafood industry provides jobs for people who might find it difficult to get work elsewhere.
- There are opportunities for young people to enter the seafood industry. However, the professional fishing industry struggles to attract young people, while the aquaculture industry attracts young school leavers and graduates into entry-level work.
- The Victorian seafood industry tends to be male-dominated with low percentages of women in the production sectors. However, in the processing sector there appears to be a more equal gender balance.
- The professional fishing and aquaculture production sectors are not ethnically diverse, although the post-harvest sector in Victoria is characterised by ethnic diversity.

Food supply

Contributions to food supply from professional fishing and aquaculture was rated as the second most important of the five domains of wellbeing contributions to Victorian regional communities.

In 2016–17, professional fishers in Victoria produced 4,845 t from state fisheries and 10,187 t from Commonwealth fisheries. Aquaculture operations produced a further 3,147 t of seafood.

Melbourne has one of the largest post-harvest sectors in Australia, manufacturing, processing, wholesaling or retailing well over 55,000 t of seafood per year. In 2016–17, over 37,000 t were overseas imports. The Melbourne post-harvest sector also handles significant, although unknown, quantities of interstate-produced seafood.

While the seafood produced in Victoria may be a small part of the Victorian seafood landscape, it is highly valued by post-harvest seafood businesses, including the hospitality sector, and seafood consumers.

Post-harvest seafood businesses value Victorian seafood:

- Aside from selling local produce because of its appeal and value, retailers and wholesalers suggested that local produce was important to their image. Having Victorian produce helps them to project an image of freshness and quality.
- Eighty-six per cent of surveyed post-harvest businesses believe the Victorian seafood industry is important to the success of their businesses.

- Sixty-two per cent of surveyed post-harvest businesses said they experience greater demand for Victorian seafood than they can supply, with 80 per cent saying they experience greater demand for Victorian seafood than seafood from other countries, and 58 per cent experiencing greater demand for Victorian seafood than from interstate producers.
- Ninety-six per cent of the surveyed hospitality businesses said their customers want to know the origin of their seafood.
- Victorian-produced seafood caters for diversity in species preferences, price points and ethnicity of Victorian seafood consumers, although diversity has reduced in Victoria with the closure of Victorian Bay and Inlet fisheries.
- Food localism among consumers is a growing trend, which benefits seafood businesses around the state.

Victorian seafood consumers value Victorian seafood:

- Eighty-five per cent of Victorians prefer Australian seafood and 24 per cent prefer Victorian seafood. The preference for Victorian seafood is even stronger for residents of Victorian coastal fishing towns, where 40 per cent prefer seafood from their town or region.
- Seventy-four per cent of surveyed Victorians feel it is very or extremely important to know where their seafood comes from. Of these Victorians, respondents who identified as recreational fishers, as well as older and wealthier respondents were significantly more likely to consider the origin of their seafood to be 'very' or 'extremely' important.
- Victorians prefer local seafood because they believe it is fresher and higher quality, they want to support the Australian economy and fishers, and they believe it is safer to eat and is from cleaner waters.
- Interviews suggested that people go to considerable effort to buy Victorian or more localised product. Customers regularly travel substantial distances to visit their shop and 'stock up' on local seafood.

Ninety per cent of Victorians believe it is important to produce seafood in Victoria and reduce reliance on imports (over 70% of seafood consumed in Australia is imported).

Tourism and recreation

The main tourism and recreation beneficiaries of contributions from Victorian seafood production are:

- Tourism businesses
- Regional communities, especially in coastal regions and some river areas
- Victorian, interstate and international tourists
- Victorian recreational anglers.

Sixty-seven per cent of surveyed residents from regional Victorian towns believe the most important contribution the local seafood industry makes to communities is through the interactions and benefits flowing to tourism.

The consumption of local seafood in regional Victorian communities is part of the travelling experience and a key activity for international and domestic visitors:

- Tourists visiting regional communities place increasing importance on local food provenance and experiences relating to local food production. Ninety-four per cent of surveyed tourism businesses said eating locally produced seafood is an important part of the Victorian tourism experience.
- Ninety per cent of Victorian tourism operators say tourists expect to eat local seafood when visiting the coast.
- International visitors, particularly Asian tourists, are the most interested group of visitors in eating local seafood. Victorian seafood producers have a desirable product for international visitors because of cultural delicacies, such as abalone and rock lobster, and the clean environment from which local seafood is caught/farmed.
- There is strong interest within the Victorian community in accessing local seafood when visiting coastal/waterside towns. Eighty-one per cent of surveyed Victorians said eating local seafood is an important part of their coastal holiday experience and 88 per cent of Victorians expected to eat local seafood when visiting the coast.

There is considerable unmet demand in terms of availability of local seafood for tourists, with 54 per cent of tourism businesses surveyed reporting that regional tourism suffers from a lack of access to locally produced seafood.

The tourism–seafood connection is apparent with the emergence of regional seafood festivals in Victoria. In recent years, several festivals have grown and developed into substantial events on the tourism calendar. Seafood festivals make noteworthy contributions through building links between the seafood and tourism industries.

Tourists enjoy contributions from seafood producers through non-food related experiences. In particular, the fishing industry is important to the character and appeal of coastal towns, whether they are a ‘fishing village’ or a ‘working port’. Walking the fishing wharves in Victorian coastal towns is a popular activity:

- Eighty-eight per cent of surveyed Victorian tourism operators said the fishing industry adds to the character of coastal towns, which attracts visitors.
- Eighty-six per cent of surveyed Victorian tourism operators said the history of fishing is an important part of the tourism offering.
- Sixty-nine per cent of surveyed Victorians enjoy watching professional fishers working while on holiday.

Professional fishing and recreational fishers are often portrayed as being at odds. However, we found evidence throughout Victoria that the professional fishing and aquaculture sectors have important synergies with and benefits to recreational anglers. All the surveyed tourism businesses agreed that, from a tourism perspective, there is a need for the professional and recreational fishing sectors to co-exist.

- Recreational fishers are more interested in professional fishing than the non-fishing public.
- Recreational fishers are more likely than non-fishers to buy local Victorian seafood, and consider the origin of their seafood to be ‘very’ or ‘extremely’ important.

- Recreational fishers are more confident than non-fishers that the local fishing industry will act in ways that sustain fish production and that the aquaculture sector will act to sustain environmental health.
- Over 80 per cent of recreational fishers prefer to use local commercially caught bait because they believe it is better for the community and the environment than imported bait.
- The marine infrastructure, including wharves, boat ramps and slipways, that serves commercial fishing is available to recreational users.
- Professional fishers often provide advice on fishing and sea conditions to recreational fishers.
- Aquaculturists support inland recreational angling through stocking recreational target species into publicly accessible waterways.
- Aquaculture infrastructure, such as mussel ropes, offer good habitat and act as fish attracting devices for recreational fishing.
- Fifty-eight per cent of Victorian professional fishers have assisted recreational users of the sea (e.g., anglers, wind surfers and jet skiers) in distress during the past five-year period, which supports maritime safety for all.

Environmental sustainability

Important information for understanding and managing Victorian fish stocks and the broader aquatic environment comes from professional fishing and aquaculture operations. Fishers and aquaculturists are required to undertake this as part of the regulatory oversight of their industry, although in many cases, data provide the only indicators of aquatic ecosystem health. This is also important for recreational species where recreational fishing data are limited. Additional non-regulatory data is often collected voluntarily by the fishing industry and informal monitoring occurs by fishers and aquaculturists.

A range of professional fisheries and aquaculture businesses and sectors have voluntarily implemented industry-led initiatives to improve the environmental sustainability of their operations and sector, beyond what is required under regulations.

Professional fishers and fish farmers participate in projects that seek to improve aquatic ecosystems, including support for research on marine or freshwater environments and non-target species, providing logistics, local knowledge and in-kind support for research projects, sitting on environmental and research advisory groups and committees, and sharing local ecological knowledge. It also includes participation in projects to restore and rehabilitate habitats, rubbish clean-ups and pest management.

The survey of the Victorian public indicated that the public generally believes the seafood industry is ecologically sustainable. However, findings also revealed that there is poor knowledge of, and substantial misunderstanding of how the industry operates, is managed and its level of impact. A minority of surveyed Victorians believed the seafood industry is unsustainable, with the aquaculture industry viewed as being less sustainable than wild-catch fishing. A significant proportion of Victorians surveyed were 'unsure' about the sustainability of the Victorian seafood industry, despite strong management of fisheries and aquaculture in Australia, the sustainability status of Victorian stocks, and that many operators go above and beyond regulations to

implement best harvesting practices and participate in conservation projects. Key groups who hold more favourable attitudes towards Victorian fisheries and aquaculture sustainability are people who live in regional Victoria, recreational anglers and those that regularly purchase seafood. Poor knowledge and misunderstanding could be due to a lack of engagement by the Victorian seafood industry with communities.

Social fabric of communities

The presence and history of professional fishing and aquaculture contributes to the character and sense of identity within the communities in which they live and operate. This is partly because many of these communities were founded on fishing activity and for small communities, much of the community infrastructure was built by fishing families. Eighty-three per cent of surveyed community respondents agreed that fishing and aquaculture is important to the cultural heritage and identity of their community. The ways in which seafood production contributes to the fabric of communities include:

- Seafood festivals, which are supported by local industry, help to foster social connections and reinforce community identities.
- Fishing and aquaculture families are active participants in community civic life.
- Fishing and aquaculture businesses support and donate to local events and charities.
- The professional fishing sector provides a workplace, mentoring and support network for young and sometimes vulnerable men in the community. This was particularly the case for Commonwealth fisheries operations.

Implications for relevant stakeholders

The project uncovered several areas of further work required to enable fisheries and aquaculture to further improve their contributions to community wellbeing, such as meeting unmet demand for fresh local seafood. These included:

- Improving public understanding of the seafood industry and its contributions to Victorians, specifically about environmental management and addressing misperceptions that seafood production is unsustainable.
- Providing improved access to Victorian seafood, especially in popular tourist locations.
- Strengthening relationships between the seafood and tourism industries.
- Attracting new entrants, especially young people.
- Improving opportunities for Aboriginal people, communities and enterprises to enter fisheries and aquaculture.

Recommendations

The main recommendation from this project is:

1. Integrate social and economic indicators from the wellbeing framework into government monitoring, reporting, evaluation and policy development processes.

Other key recommendations arising from the research include (for full detailed list, see **Table 29**):

1. Conduct value chain, marketing and logistics research to better understand the economic contributions made by Victorian seafood production in the food industry to the point of consumption, and the possibilities for increasing these contributions.
2. Conduct social and economic impact assessments of planned fishery closures, evaluating whether restrictions will significantly negatively affect fishers and their communities' wellbeing, and Victorian consumers' access to fresh local seafood.
3. Develop programs for social capital to build industry resilience and cohesion: 1) within the seafood industry; 2) between seafood producers and other sectors and community groups in their regions (e.g., environmental groups and recreational fishing clubs); and 3) between seafood producers and government agencies—for regional development and tourism as well as fisheries management.
4. Explore ideas, experiment and develop programs to overcome the challenges to increasing the supply of fresh local seafood throughout Victoria, without increasing the risk of overfishing.
5. Develop opportunities for new entrants to enter the industry and to learn from established operators who may soon retire.
6. Increase Aboriginal participation in professional fishing and aquaculture through a strategic policy to promote positive change for Aboriginal communities, considering the role that working on Country and communal sharing of food from Country plays in cultural, social and economic activities of those communities.
7. Develop and promote materials from trusted, independent bodies, which clearly explain the environmental sustainability credentials of Victorian professional fisheries and aquaculture, including the scale of the threats they pose in context with other environmental threats.
8. Deliver targeted counselling and mental and physical health support services, tailored to the needs of the professional fishing community (King et al., 2019) to address the impacts of industry marginalisation and regulatory uncertainty.

Keywords

Victorian fisheries; Victorian aquaculture; contributions study; wellbeing approach; input–output analysis; regional economics; qualitative interview study; phone survey of perceptions of seafood industries

Apollo Bay Seafood festival
Credit: Bill Fraser



1 Introduction

1.1 Overview

Seafood production through professional wild-catch fishing and aquaculture contributes to communities in a range of ways. Local seafood producers make economic contributions, including the provision of employment, income generation and other economic activities, which are important for the stability and resilience of regional communities. Professional fishing and aquaculture industries also make social contributions, including the direct contribution of providing fresh seafood¹ to consumers, as well as contributions to the identity and fabric of regional communities, to the health of aquatic environments, and through their interrelationships with other sectors such as tourism and recreational fishing.

The professional seafood industry in Victoria has been operating for over 170 years. While the industry is small relative to those in other Australian states, it is diverse. There is a wide variety of fishing and farming methods and target species. The fisheries include Victorian state licences, which tend to be small-scale daily fishing operations within three nautical miles of the coast, or Commonwealth permits, which allow fishing offshore for multiple days. Victoria's wild-catch fisheries stretch along the Victorian coast from Portland to Mallacoota and through inland waterways. There are several visible fishing ports, although small-scale fishing operations are also dispersed along the coast and inland in towns with no obvious fishing infrastructure. Aquaculture is similarly diverse, operating throughout Victoria along the coast and inland. There are hubs of greater activity, such as abalone farming on the south-west coast, mussel farming in Port Phillip Bay, and salmonid farming in the Goulburn Valley. Most of the aquaculture production and value lies with a few large farms and is dominated by abalone, mussel and salmonid aquaculture. While the production of Victorian wild-catch fisheries has reduced over the past 20 years—particularly in the state sectors—aquaculture production has increased. Although Victorian seafood production is relatively small, the post-harvest sector in Victoria is one of the most significant in Australia. Processors, marketers and wholesalers are concentrated in Melbourne and handle Victorian-produced seafood in additional interstate and international imports and exports.

Until now, limited data existed regarding the economic and social contributions of professional fisheries and aquaculture in Victoria, along with most other Australian jurisdictions. Existing data has only calculated the gross value of production (i.e., beach/farm gate price by volume of seafood caught/produced), the number of fishing and aquaculture licence owners and the number of business owners or professional fisheries and aquaculture employees². There was no reporting of the broader (multiplier) economic or other kinds of effects, such as cultural effects in communities of having businesses based in Victoria nor the flow-on effects of associated service industries or businesses through the seafood value chain. The social contributions arising from the professional fishing and aquaculture industries have not previously been systematically evaluated in Victoria.

¹ We include marine and freshwater species under the broader term 'seafood'.

² Australian Bureau of Statistics census data.

The lack of sophisticated information regarding the contributions seafood production makes in regional communities has placed the Victorian professional fishing industry at a disadvantage compared to competing resource users. Evidence generated using rigorous social science and economics mixed methods presented in this report about these contributions could be used to address the lack of community support for fisheries and consumer influence on the regulatory environment, which has grown to constitute a threat to the continued viability of professional fisheries in Victoria. The findings could also be used to improve the aquaculture sector's 'social licence to operate'. Within the context of discussions regarding resource allocation, regional economic development and resilience, it is important to have a better understanding of these contributions in the Victorian context.

This report presents a comprehensive assessment of the contributions made by the professional fishing and aquaculture sectors to the regional communities in which they are based and to Victoria. The project was advised by a Steering Committee, which was comprised of people working in Victoria's professional fishing and aquaculture industries.

1.2 Aim and objectives of this report

The overall goal of the project was to develop a better understanding of the social and economic contributions made by wild-catch professional fisheries and aquaculture to Victorian communities.

Research question:

How do professional fisheries and aquaculture contribute to the wellbeing of Victorian communities?

The research question was further broken down into four objectives, which were specified in the project proposal:

1. Evaluate the economic contribution of commercial wild-catch fisheries and aquaculture for seven³ regions of Victoria, including the regional economic impacts such as multiplier effects and employment and contributions to related sectors within regions, building on previous Australian studies.
2. Evaluate the social contributions of commercial wild-catch fisheries and aquaculture for the same regions, including the social aspects of economic contributions, food provision, health and nutrition, services and infrastructure, interactions with tourism, consumers, and recreational fishers, contributions to community identity and heritage, and knowledge networks, building on previous Australian studies.
3. Develop and refine a methodology to be used for ongoing social and economic evaluations of industry as part of a FRDC national framework.
4. Disseminate findings, identifying the social and economic contributions of seafood production for each study region, highlighting threats to sustainability and viability, as well as opportunities, in a form suitable for engaging local and state government agencies and the general public, to raise awareness of the role of professional wild-catch fisheries and aquaculture in Victorian communities.

³ The original objective was for seven areas, but as the project progressed, we settled on five areas for wild-catch fishing and two for aquaculture. See **Section 3.4** for further explanation of the study areas.

1.3 Structure of this report

In this report, we:

- Provide background to the professional fishing and aquaculture sector in Victoria, including key species, operations, locations, history and previous studies (see **Section 2**).
- Outline our approach and methods for understanding the social and economic contributions of the professional fishing and aquaculture sectors to Victorian communities (see **Section 3**).
- Present project results with respect to the contributions of the Victorian seafood industry to:
 - regional economic diversity and resilience (see **Section 4**)
 - food supply (see **Section 5**)
 - tourism and recreation (see **Section 6**)
 - environmentally sustainable seafood production (see **Section 7**)
 - the social fabric of communities (see **Section 8**)
 - the importance of these contributions to communities (see **Section 9**).
- Reflect on the findings in relation to project objectives (see **Section 10**).
- Discuss future opportunities and challenges for the sector that have emerged through the research (see **Section 11**).
- Make fifteen recommendations arising from the project findings (see **Section 12**)
- Outline the project outputs and project materials developed for extension and adoption (see **Sections 13 and 14**)

2 Background to the Victorian professional fishing and aquaculture sectors

2.1 Overview

The professional wild-catch fishing and aquaculture industries in Victoria are diverse in terms of fishing and farming methods, and the species caught and farmed.

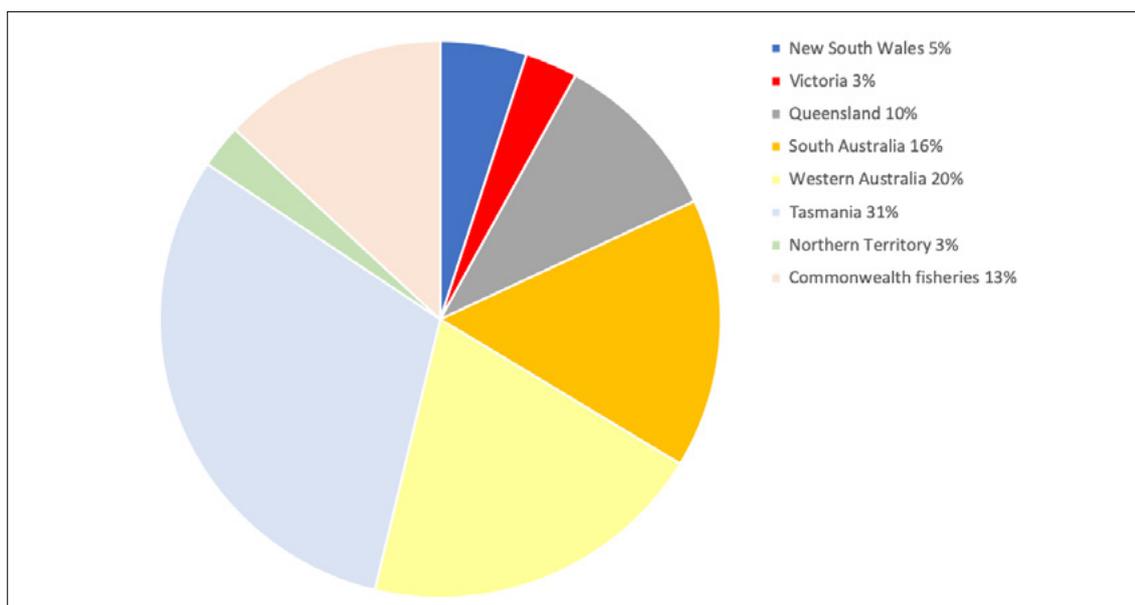
The professional wild-catch fishing industry operates under Victorian state fisheries access licences and/or Commonwealth permits. Fishing ranges from the large-scale Commonwealth vessels operating offshore (i.e., outside three nautical miles) and using methods such as trawl, Danish seine, longline, dredge and jigs, to the smaller Victorian state fisheries operating inshore, with one or two people per operation, using nets, lines, pots or hand harvesting methods.

Commercial aquaculture operations in Victoria are similarly diverse, with shellfish farms on the coast such as abalone and mussels and a range of inland farms, which produce species such as trout, Barramundi and eels.

Victorian fisheries and aquaculture production and value is one of the smallest in Australia. Out of a total gross value of production (GVP) of \$3.06 billion generated by Australian wild-catch fisheries and aquaculture in 2016–17, Victorian state fisheries and aquaculture comprised just 3.03 per cent (Australian Bureau of Agricultural and Resource Economics and Sciences [ABARES] 2018; see Figure 1). However, when Victorian-landed Commonwealth fisheries are included in the Victorian figures, this rises to 4.57 per cent.

Figure 1. Share in the GVP of fisheries and aquaculture by jurisdiction 2016–17

Source: ABARES (2018)



The sections below outline key characteristics of the professional fishing and aquaculture sectors, including:

- a brief history of each sector
- key species and fishing/culture methods
- location of operations throughout the state.

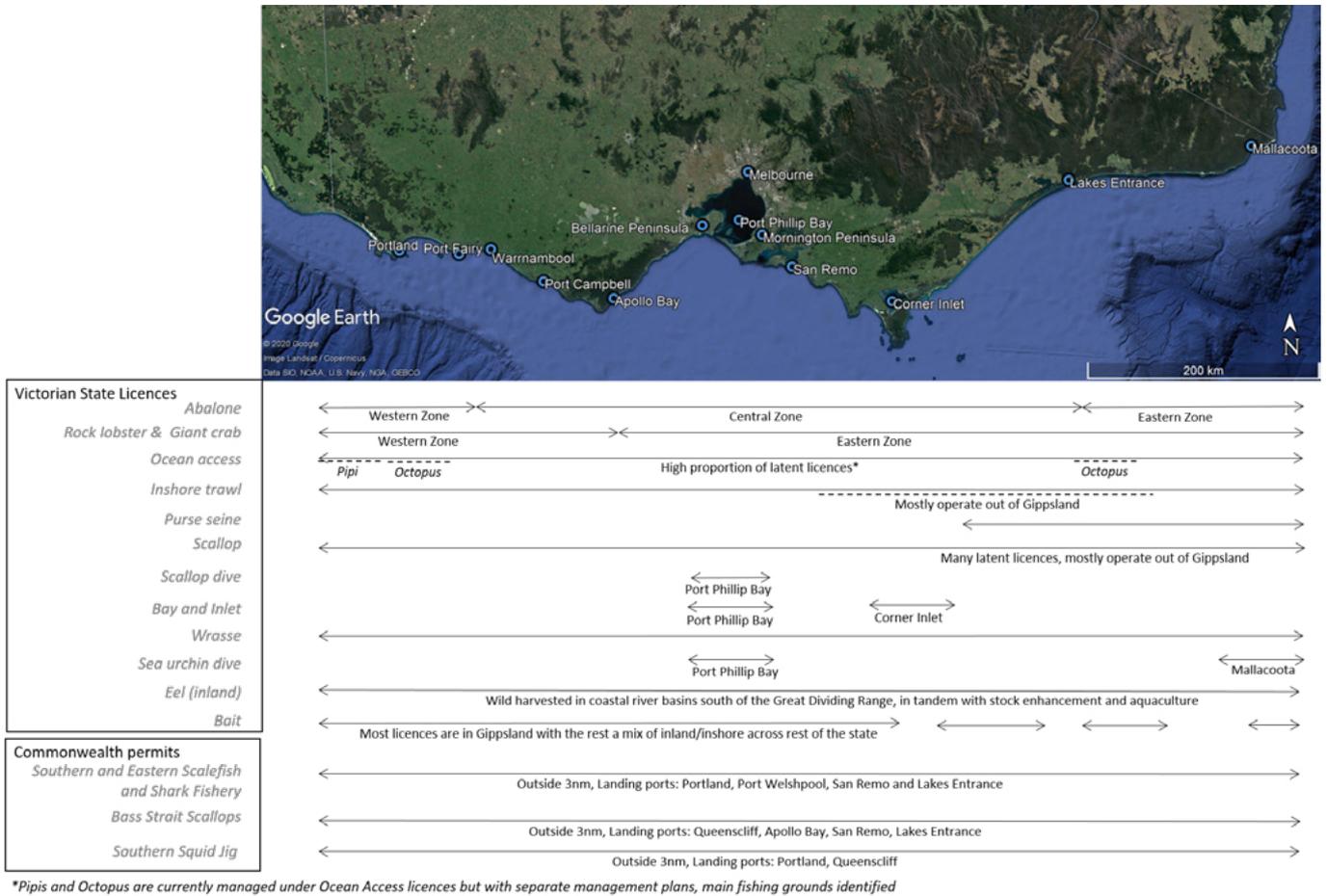
2.2 Professional wild-catch fisheries

Prior to European colonisation, Aboriginal peoples in Victoria engaged in a range of different types of fishing in fresh and salt water, as well as eel aquaculture. For example, the Gunditjmarra people in Western Victoria are well known for their eel fishing and eel farming using elaborate systems of embankments, walls and channels, and catching other freshwater species using woven basket traps. Closed river systems that did not host eels had fisheries centred around galaxiids. Fish were also caught with spears, baited lines and nets, and people used torch light to attract fish. People also gleaned various edible plants and animals in the intertidal zone and dived for shellfish (Frankel & Major, 2017; McNiven & Bell, 2010). The shell middens and many sacred sites along the Victorian coastline point to the dependence of Aboriginal peoples on seafood. Trade and barter were important pre-colonial activities connected to fishing and aquaculture (National Oceans Office, 2002).

Almost immediately after colonisation, the professional fishing industry commenced. Port Phillip Bay was the principle fishing grounds for the new colony and during the 1840s, there was a well-organised fleet of about 20 boats (Bennett, 2002). Following the influx of immigrants to Victoria with the goldrush in the 1850s, the fishing industry gradually expanded with the demand into Western Port Bay and the inland rivers. Fishing ports and fisheries opened up along the Victorian coast. While fishers have always sold fish direct to the public on a small scale, the Melbourne fish markets were the hub for large-scale trade. Multigenerational fishing families have often had multigenerational relationships with the marketers of Melbourne. The professional fishing industry in Victoria is now managed under Victorian state licences or Commonwealth licences. Figure 2 displays the fisheries and the key regions from which they operate:

Figure 2. Map of state and Commonwealth fisheries and main towns in Victoria

Source: adapted from Australian Fisheries Management Authority (n.d.); VFA (2020); VFA (2018a, 2018b); pers. comm. Seafood Industry Victoria; professional fishing participants.



2.2.1 Victorian state fisheries

Victorian state professional fisheries are diverse in terms of the types of licences and species caught, and operate in coastal communities from Portland to Mallacoota. During 2017–18, there were 613 Fisheries Access Licences and 36 permits (see Table 1 and Figure 3). Several licences are latent, particularly within the Ocean Scallop Fishery and Ocean Access Fishery. With multiple licences operated by one operator (and number of operators not available), it is estimated that there are approximately 200–250 state professional fishing operators and businesses in Victoria (Primesafe, 2018).

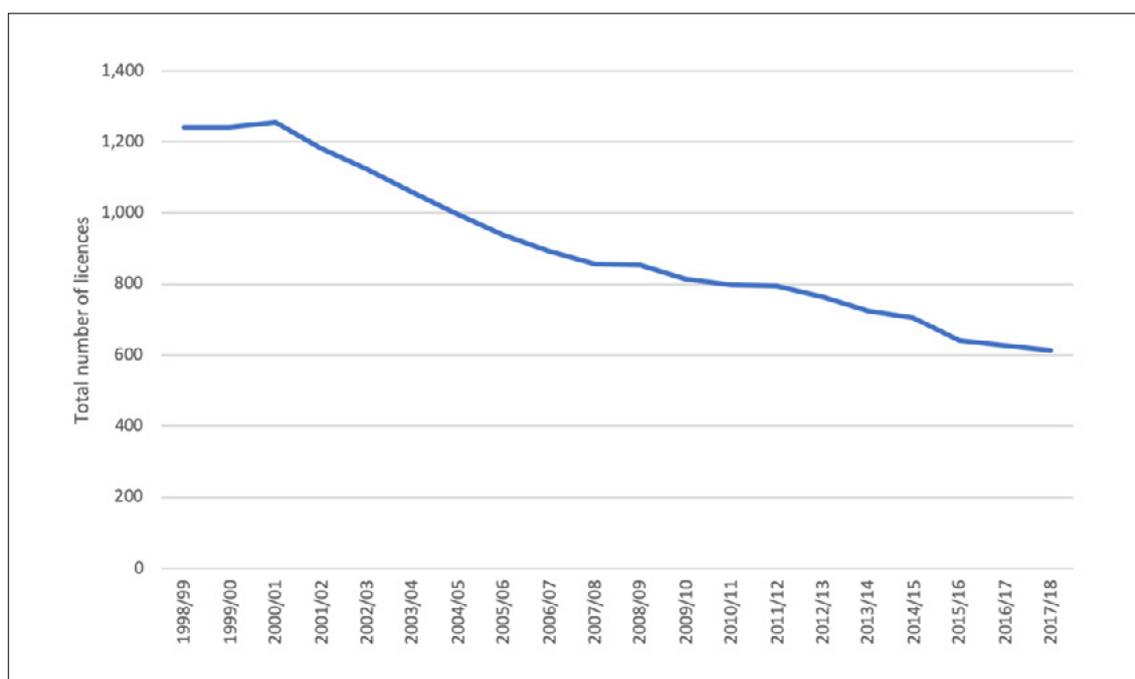
Table 1. Number of Victorian State Fishery Access Licences (June 2018)

Source: VFA (2018b)

Type of fisheries access licence	Number of licences
Abalone	71
Southern Rock lobster	107
Giant Crab	14
Eel	18
Ocean Access (general)	162
Bait (general)	11
Bait (Bay and Inlet)	15
Purse Seine (Ocean)	1
Scallop (Ocean)	88
Sea Urchin	10
Inshore trawl	54
Wrasse (Ocean)	22
Port Phillip Bay Scallop Dive	1
Gippsland Lakes Mussel Dive	2
Bay and Inlet (incl. Corner Inlet, Gippsland Lakes, Port Phillip Bay & Western Port)	37

Figure 3. Total number of Victorian State fisheries licences over the past 20 years

Source: VFA catch and effort data supplied to research team.

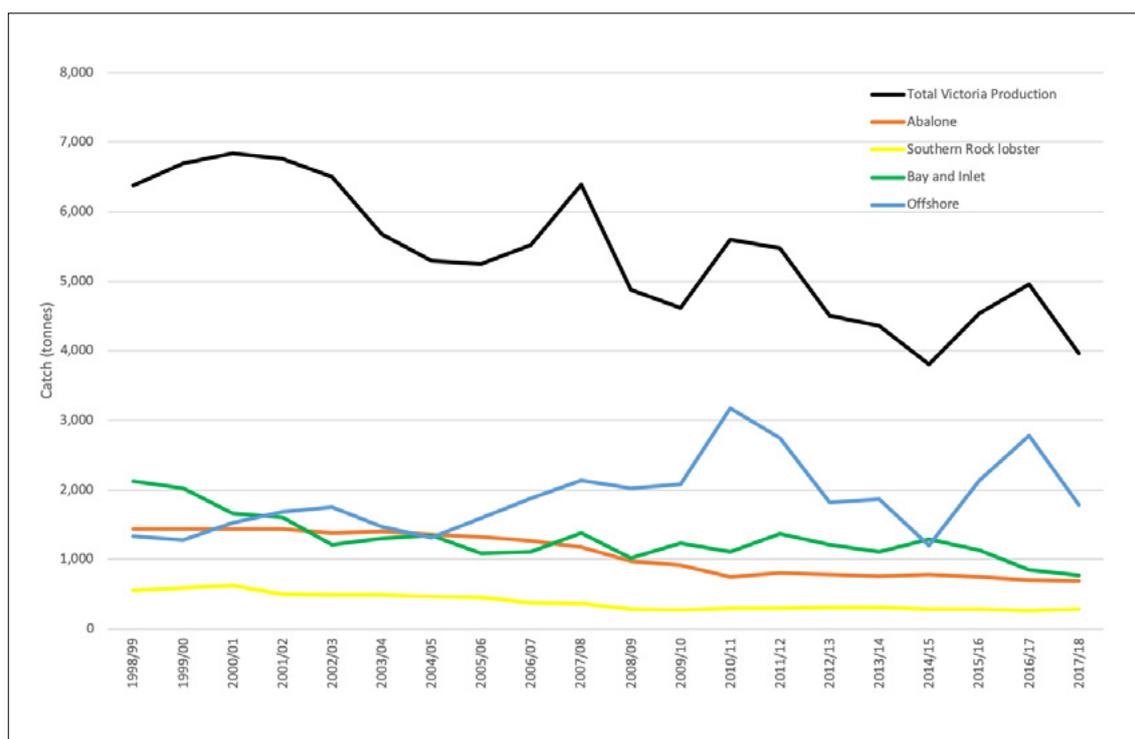


During 2017–18, the total Victorian state fisheries catch was 3,961 t (see Figure 4). Abalone *Haliotis rubra* (dive fishery) and Southern Rock lobster *Jasus edwardsii* (pot fishery) were key high-value species in Victoria, with their catches 694 t and 287 t, respectively. Bay and inlet fisheries (net and longline fisheries) were important for providing a diversity of finfish species for Victorian consumers, and their total catch in 2017–18 was 774 t. The offshore fisheries catch, which is the sum of several fisheries operating outside the bays and inlets was 1,788 t. This catch is dominated by Australian salmon *Arripis trutta* and Australian sardine *Sardinops sagax*, of which a large proportion is used for bait. Octopus (multiple species) is an emerging fishery in the past few years, and the live wrasse (multiple species) fishery has increased in the past five years as a result of licence changes. Other key species in this group include Sand crab *Emerita analoga* and Eastern King prawns *Melicertus plebejus*.

Figure 4. Victorian fisheries catch 1998–99 – 2017–18, including total catch, abalone, Southern Rock lobster, bay and inlet fisheries (e.g., Port Phillip Bay and Western Port Bay, Corner Inlet, Gippsland Lakes and Lake Tyers)

Source: VFA catch and effort data supplied to research team and VFA (2018b, 2019a).

Note: The total catch does not equal the sum of the four groups of fisheries below because four bay and inlet fisheries closed during the time period, and eels, Port Phillip Bay Scallops, Sea Urchin, bay and inlet bait fisheries, and fish caught under permit are not included in the four groups.



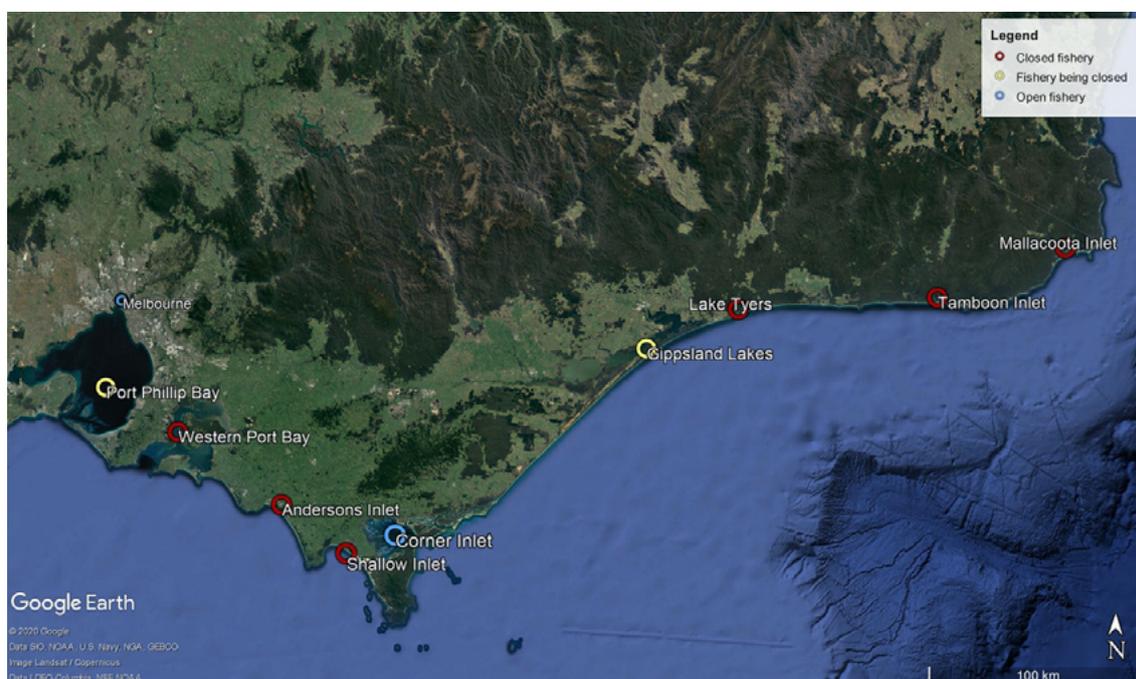
Professional Victorian state fisheries have undergone considerable contraction over the past 20 years in terms of licence numbers and seafood caught (see Figure 3 and Figure 4). In 1998–99, there were approximately double the number of fishing licences, whereas during the past 20 years, the total production has dropped from just under 7,000 t to under 4,000 t (VFA, 2018a, 2019a).

The past ten years have been challenging for the Victorian professional fishing industry. In part, the reduction in Victorian fisheries production in the state fisheries has been due to policies associated with rationalisation of the fleet and effort reduction to achieve sustainable harvest limits. In 2018, out of 38 Victorian species assessed, 82 per cent were considered to be sustainably harvested (28) or recovering (3) (SAFS 2018).

However, reduced production in Victorian fisheries has not only been due to the introduction of policies associated with sustainable harvesting. For example, Victoria established 63,000 hectares of marine protected areas in 2002, which reduced accessible professional fishing grounds. Another example is during 2006–07, the abalone fishery stocks were decimated in the Western Zone and damaged in the Central Zone by an outbreak of the Abalone Viral Ganglioneuritis (AVG) virus. The wild-catch eel fishery, which has suffered low production for more than a decade due to drought, and numbers of trout farms have reduced, in part due to drought and long-term changes to warmer and drier conditions.

Reduced production from the professional wild-catch fishing industry also reflects a recent policy direction to allocate a larger portion of fisheries resources to recreational fishing in bays and inlets in Victoria. Bay and inlet small-scale fisheries have operated in Victoria for more than 170 years, with credentials of sustainable harvests and responsible practices (e.g., Knuckey et al., 2002, 2017), and are dominated by small, family-run businesses. Originally, there were nine bay and inlet professional net fisheries operating in Victoria. In 2000, Anderson Inlet, Shallow Inlet and Tamboon Inlet were closed to professional fishing. In 2003, Lake Tyers and Mallacoota Inlet were closed and in 2007 Western Port Bay was closed (see Figure 5).

Figure 5. Map of open, closed and closing professional wild-catch fishing locations on the Victorian coast



In 2015, the trend continued with the government passing legislation to remove commercial netting in Port Phillip Bay for the purpose of improving recreational fishing experiences as part of their 'Target One Million' policy, which aimed to attract one million Victorians to recreational fishing. In 2016, 33 fishing licences were surrendered, and by 2022, eight non-net fishing licences will remain:

The Andrews Labor Government today celebrated a major milestone in its work to end commercial netting in Port Phillip Bay. Minister for Agriculture Jaala Pulford today joined fishing and media icon Rex Hunt at Albert Park Angling Club to announce that 33 of the 43 Port Phillip Bay licence holders who have caught 87 per cent of the key targeted species in the bay have accepted the Government's compensation package to exit this April. The removal of netting in Port Phillip Bay is a key component of the Andrews Government's Target One Million plan for recreational fishing, which aims to get more people fishing more often, by boosting participation to one million anglers by 2020.

– (Pulford, 2016)

More fish in the bay is a win for recreational fishers and families, providing more fish to catch in Victoria's most popular fishery.

– (Pulford, 2016)

In 2018, the government announced the compulsory acquisition of the Gippsland Lakes fishery by 2020. The Corner Inlet is the lone bay and inlet fishery that has not yet been reallocated to the recreational fishing sector. Twenty years ago, the bay and inlet fisheries produced over 2,000 t of finfish for Victorian consumers. In 2018, bay and inlet fisheries produced 774 t. By 2022, with only Corner Inlet able to catch the diversity of net-caught species, and there being no further restrictions, an estimated finfish catch from the bay and inlet fisheries may be approximately 400 t⁴.

While Victorian state fisheries production declined by 12.2 per cent between 2006–07 and 2016–17, the value of production (GVP) decreased by 28.6 per cent in nominal terms (see Figure 6).⁵ The stabilisation of Victorian state professional fisheries GVP over the past five years is likely due to fisheries operating at biologically sustainable effort and stock levels, more efficiently and more profitably.

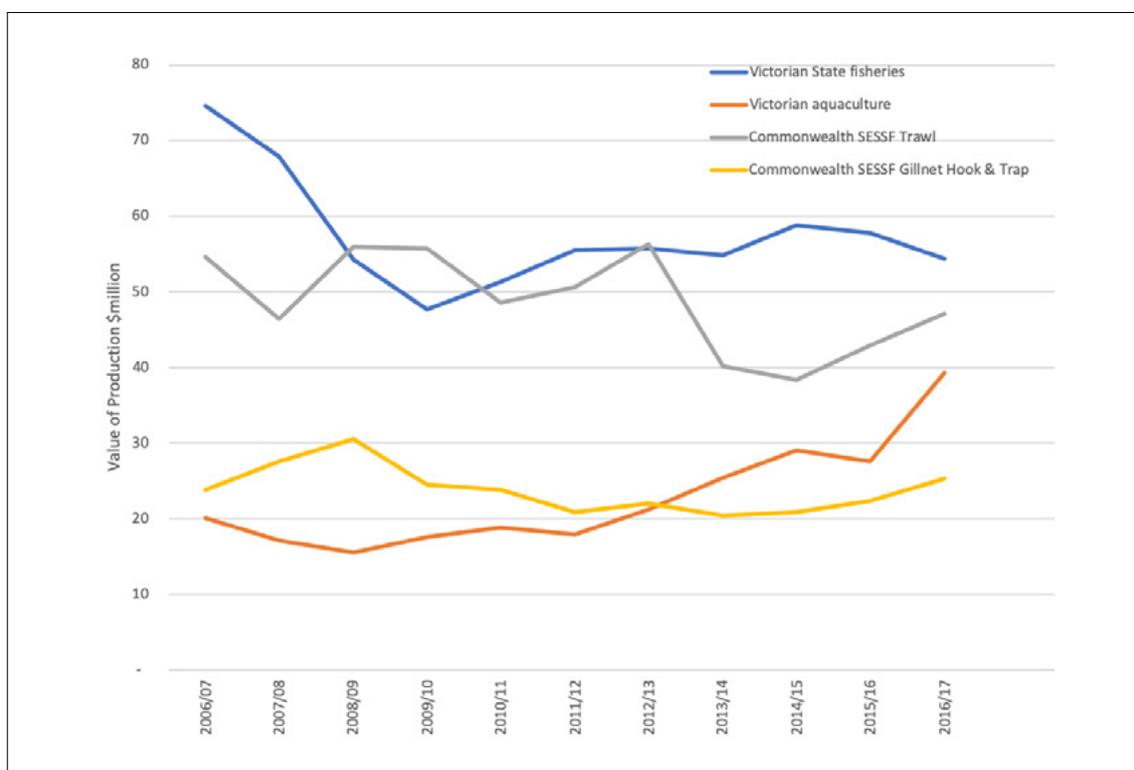
⁴ The average Corner Inlet catch 2013–14 – 2017–18 was 302.8 t. The remaining eight Port Phillip Bay fishers will only be able to line fish. The target species for longlines are snapper and will be on quota at a total of 88 t per year. There is potential that fishers may be able to supplement their catch using handline fishing for whiting or calamari, but in the ten years prior to 2016, there were only five reports of catches of 1 t or more for calamari or whiting (Winstanley, 2017).

⁵ 'Nominal' values are the dollar figure at the time of recording, as opposed to 'real' values, which are adjusted for inflation.

Figure 6. Value of production (GVP) for Victorian state fisheries, Victorian aquaculture, Commonwealth SESSF Trawl and Commonwealth SESSF Gillnet Hook and Trap

Source: ABARES (2017).

Note: Commonwealth vessels operating from Victorian ports are only a proportion of the total GVP.



Abalone and Southern Rock lobster accounted for 78 per cent of professional fisheries GVP in 2016–17. The last decade has seen a change in fortunes for rock lobster and abalone. Internationally the farming of abalone in China and production in other countries has reduced the demand for Victorian wild abalone with price reductions as a result. The value of the abalone produced declined both nominally and in real terms in the wild-catch fishery (and in real terms in the aquaculture sector). In 2006–07 the wild-catch sector received an average beach price of \$37.62 /kg (VFA 2018b), which would have an inflation-adjusted value of \$47.40 in 2019. However, in 2016–17, the wild-catch industry received an average of \$28.63 /kg. This has since increased significantly, with the average 2019 price closer to \$50 /kg. However, the price of \$28.63 in 2016–17 represented a price decline of 40 per cent in real terms for each kilogram of abalone produced, which has resulted in a large structural adjustment in the Victorian abalone supply chain. There were variations in demand for abalone, in which prices increased in some years. According to an industry member participating in this study, the abalone beach price increased to \$40 during 2018–19 and then towards \$50 /kg.

In contrast to abalone, prices have improved for Rock lobster. While the quantity of Rock lobster produced by the fishery declined by 33 per cent between 2005–06 and 2016–17, the real price received increased by 75 per cent. This increased the nominal Rock lobster fishery GVP from \$85 m (456 t) to \$23.28 m (287 t) in 2017–18 (VFA, 2019a).

2.2.2 Victorian-landed Commonwealth fisheries

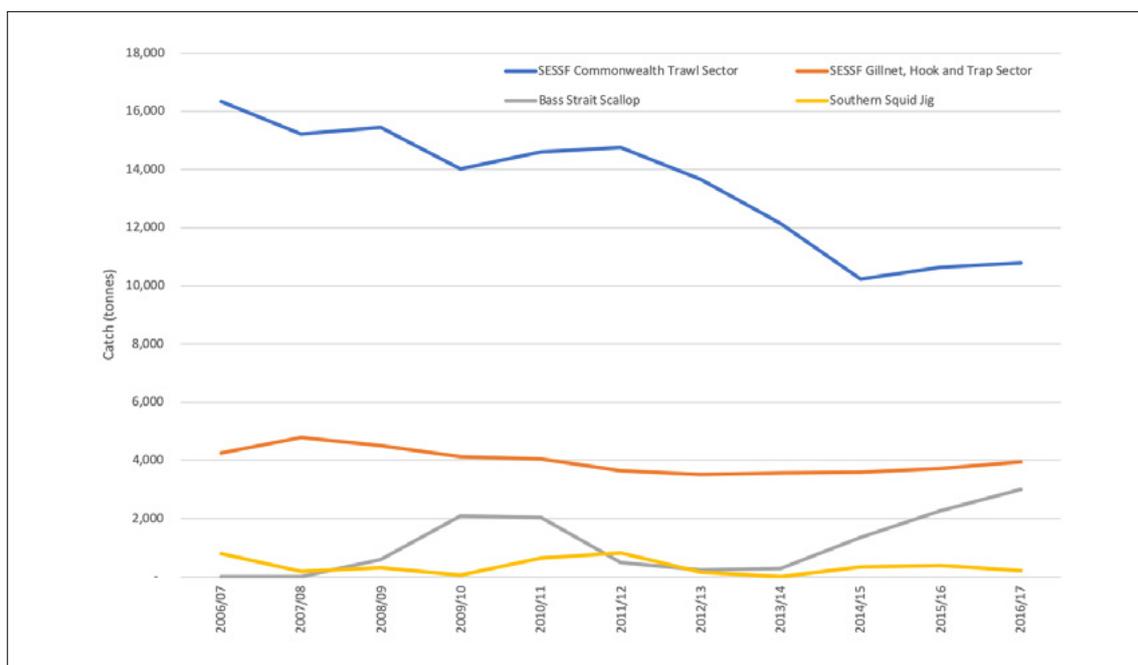
Victorian professional fisheries also include fishing by vessels in Commonwealth fisheries. This fishing is outside of Victorian state waters (i.e., three nautical miles) and is managed by the Australian Fisheries Management Authority (AFMA). Commonwealth fisheries main ports include Lakes Entrance, Portland, San Remo, Port Welshpool and Queenscliff. The four main Commonwealth fisheries that operate out of Victoria include:

- Southern and Eastern Scalefish and Shark Fishery (SESSF) with two sub-sectors by fishing methods—trawl and gillnet, hook and trap.
- Bass Strait Scallops.
- Southern Squid Jig Fishery.

The fisheries data provided by ABARES (2018) does not partition out Victorian-landed catches or the number of Commonwealth vessels operating from Victorian ports, but the overall catches of each of the four sectors are displayed in Figure 7 and descriptions of the four main Commonwealth fisheries in Victoria are described below.

Figure 7. Total catch of four Commonwealth professional fishing sectors operating from Victoria from 2006–07 – 2016–17

Source: ABARES (2018).



The SESSF Trawl Fishery is also known as the Southeast Trawl Fishery. It stretches from Barranjoey Point (north of Sydney) in NSW southwards around Tasmania to Cape Jervis in South Australia. The main fishing methods are demersal otter trawl and Danish seine. In 2017–18, there were 32 active trawlers and 18 Danish seiners (ABARES, 2019). The Southeast Trawl Fishery has more than 30 species that are managed under quotas, with the main species caught being Blue grenadier *Macruronus novaezelandiae*, Tiger flathead *Platycephalus richardsoni*, Eastern School whiting *Sillago flindersi*, and Pink ling *Genypterus blacodes*. The decline visible in Figure 7 are due to a reduction in catches

of Blue grenadier, Silver warehou *Seriolella punctata* and Orange Roughy *Hoplostethus atlanticus* under reduced total allowable catches (TACs).

The SESSF Gillnet, Hook and Trap Fishery operates out of ports in Victoria, Tasmania and South Australia. The main fishing methods are demersal gillnet and longline, which are used to target Gummy Shark *Mustelus antarcticus*. Other species are caught as by-products and include Blue-Eye trevalla *Hyperoglyphe antarctica*, Pink ling and other shark species. There were 75 active vessels during 2017–18 (ABARES, 2019). Fishing for sharks has a long history in Australia, with reports that the first white settlers supplemented their food resources by fishing for sharks. Gummy Shark is the original ‘flake’ that Victorians used for fish and chips. Gummy Sharks are relatively fast growing compared to other shark species and the stock is considered to be sustainably harvested (SAFS, 2018).

The Bass Strait Scallop Commonwealth Fishery uses scallop dredges to fish in between the Victorian and Tasmanian scallop fisheries. There were 12 active vessels in the fishery in 2017–18 operating out of Victoria and Tasmania. For the past five years, the fishing has been concentrated to the east of King Island. The Bass Strait Scallop Fishery is considered to be sustainably harvested (SAFS 2018).

Southern Squid Jig Fishery fishes off the coast of NSW, Victoria, South Australia and Tasmania, with the main landing ports in Hobart, Portland and Queenscliff. Most of the fishing occurs out from Portland in Victoria (ABARES, 2019). Squid jig vessels operate at night in continental shelf waters between depths of 60–120 metres, and target Gould’s Squid *Nototodarus gouldi*. In 2017–18, there were six active vessels. Gould’s Squid is a sustainable species widespread throughout south-eastern Australia and into the Great Australian Bight.

2.3 Aquaculture

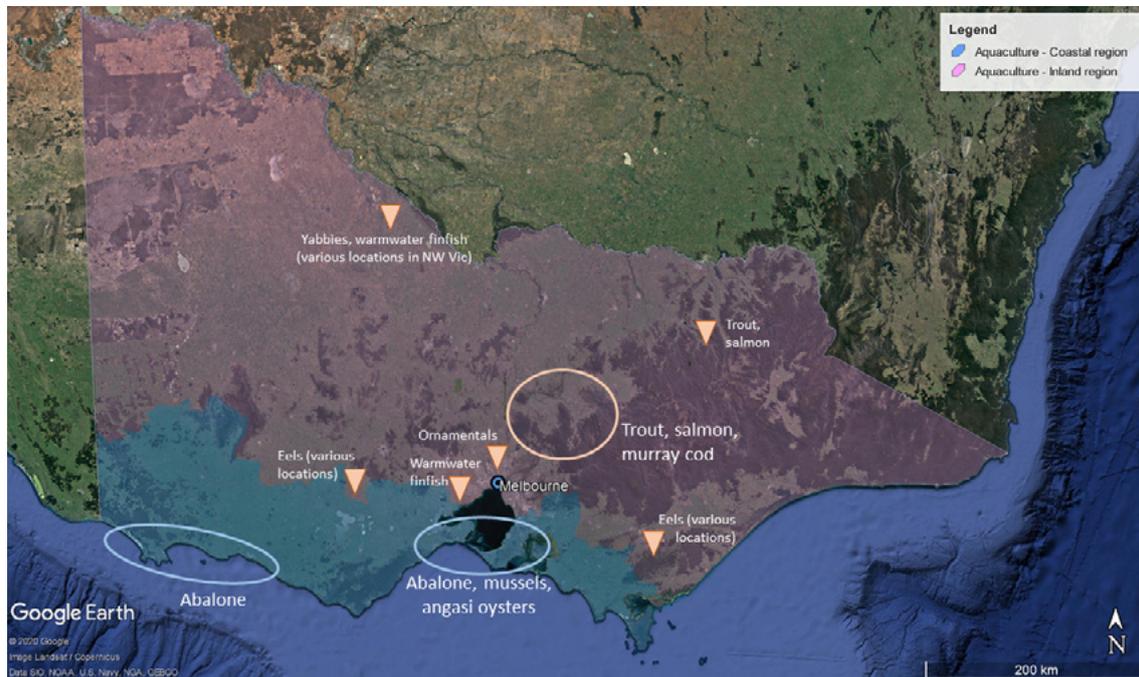
Aquaculture has a long history in Victoria. Western Victoria’s pre-colonial history of eel (*Anguilla reinhardtii*, *Anguilla australis*) fishing and aquaculture dates back between 7,000–10,000 years. The aquaculture system is unique in its size and complexity (Jones, 2011; Jordan 2012). In particular, the complex water harvesting and aquaculture structures constructed from stone at Lake Condah have been recognised a World Heritage site, and ‘would today be categorised as a major integrated landscape planning and catchment management scheme’ (Jones, 2011). Aquaculture at Lake Condah ‘produced a permanent food supply, a permanent settlement, food trading and a different form of governance than was generally found elsewhere in Australia’ (Jordan, 2012).

Following British colonisation, aquaculture began with the introduction of Rainbow trout *Oncorhynchus mykiss* to Ballarat in 1864. Salmonid aquaculture has since played a major role in the growth of the aquaculture industry in Victoria, supporting food production and the growth of recreational trout fisheries. The key aquaculture sectors and locations around Victoria are presented in Figure 8.

In 2017–18, there were 127 aquaculture licences in Victoria, with multiple licences held by some operators (see Table 2). The number of aquaculture licences has almost halved during the past 20 years, indicating consolidation of licences and the exiting of some operators (see Figure 9). The Victorian aquaculture industry is currently dominated by a small number (approximately nine) of large farms, which produce the majority of aquaculture products.

Figure 8. Map of main aquaculture regions in Victoria

Source: adapted from DEDJTR (2016); pers. comm. with Andrew Clark (Aquaculture Manager, Victorian Government); primary interviews.

**Table 2. The type and number of Victorian aquaculture licences in 2017-18**

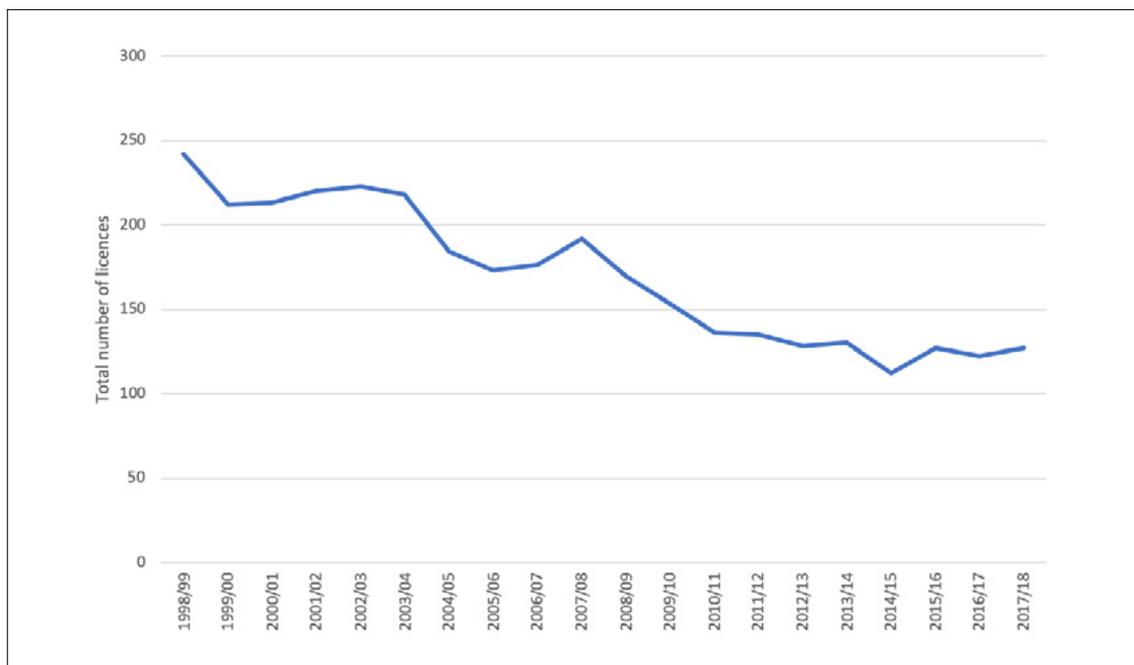
Source: VFA (2018b)

Note: This includes hatchery production and grow-out production.

Type of aquaculture licence	Number of licences
Freshwater Eels	13
Salmonids	18
Native Finfish (Inland)	18
Yabby	20
Abalone	10
Blue Mussel and Other Molluscs (Bivalves)	17
Ornamental Fish	8
Other	23
Total	127

Figure 9. Total number of Victorian aquaculture licences 1998–99 – 2017–18

Source: VFA catch and effort data from information bulletins supplied to research team.

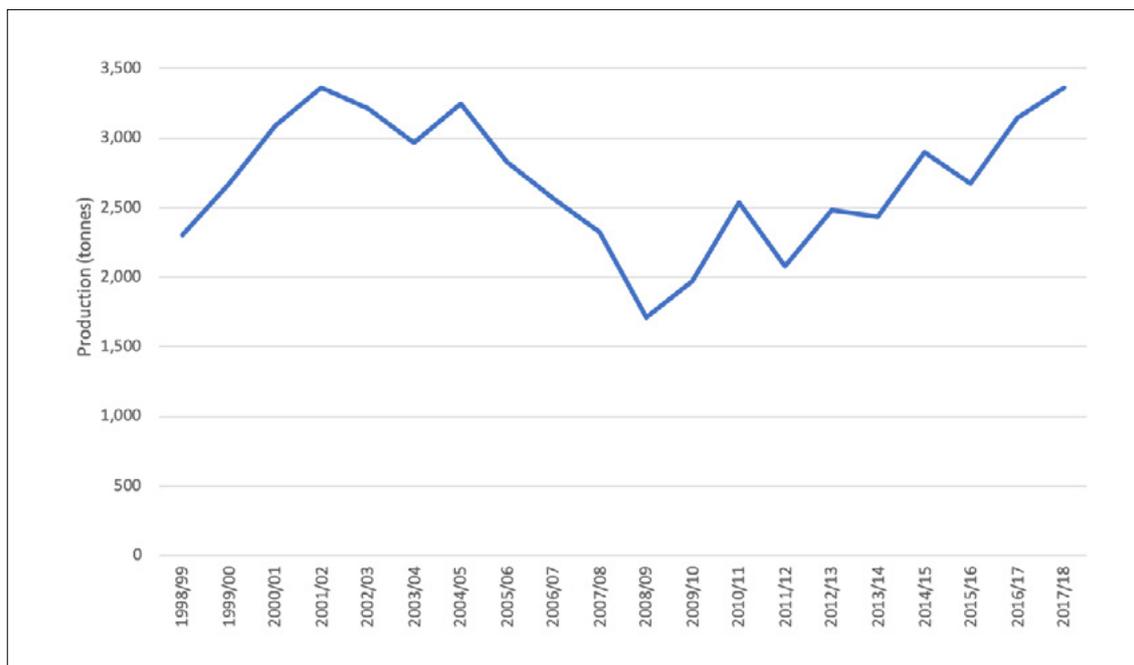


At the same time, aquaculture production has grown from 2,306 t in 1998–99 to 3,362 t in 2017–18 (see Figure 10), although production has been variable for several reasons. In Victoria salmonid culture was originally the most significant aquaculture sector and continues to be the largest by volume. However, there has been significant growth in abalone (multiple species and hybrid species) culture and given its high value is the most significant by value, and it is set to expand further. Additionally, the production of new finfish species such as Barramundi *Lates calcarifer* and the re-establishment of production of Blue Mussels *Mytilus galloprovincialis* over the past decade has seen these sectors significantly grow.

Periodically, environmental and biological factors have also influenced the growth of parts of the sector. For example, the spread of the AVG virus in abalone farms in 2006 led to significant reductions in production. While the courts did not conclusively determine that the AVG virus was caused by aquaculture farms, they were perceived as having played a role in spreading the virus (Prince, 2007). There is a strong perception among the wild-catch abalone industry and local communities that abalone farms were responsible for the virus and declines in the wild population, so the abalone aquaculture industry suffered from a loss of social licence to operate. A second influencing factor on aquaculture production was the Millennium drought (1996–2010), which led to problems with natural spat fall for mussels, and many smaller operations exited the industry. The drought also restricted aquaculture production for eels as natural waterways became incapable of supporting natural eel migration for breeding, and some waters covered by aquaculture licences had insufficient water to grow out cultured/stocked eels. The drought and the 2009 fires also severely impacted the productivity of trout farms.

Figure 10. Total Victorian aquaculture production 1998–99 – 2017–18

Source: VFA catch and effort data from information bulletins supplied to research team.



Native finfish, ornamentals and salmonids are grown inland using intensive farming methods, including some closed-system operations, which are based on emerging and species-specific techniques and technology. These intensive systems have high input costs, due to their reliance on feed, and the need to process nutrient loads in wastewater. In the case of closed-system aquaculture, clean water is taken from the water grid, with the exception of Barramundi farming, which relies on geothermally heated groundwater. Trout and pond-based native aquaculture rely on diverting water from natural waterbodies. This has led to trout farms being clustered around the Goulburn River tailrace, where cold clear water flows from the Eildon Weir. Some salmonid farmers also provide a ‘fish out’ angling experience, in which anglers pay for access to fish recreationally and to take catch home.

Other inland aquaculture for Yabbies *Cherax albidus* and eels is low density and widely geographically dispersed throughout Victoria. These operations may be undertaken in concrete and earthen ponds, dams, or in the case of eels, in natural waterways. Modern eel aquaculture is intrinsically linked to the wild-catch fishery as it was in the past, with juvenile eels caught in the wild and either grown out in ponds or lakes, or released into designated wild-catch waterways by fishers for later recapture. Many aquaculture licence holders also have a wild-catch licence. Both yabby and eel operations tend to have lower input costs due to the fact they do not use feed, except for when concrete ponds are used, instead relying on the natural productivity of dams and waterways.

Saltwater aquaculture operations are comprised of abalone, mussels, and small experimental operations for Angasi oysters *Ostrea angasi*. These operations are geographically located on the Far West Coast and around Port Phillip Bay. Abalone farms are onshore, circulate saltwater from the ocean, and utilise feed. Mussels are grown at sea, in Port Phillip Bay on anchored ropes, filtering nutrients from the ocean. Mussels and Angasi oysters are the only mariculture species grown in Victoria.

The aquaculture industry requires seed for stocking and there are a range of different hatchery businesses for salmonids, warm finfish, mussels and abalone, typically operating as one part of integrated businesses, with the exception of mussels, which has a standalone hatchery.

In contrast to the Victorian professional fishing sector, the aquaculture sector's GVP at the farm gate has grown from \$20.12 m in 2006–07 to almost double to \$39.32 m in 2017–18 (see Figure 6). Of this, 37 per cent of the aquaculture industry GVP value was in abalone farming, 30 per cent in salmonid farming and 9 per cent in Blue Mussel *Mytilus edulis* farming. The balance of 24 per cent of GVP came from the small sectors species such land-based culture of finfish such as Barramundi, freshwater eels, Yabbies, ornamental fish and other species. For further details on GVP and sources of data for these figures, see **Section 4.2.1.2**.

3 Approach and methods

3.1 Overview

This study was completed following similar FRDC projects (2014-301, 2015-302) in NSW (Barclay et al., 2016; Voyer et al., 2016). Further, it was concurrent with work being undertaken by the FRDC (project 2017-210) to develop a national framework for researching the contributions of fisheries and aquaculture to communities (Ogier et al., 2019).

Our approach was informed by both bodies of work, as well as a small exploratory project to determine the appropriate approach to take for Victorian fisheries in collaboration with industry (FRDC 2016-263). This scoping project was undertaken in partnership with Seafood Industry Victoria (SIV) and UTS during 2017.

The types of data and collection methods for this project are summarised in Table 3, with further details below in **Sections 3.5–3.8**. Most of the data used in the project was qualitative or semiquantitative regarding perceptions about contributions. The economics portion of the project included direct measures of contributions.

Table 3. Summary of types of data and data collection methods used in this project.

Type of data	Explanation	Numbers
Documents and existing data	Including grey literature relating to the social and economic value of Victorian fisheries.	See reference list
Data on costs of production and other financial information gathered through economic survey of fishing and aquaculture businesses	Income and expenditure data collected for the economic analysis. The survey was completed either face-to-face or via hard-copy questionnaire.	52 respondents ⁶ (aquaculture: 6; fisheries: 46)
Qualitative data on perceptions of contributions gathered through interviews with fishers, aquaculturists and key community members	To understand industry and community perceptions of wellbeing contributions from seafood production. Most interviews were face-to-face, with individuals or in group settings. Three were by telephone.	140 participants

⁶ For fisheries, the response rate for the economic survey was 18.4 per cent. For further details on the response rate for the economic survey, see **Appendix 1**.

Type of data	Explanation	Numbers
Qualitative and semiquantitative data on perceptions of contributions gathered through a phone survey of the Victorian population	To understand general public views and perceptions of key issues identified in the interviews. The sample for this survey was representative of the Victorian population ⁷ .	1,154 respondents
	Respondents who were residents of ten towns identified as having a substantive fishing or aquaculture presence were given a more detailed version of the survey asking about contributions to their towns.	150 respondents (subset of the 1154)
Qualitative and semiquantitative data on perceptions of contributions gathered through phone surveys of seafood-related business sectors	To understand views, perceptions and relationships with the seafood-producing sector in businesses in tourism, secondary sector (e.g., seafood processing and trade) and hospitality.	150 respondents (50 businesses in each of the 3 groups)

3.2 The wellbeing approach for a contribution study

The concept of wellbeing has been found to be a useful tool to explore the environmental, political and economic aspects of the fisheries and aquaculture sectors (e.g., Britton & Coulthard, 2013; McMichael et al., 2005; Pierce & Robinson, 2013; Smith & Clay, 2010). The integrated approach we used to consider the social and economic contributions of the wild-catch industry was guided by the ‘social wellbeing’ framework, adapted from Sen, Muellbauer and Hawthorn’s (1987) capabilities approach:

Wellbeing is a state of being with others, which arises where human needs are met, where one can act meaningfully to pursue one’s goals, and where one can enjoy a satisfactory quality of life.

– (McGregor, 2008, in Coulthard et al., 2011)

The social wellbeing concept builds on established theory regarding the measurement of ‘quality of life’ and ‘standard of living’, which developed in the mid-20th century. Since that time, there has been considerable scholarly and policy debate regarding how best to measure quality of life (e.g., Coulthard, 2012; Nussbaum et al., 1993; Stiglitz et al., 2009).

Most studies into quality of life conducted around the world recognises the necessity to include ‘subjective’ measures of wellbeing with conventional objective measures such as income, health and education (e.g., Himes-Cornell et al., 2013; Kasperski & Himes-Cornell, 2014; New Zealand Quality of Life Project, 2007; Nussbaum et al., 1993; OECD, 2013; Partridge, Chong, Herriman, Daly & Lederwasch, 2011; Stiglitz et al., 2009). People’s sense of wellbeing can differ considerably regardless of their economic circumstances, given the human tendency to adapt expectations to their situation. Equally, focusing on goods or resources alone fails to account for the different amounts of primary goods required by different people to satisfy the same needs (Garnham, 1999).

⁷ For further details on sample sizes for the phone surveys, see Section 3.7.

Wellbeing also has a relational dimension. The notion of wellbeing can be highly malleable, with people assessing their own wellbeing in the context of socially constructed meanings formed through their relations with others. That is, the relationships that people have within their communities can influence peoples' sense of their own and others' wellbeing. Moreover, people's relationships within communities and with decision-makers affect their capabilities to achieve a state of wellbeing, such as through access to resources (e.g., Coulthard et al., 2011; McGregor, Coulthard & Camfield, 2015).

The 'social wellbeing' approach combines an objective evaluation of circumstances in which a community finds itself, with a subjective evaluation of those circumstances, while emphasising the social context in which these meanings are framed and conceptions of wellbeing can be achieved (Britton & Coulthard, 2013). The approach has three dimensions:

- **Material**—the resources people have and the extent to which their needs are met in terms of food, income and assets, access to services and environmental quality.
- **Subjective**—the level of satisfaction with quality of life, as well as perceptions, values and beliefs that shape their experience of wellbeing.
- **Relational**—the extent to which relationships enable people to act to achieve wellbeing, and affect their perceptions of wellbeing.

Wellbeing studies have been used to assess the wellbeing of fishing communities (e.g., Britton & Coulthard, 2013), human dimensions in ecosystem-based resource management (e.g., Breslow et al., 2016; Hicks et al., 2016), and the non-monetary benefits people gain from ecosystem services, and trade-offs in different uses of marine resources (e.g., Chaigneau, Brown, Coulthard, Daw & Szaboova, 2019; Chaigneau, Coulthard, Brown, Daw & Schulte-Herbrüggen, 2019). These uses of the wellbeing approach involve asking the question: 'what is the wellbeing of community x?'

Our use of wellbeing approach in this project was slightly different, similar to the preceding NSW studies. We asked: 'what contributions do seafood producers make to the wellbeing of community x?'

Addressing this question involved a two-step process by which we: 1) identified the domains of wellbeing to which seafood production can contribute, via the literature on wellbeing and asking our participants what areas of community life are benefited by seafood production; and 2) considered the specific contributions seafood producers make to those areas of community life (see Table 4). This approach to using the wellbeing concept to frame contributions studies has been validated and peer-reviewed several times through previous reports (e.g., Barclay et al., 2016; Voyer, Barclay, McIlgorm & Mazur, 2016), scientific journal publications (e.g., Voyer et al., 2017a; 2017b) and workshops hosted by the FRDC to develop a national approach for promoting high-quality contributions studies (FRDC 2017-210).

Table 4. Domains of community wellbeing and contributions of Victorian seafood production to each domain

Domains of community wellbeing				
Economic diversity & resilience	Food supply	Tourism and recreation	Environmental sustainability	Social fabric of communities
Contributions of Victorian seafood production to community wellbeing				
Revenue Employment Synergies with connected industries: service; post-harvest; tourism, etc.	Fresh local seafood Nutritious food Food safety	Local seafood for visitors Experiences and aesthetics for visitors Supporting other activities, including recreational fishing	Supporting fishery monitoring and research Improving practices that enhance sustainability of production Supporting other research and environmental work	Local sense of place & identity as 'fishing town' Participation of fishers and aquaculturists in important parts of community life Support for vulnerable young men

For the purposes of this report, the three dimensions of 'community wellbeing' derived from seafood production are as follows:

- **Material**—the extent to which seafood producers contribute resources for local communities to meet their needs, including food, income and assets, access to services and environmental quality.
- **Subjective**—the level of satisfaction with the contributions made by seafood producers to the quality of life of local communities and the values and beliefs that shape these levels of satisfaction.
- **Relational**—the extent to which seafood producers contribute to the development and maintenance of relationships that enable communities to achieve wellbeing and shape perceptions of wellbeing.

To some extent, there is overlap between the dimensions of wellbeing—material, relational, subjective—and the domains of wellbeing (see Table 5), although they are not the same. For example, the economic and food supply domains of wellbeing overlap with the material dimensions of wellbeing, but the other domains of wellbeing have material dimensions. The social fabric of communities overlaps with the relational dimensions of wellbeing, but there are also relational dimensions to the other domains.

We investigated the contributions of Victoria's seafood producers to domains of community wellbeing and considered evidence of the three dimensions within each domain insofar as such evidence was available or feasible to collect within the scope of the project. It was difficult to collect useful quantitative data regarding subjective and relational aspects of wellbeing, so the data types constituting evidence for these dimensions were mostly qualitative, with some semiquantitative data. Other wellbeing studies have used semiquantitative methods in the form of social psychology survey tools to ascertain subjective and relational wellbeing (e.g., Britton & Coulthard, 2013). However, it was not clear that those tools would provide more useful evidence than the interviews and phone surveys, so social psychology tools were not used for this study⁸. Contributions to community wellbeing were thoroughly considered across every domain through the lens of three-dimensional wellbeing, although we did not have a full range of qualitative, quantitative and semiquantitative evidence for each dimension across all domains (see Table 5).

⁸ For details on the data collection instruments used in this study, see **Sections 3.5, 3.6, 3.7 and 3.8**.

Table 5. Contributions of Victoria’s seafood production to domains of community wellbeing, with indicators, data collection methods and types

Note: for details on the data collection instruments used in this study, see **Sections 3.5, 3.6, 3.7 and 3.8.**

Domain of community wellbeing	Dimensions of wellbeing	Contributions of Victorian seafood production	Indicators	Numbers
Economic diversity and resilience	Material (e.g., regional income, household income and employment)	Primary economic impact through direct revenue and business profitability Secondary economic impacts (or multipliers) Employment	Gross Value Added (GVA), GVP Business profitability and employment Regional inputs (multipliers), including value added, household income and employment Investments Full-time equivalent (FTE) positions Types of work, i.e., entry-level v. skilled	- Government production and price data (quantitative) - Economic questionnaire (quantitative, financial) - Interviews (qualitative, values and perceptions)
	Relational (existence of mutually supportive elements in the economy)	Clients for service and supply businesses Supply raw material and experiences for post-harvest businesses Provide baseline year-round economic activity in contrast to seasonal tourism activity	Value of the secondary (post-harvest) seafood sector, including wholesale, processing, retail, hospitality, tourism Post-harvest supply chain characteristics Importance of Victorian seafood production to the post-harvest sector	- Government production and price data (quantitative) - Economic questionnaire (quantitative, financial) - Interviews (qualitative, values and perceptions) - Phone questionnaires (semiquantitative, values and perceptions)
	Subjective (perception that the economy is healthy)	A community sense that seafood production adds diversity and increases activity in the regional economy	Belief that seafood production is important to regional economies (including among recreational fishers)	- Phone questionnaires (semiquantitative, values and perceptions) - Interviews (qualitative, values and perceptions)

Domain of community wellbeing	Dimensions of wellbeing	Contributions of Victorian seafood production	Indicators	Numbers
Food supply	Material (having access to enough food and desired foodstuffs)	Contributes to nutritional needs of local communities Provides a diverse range of foodstuffs desired by communities	Purchasing patterns regarding locally produced seafood	<ul style="list-style-type: none"> - Phone questionnaires (semiquantitative, values and perceptions) - Interviews (qualitative, values and perceptions) - Government production and price data (quantitative)
	Relational (existence of supply chains and logistics that support access to food)	Seafood producers participate in and help build channels for local supply	Sufficiency of purchasing channels—local seafood	<ul style="list-style-type: none"> - Phone questionnaires (semiquantitative, values and perceptions) - Interviews (qualitative, values and perceptions)
	Subjective (perception that the food available is sufficient and of the desired types)	Provides high-quality seafood types desired by communities at different price points	Beliefs about the quality, availability and prices of locally produced seafood Preferences for locally produced seafood	<ul style="list-style-type: none"> - Phone questionnaires (semiquantitative, values and perceptions) - Interviews (qualitative, values and perceptions)
Tourism and recreation	Material (access to desired tourism and recreation experiences)	Raw material for hospitality sector Bait for recreational fishing Infrastructure and services for recreational boaters Aquaculture produces stocks for recreational fishing Professional fishing and aquaculture experiences for tourists (e.g., fresh local seafood and fishing town atmosphere)	Use of locally produced seafood in hospitality sector Size of locally produced bait market Extent of infrastructure and services for seafood production also used by recreational boaters Extent of recreational fishing supplied by aquaculture production Value of seafood-related experiences for tourism sector	<ul style="list-style-type: none"> - Interviews (qualitative, values and perceptions) - Phone questionnaires (semiquantitative, values and perceptions) - Literature review
	Relational (functional relations among the sectors supporting tourism and recreation experiences)	Fishing and navigational knowledge shared with recreational boaters and fishers Professional fishers assist with rescues and incidents at sea	Extent of sharing of fishing and navigational knowledge Extent of professional fishing involvement in rescues	<ul style="list-style-type: none"> - Interviews (qualitative, values and perceptions) - Literature review
	Subjective (perceptions that tourism and recreational experiences are sufficient and of desired quality)	Perception in communities that locally produced seafood is important for tourism and recreational experiences The level of importance recreational users put in the provision of local services and infrastructure from seafood producers	Importance of locally produced seafood for human consumption and bait to recreational users Importance of services and infrastructure to recreational users	<ul style="list-style-type: none"> - Phone questionnaires (semiquantitative, values and perceptions) - Interviews (qualitative, values and perceptions)

Domain of community wellbeing	Dimensions of wellbeing	Contributions of Victorian seafood production	Indicators	Numbers
Environmental sustainability	Material (healthy ecosystem functioning now and into the future)	Complying with regulations for environmentally sustainable fishing/aquaculture Going beyond regulations with additional activities to promote ecosystem health	Sustainability assessment of the fishing and aquaculture industries Involvement in additional environmental stewardship activities	- Literature review - Interviews (qualitative, values and perceptions)
	Relational (groups within society cooperate to manage environmental impacts)	Seafood producers participate in government and non-government environmental management networks	Involvement in environmental management programs, groups and committees	- Interviews (qualitative, values and perceptions)
	Subjective (perceptions that local ecosystems are healthy and protected)	Seafood producers are known in communities as helping protect the environment	Levels of trust that seafood producers are protecting the environment	- Phone questionnaires (semiquantitative, values and perceptions) - Interviews (qualitative, values and perceptions)
Social fabric of communities	Material (there are events and organisations that promote a sense of community, people who are socially marginalised have economic opportunities)	Supporting community events Fishing and aquaculture provide workplaces for entry-level work with no educational qualifications required	Prevalence of contributions to cultural events, sponsorship and donations Community identification with fishing heritage and notion of 'fishing villages' Prevalence of entry-level work provided for vulnerable young men	- Interviews (qualitative, values and perceptions) - Phone questionnaires (semiquantitative, values and perceptions)
	Relational (there is cooperation to support community-building events and organisations, networks exist to link socially marginalised people with economic opportunities)	Seafood producers are part of the cooperative networks that support community-building and economic opportunities for marginalised people	Extent to which seafood producers are part of these cooperative networks to support community-building activities and organisations, and provide work for vulnerable young men	- Interviews (qualitative, values and perceptions)
	Subjective (community members feel a sense of belonging, marginalised people feel they have opportunities)	The fishing and aquaculture sectors are seen by communities as contributing to community events and organisations, and providing opportunities for marginalised people Fishing/aquaculture is a part of cultural and community identity	Perceptions that seafood production industries and their families contribute to: community life; a part of towns' sense of identity; and entry-level work for vulnerable young men	- Phone questionnaires (semiquantitative, values and perceptions) - Interviews (qualitative, values and perceptions)

3.3 Ethical approval

The project was approved and overseen by the University of Technology Sydney Human Research Ethics Committee (HREC; reference ETH17-1947),⁹ including the economic and social questionnaires, interview questions and protocols for data storage and protection of participant confidentiality.

Given the sensitive commercial nature of much of the information collected through this research, special care was taken to ensure the privacy and anonymity of participants, including:

- No personal information was shared with anyone outside the project team.
- The questionnaire data were de-identified and/or aggregated so the data reported cannot be linked back to individuals.
- The raw data (e.g., paper copies of completed questionnaires) were only seen by the research team.

In terms of the interviews, we prepared a detailed consent form that participants were asked to complete as part of the interview process. This provided instructions to the project team regarding how the participants would like their stories to be used, including whether they consented to be identified, photographed and whether they agreed for the data to be archived and reused.

3.4 Study regions

The project focused on the contributions of seafood-producing industries to the State of Victoria, including to regional communities within the state. The seafood production sector is not large at the state scale, so its benefits are more significant at the level of regional communities. However, communities are not always easy to define because their boundaries are marked differently by different bureaucratic institutions and by historical and cultural customs. Moreover, communities ‘of place’ are only one of the types of communities of interest for this study. Communities ‘of practice’, such as professional fishers and aquaculturists are relevant for considering contributions of the seafood industry to wellbeing, as are ethnic communities and Aboriginal communities.

The economic analysis in this project used a regional economics approach and required specified discrete geographic areas (see Figure 11).¹⁰ For the phone surveys, the main category was ‘Victoria’ as a state, with a subset of ‘fishing/aquaculture towns’ identified by the researchers as having concentrations of seafood production via interview data collection. For open-ended interview qualitative data, it was difficult to apply fixed spatial boundaries. On the social analysis side, the definition of ‘community’ varied as appropriate to the topic. In some cases, contributions flowed to the same regions as used in the economic analysis, sometimes it was specific towns and sometimes it was communities of practice or ethnicity that transcended particular places. In the results and findings discussions, we specify the geographical regions and groups to whom contributions flowed. In the project factsheets (see Section 14), in which contributions are reported by region for wild-catch fishing and by-product for aquaculture, the interview and phone survey results relevant for those regions and products are collated.

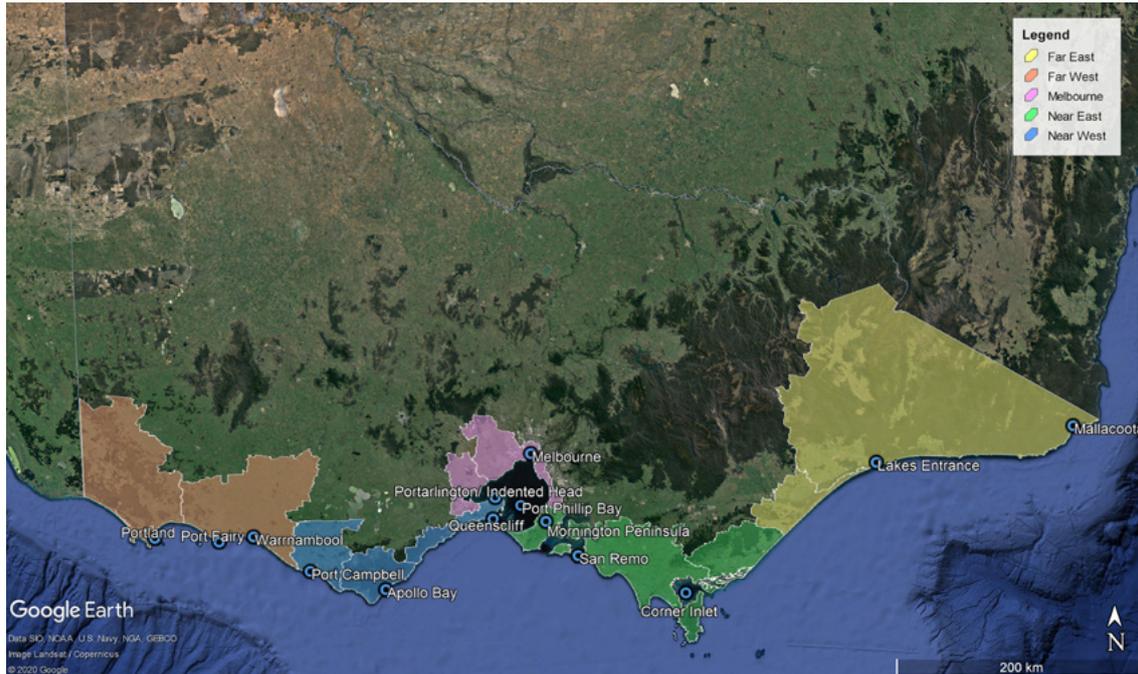
⁹ Amendments for additional information on questions for the phone surveys (reference ETH19-3727) and a small survey run in stakeholder feedback workshops (reference ETH19-4074) were also approved.

¹⁰ For further details on the specific ABS areas used in the input-output analysis, see **Appendix 2** (WRI 2019).

The initial proposed objectives for this project specified that the economic analysis would investigate regional contributions across seven coastal regions. However, we ended up using five coastal regions (see Figure 11). This was based on consideration of Australian Bureau of Statistics (ABS) data, the activity of the fishing industry and response rates across different fisheries and regions in light of the need to aggregate responses to preserve anonymity.

Figure 11. Study regions for wild-catch professional fisheries

Note: These areas use a mix of statistical reporting areas as defined by the ABS and detailed in **Appendix 2**.

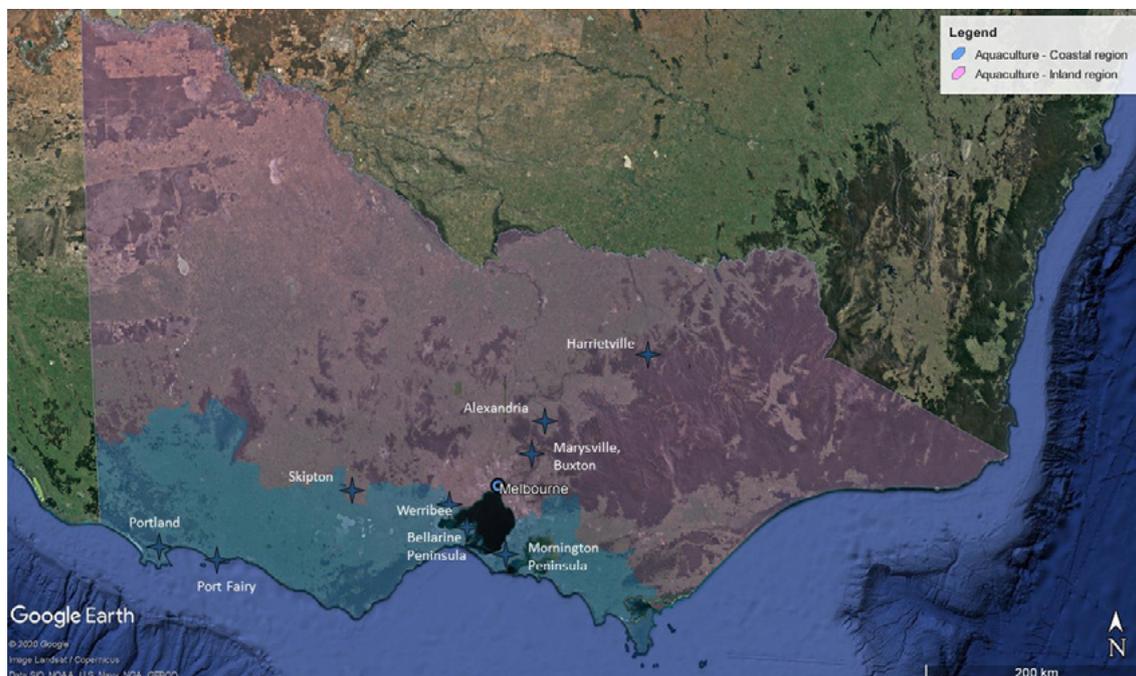


Discussions with the VFA (formerly Fisheries Victoria) regarding ways to categorise Victorian aquaculture activities led to the industry being divided into two regions: coastal seawater and inland freshwater aquaculture activities (see Figure 12). This high-level aggregation was required to protect the confidentiality of businesses that replied to the questionnaire.

Figure 12. The coastal and inland areas used to divide Victorian state aquaculture in this study, with locations of the main aquaculture operations indicated with stars.

Source: adapted from DEDJTR (2016); pers. comm. with Andrew Clark (Aquaculture Manager, Victorian Government); primary interviews.

Note: These areas use a mix of statistical reporting areas as defined by the ABS and detailed in **Appendix 2**.



3.5 Economic survey of fishing and aquaculture businesses

There has been limited formal investigation of the social and economic aspects of the Victorian professional fishing and aquaculture industries. The main recent economic studies included several analyses of different fisheries (e.g., Econsearch, 2010, 2011a, 2011b, 2011c, 2011d) and a fishing port economic valuation project (Econsearch & Roberts Evaluation, 2014). Past economic surveys of aquaculture in Victoria included Econsearch (2011a, 2011b, 2011c, 2011d, 2011e).

3.5.1 Scope of the study

There are a range of economic methods that can be used to value seafood production. The Victorian government produces GVP data, which indicates primary economic activity in terms of direct revenue at point of first sale. We examined the profitability of fishing and aquaculture businesses as used to value fishing and aquaculture industries in other Australian states. For Commonwealth fisheries, we obtained relevant data from surveys by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), such as Bath et al. (2018). For state fisheries this required an economic survey of fishing and aquaculture businesses. An economic questionnaire for Victorian state wild-catch fisheries was developed using the experience of previous studies in other states and Commonwealth fisheries (e.g., Bath et al., 2018; Econsearch, 2012, 2014; Skirtun & Green, 2015; Voyer et al., 2016). The aquaculture survey was developed based on the aquaculture survey in NSW (Barclay et al., 2016) and in other states (Econsearch, 2015).

The survey enabled us to address the Victorian industry request for an analysis of secondary economic impacts or multipliers to regional economies through relationships with service industries providing inputs for professional fishing. Regional modelling of wild-catch and aquaculture data generated from the survey was performed by the Western Research Institute (WRI; see **Appendix 2**).

The survey method was a snapshot of the 2016–17 financial year, which did not enable us to assess the long-term sustainability of the observed results. In some fisheries, there may be considerable inter-annual variability. The fish stocks underpinning the fish catch would have to be included in a much larger bio-economic modelling exercise to comment on the long-term economic sustainability of the industry.

The Victorian seafood industry stakeholders on the project Steering Committee asked us to investigate the contributions made down value chains to the point of retail. Consistent price data were lacking, and this project could not collate all of those data for Victorian fisheries and aquaculture. Instead, we have provided some indicative brief case studies of select species in **Section 3.5.8** for Gummy Shark, flathead and prawns.

3.5.2 Survey design and implementation

As part of the scoping project FRDC 2016–263, the research team held discussions with industry representatives, who indicated that there would be a reluctance among fishers and aquaculturists to provide financial data via postal survey. Rather than a postal survey, the research team decided to use a two-step process. First, to call fishers and explain the intention of the survey and the FRDC project and the type of data required, and second, to conduct the economic survey face-to-face with participants as part of the project fieldwork. Industry initially advised us to ask fishers in a given port area to meet and do the survey in groups, but it emerged this was not a feasible approach. Given the sensitivity of revealing personal financial data to their colleagues, fishers preferred individual interviews with the researchers.

We did not have a list of operators from which to select a random sample because they are confidentially held by SIV and the VFA. Instead, known fishers were contacted based on the project team’s personal contacts in each region, including industry leaders and association executives. Further contacts snowballed from there, with the aim to cover all fisheries and major towns. Because of this approach, it is important to note that some small areas of fishing activity may have been missed.

In some cases, fishers did not wish to participate. Others accepted the value of an independent assessment, noting it was long overdue. The project team expended considerable resources on explaining the intention of the project and responding to industry concerns, including direct interactions on the phone, in person and online with industry group representatives and individual fishers. To mitigate a potentially low response rate, a range of strategies to encourage greater buy-in from industry and boost response rates were used, including:

- Pre-survey phone calls were conducted with every fisher to explain the project, the economic survey and types of questions they would be asked, what the survey would be used for and the confidentiality of responses.

- Pre-visits by the social science researchers were undertaken to inform fishers about the economic survey and to leave a copy of the survey if appropriate to be followed up on at a later date by researchers.
- Face-to-face discussions about the survey were held during field visits to gain trust with the fishers. The fishers often provided copies of accounting paperwork to the researchers to reduce the time taken to complete the questionnaire.
- Industry leaders, including Steering Committee members, acted as ‘champions’ for the project, which encouraged their peers to participate by communicating the importance of the study.
- SIV published information and sending emails to licence holders and operators regarding the project and participation in the survey.
- In the absence of a peak body or association for the Victorian aquaculture industry, the VFA sent emails to aquaculture licence holders regarding the project and participating in the survey.

These efforts were made to promote the survey and to increase the response rate with a greater number of completed surveys. The project staff successfully surveyed 46 Victorian state fishers face-to-face. This was from an estimated 200–250 professional fishing businesses¹¹ operating at the time of the fieldwork, which gave an estimated response rate of 18–23 per cent. The businesses that responded represented 32 per cent of the total state fishery GVP. The level of response over different fishing methods and ABS areas required that the data be aggregated into five regions to ensure robust results, which resulted in the combination of multiple ABS regions (see Figure 11).

Contact with the aquaculture sector in the development of the project indicated that there was reluctance among aquaculture operators to share business information. However, there was a desire among industry representatives that the economic contributions of the industry should be estimated to determine the range of benefits derived from the industry. This led to discussions with the project Steering Committee regarding the best way to approach the 122 aquaculture licences registered in 2018. This included making the questionnaire as short as possible to improve response rates and reassuring prospective participants about the research team’s handling of their information.

The research team communicated with aquaculture industry representatives and VFA staff to determine the willingness of operators to be involved in this study. Those who said yes to industry or VFA representatives were included in a list of names and contact details, which was passed to the research team. The project researcher visited those on the list as part of the qualitative survey fieldwork, explained the economic survey request and determined their willingness to participate. A questionnaire was left with business owners to consider. A refined list of those who had indicated a willingness to participate in the economic survey was given to the project economist to follow up by telephone. An introductory call was made to explain the request for information and a subsequent call discussed the business and recorded information requested in the questionnaire.

¹¹ An estimate based on triangulation between: 1) A count of vessels in each region as part of fieldwork; 2) primesafe.vic.gov.au/about-us/statistical-information/; 3) an estimate from SIV.

3.5.3 GVP

For state fisheries and aquaculture, GVP was investigated through contact with VFA in respect of catch records and fish prices. The wild-catch industry is concerned that the GVP does not sufficiently reflect their value to Victoria. The regional economic contribution analysis estimates added values and employment contributions. While GVP is a measure of activity, it does not explain the profitability of the producers or the regional importance of this activity to the Victorian economy. For example, there were a range of businesses in the community providing inputs and services to fishing businesses, from which there were added values and employment contributions. These were measured through the regional economic approach, rather than by GVP (see **Section 3.5.6**).

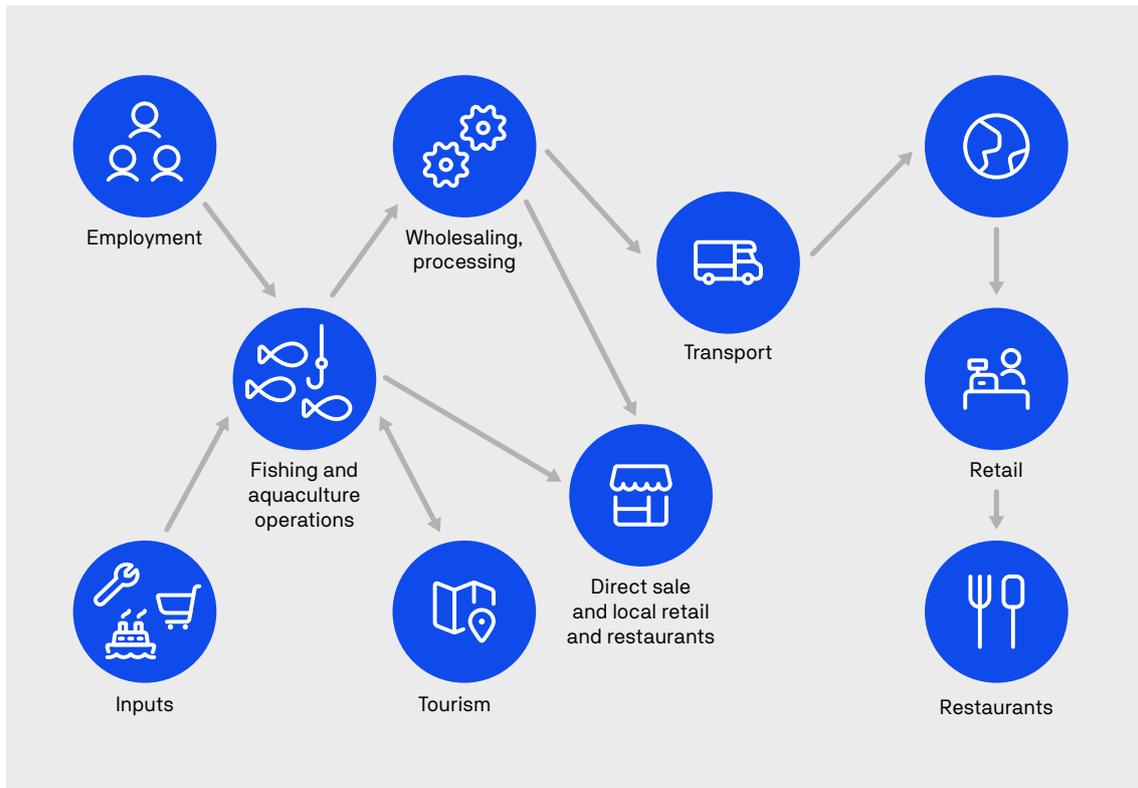
There are currently no fish price sales data being recorded in Victoria for wild-catch species other than abalone and Southern Rock lobster, for which management arrangements require prices be recorded. The only finfish species prices collected are Australian sardines, Australian salmon and eels. In the old Victorian fish markets system, local council officers collated fish sales information as part of the basis of payments to the market. At the time of the changeover from the old fish markets to the new Melbourne Seafood Centre, existing arrangement for sales and prices data collection ceased. The new private Melbourne Seafood Centre did not continue data provision.

The VFA had a statutory responsibility to provide catch data for all species in the 2016–17 period, which was forwarded to the Commonwealth data system coordinated by ABARES. The generation of GVP comes from ABARES receiving the available state price data with species catch from VFA, and then applying price estimates gained from fish price data available from other fish markets at which Victorian fish are sold.

The project economist discussed this situation with VFA data staff and ABARES staff, and then met with the Melbourne Seafood Centre staff. The Centre were open to consider the benefits that could accrue from collecting data and to consider what was involved. It was agreed that the project would gain fish price data for species sold in the market, undertake comparisons with current data used by VFA and ABARES to make GVP estimates and generate recommendations on the way forward. This contact with Melbourne Seafood Centre provided information for the identification of value added by industry in the marketing chain, which was further investigated in discussion with industry.

The VFA estimates GVP for the aquaculture sector using their records of aquaculture production by weight and average ‘farm gate’ price estimates for each species produced.

Figure 13. Simple conceptual model of the economic interactions between key professional fisheries and aquaculture activities, highlighting that GVP does not capture inputs, employment or wholesaling/processing contributions



However, GVP only provides a narrow perspective on the economic contributions made by seafood-producing industries (see Figure 13). For the purposes of a more comprehensive picture of the economic contributions made by the wild-catch fishing and aquaculture industries to regional communities, we examined the expenditures and economic viability of fishing and aquaculture businesses. Analysing business expenditures enabled us to estimate the secondary economic impacts to regional economies from fishing and aquaculture's relationships with service industries providing inputs.

Knowledge of business viability provided an important context to our understanding of the economic contributions of the Victorian fishing and aquaculture industries. Viable businesses are profitable and can invest and re-invest in their operations and make contributions to their regional economies, which are indicative of the degree of economic security in the future of the industry. From the outset of this project, most aquaculture producers were reluctant to provide data on their business operations with researchers, but were prepared to discuss the industry and issues of general viability.

3.5.4 Economic performance

3.5.4.1 Victorian State fisheries

The project economic survey conducted with Victorian state fishing operators enabled us to estimate the profitability of fishing businesses. Knowledge of fishing business profitability provided an important context to our understanding of the economic contributions of the Victorian state wild-catch industry. Profitable businesses that can invest in their operations and make larger scale contributions to their regional economies are indicative of economic security in the future in managed fisheries. The economic profitability is determined from the profit and loss accounts of fishers with certain adjustments being made, which is explained later in this section (see **Appendix 1**).

3.5.4.2 Commonwealth fisheries in Victoria

The economic performance of Commonwealth fisheries in Victoria is monitored by ABARES. Economic surveys of the Commonwealth fisheries in Victoria in the study period were undertaken and reported in several reports (e.g., Bath et al., 2018; Skirtun & Green, 2014). These reports provided profitability and costs information for regional analysis in the current study.

3.5.4.3 Aquaculture

The aquaculture industry had several past economic studies (e.g., Econsearch, 2011c, 2011e, 2011f). These reflected the difficulty in producing survey results in this small industry sector, in which competition restricts information sharing due to commercial considerations. The current study approached business owners and adapted past information to discuss 'representative' business projections with several operators in each sector. This enabled the production of operational and profitability estimates at a more aggregate level, but should be treated with caution due to the sampling limitations, variations in business scale, site differences and operational business models.

3.5.5 Investment

Investment is a strong sign of economic health and reliable information about future prospects. The economic questionnaire enabled some investigation into the levels of investment in the state wild-catch fishing industry. Businesses provided data on their assets, which enabled analysis of the average age of vessels and other assets held by the respondents to the economic survey. The survey also asked about recent capital purchases and debt levels in respect of fishery assets. The data were combined with an analysis of the qualitative interview data in relation to discussions about possible or likely future investments. Qualitative interviews for the project shed light on investment and factors affecting investment.

The aquaculture industry in Victoria has had significant capital investment by industry. The industry members of the project Steering Committee were concerned that government may underestimate the significance of these capital commitments and the risks involved. The economic questionnaire enabled some investigation into the levels of investment in the aquaculture industry. The questionnaire asked about recent capital purchases and business debt levels in aquaculture, as willingness to commit to debt may indicate investor confidence in the industry's future and resilience.

3.5.6 The regional economic analysis

3.5.6.1 Overview of regional economic analyses

We undertook regional economic modelling for catching and processing in the secondary sector of the Victorian seafood industry. We also examined the regional impacts of the Commonwealth fisheries landing product in Victoria and aquaculture production to develop a full profile of regional contributions of all fishing and aquaculture activity in Victoria. Further details on the methods used in the WRI analysis are provided in **Appendix 2**.

Regional economics investigates why economic activity occurs in different areas and the connections between different sectors of the economy in generating economic activity. Traditionally, there have been Keynesian income and expenditure approaches, and what is sometimes referred to as input–output modelling based on national accounting data. In this study, we use the Generation of Regional Input–Output Tables (GRIT) technique, which incorporates Census national accounts and other data (see **Appendix 2**). Input–output modelling has been used in many regional fishery economic studies in Australia (e.g., Econsearch, 2014, 2018; Econsearch & Roberts Evaluation, 2014; WRI, 2015).

3.5.6.2 Professional wild-catch fishing

From fishing business receipts received, the initial expenditure on inputs for fishing in the Victorian economy produces an amount of economic output. Fish catching businesses require inputs in the form of goods and services, such as fuel, nets, victualling and maintenance. The economic model estimated the ‘added value’ to the economy from this business activity.

The economic information from the operational and financial data, collected from economic surveys was used to generate regional expenditure estimates. The expenditure estimates were put into WRI’s model of the Victorian regional economy to calculate the economic impacts of professional fishing—state and Commonwealth—on regional coastal economies and at the Victorian state level. Modelling was undertaken for the 2016–17 financial year.

3.5.6.3 Aquaculture

The revenues received by aquaculture businesses enabled the estimation of the initial state-wide expenditure on inputs for production. This initial expenditure produced an amount of output in the Victorian economy attributable to the purchases by these aquaculture producers. Aquaculture businesses require inputs in the form of goods and services such as fish food, fuel, oil, electricity, small farming equipment and a range of repair and maintenance goods and services. The Victorian economy model also estimates added value to the economy from these business activities.

The economic information from the operational and financial data was used to generate regional expenditure estimates for the coastal aquaculture region (i.e., Portland to Bellarine, Central Melbourne and Port Phillip Bay area; see Figure 12). ‘Inland aquaculture’ included inland Victoria and the coast east of Melbourne, which has low mariculture activity.

The expenditure estimates were put into WRI’s model of the Victorian regional economy to calculate the economic impacts of aquaculture on regional coastal economies and at the Victorian state level. Modelling was undertaken for the 2016–17 financial year.

3.5.7 The secondary seafood sector

The project Steering Committee requested analysis into the post-harvest sector to evaluate the contributions of the industry to those businesses that sell products supplied by Victorian fishers and aquaculturists. The seafood secondary sector included processing, wholesale, retail and the hospitality sector, such as restaurants, cafes and takeaway fish and chip shops. However, there were no accurate data available for quantities, costs or prices in the different parts of the Victorian secondary sector (ABS, 2019). Therefore, only processing could be included in the quantitative economic analysis for this study. The literature on the economics of the seafood sector was limited, with one regional economic study of the economic value of Lake Entrance ports with secondary seafood sector estimates (Econsearch & Roberts Evaluation, 2014).

The number of seafood processing facilities and seafood retailers meeting the Victorian Government's Primesafe (food safety) registration criteria are reported in Table 6.

Information and price data on the post-harvest sector in aquaculture in Victoria is limited because there is no formal government requirement to record those data. The aquaculture sector supplies the food sector. The seafood processing sector data were assumed to apply to aquaculture products, which has a similar supply chain to seafood products from wild-catch sources. We applied the available data on processing for fisheries and aquaculture (ABS, 2019).

Table 6. Number of licensed processing businesses and seafood retailers in Victoria

Source: Primesafe (2018).

Licensed businesses	2017–18	2016–17	2015–16	2014–15	2013–14
Seafood processing facilities	155	149	148	148	144
Seafood retailers	195	195	211	202	209

3.5.8 Value chain case studies: fishing and aquaculture

When wild-catch seafood is landed, it is purchased for processing and enters the value chain. The final value of some end uses of seafood, such as in high-end restaurants, can far exceed the price at the first point of sale. Many people may be employed along value chains. For these reasons, industry members of the project Steering Committee wanted this study to capture the full value through to retail. However, price data along value chains is not collected in Australia and was beyond the scope of this project. We discussed with industry how to present specific value chain case studies and meet commercial confidentiality conditions. This led us to take a conceptual illustrative approach for some species to demonstrate where added value occurred.

The wild-catch and secondary sector relationships were examined through an analysis of existing catch, recovery and price data at each step in the value chain. This information was collected through interviews and discussions with VFA, ABARES and post-harvest businesses located at the Melbourne Seafood Centre and elsewhere. We identified some species for which value was added by the secondary sector, particularly in the regions.

3.6 Qualitative interviews on the social contributions of the sector

Fieldwork was conducted between April 2018 and July 2019. Each of the five study regions for wild-catch and major aquaculture regions across Victoria were visited. We contacted people interested in or working in seafood production across all types of fisheries and aquaculture in significant production regions. Participants suggested further contacts to broaden the sample, with each new participant having the choice to participate as per ethical principles. In each community, we attempted to ensure that women involved in the seafood industry were interviewed. We also contacted leaders in communities, such as local governments, local business networks, tourism authorities, Aboriginal groups, recreational fishing groups, environmental non-government organisations and local action groups, to ensure we captured the views of non-fishing/aquaculture people in the community. Initial contact with participants was made in the following ways:

- Pre-survey phone calls were conducted individually with every fisher to explain the project, the social survey and types of questions they would be asked, what the survey would be used for and confidentiality of responses. Fishers who had been contacted about the economic survey were used as a starting point because trust had been established.
- Industry leaders, Steering Committee members, cooperatives, and fishers/aquaculturists who were highly supportive of the project acted as 'champions' for the project, encouraging their peers to participate by communicating the importance of the study.
- SIV published information and sent emails to licence holders and operators about the project and participation in the survey.
- In absence of a peak body or association for the Victorian aquaculture industry, the VFA sent emails to aquaculture licence holders about the project and participation in the survey.
- Targeted invitations were sent via email and phone to community leaders, including local councils (usually the Regional Development Office), chambers of commerce, local tourism bodies, local Aboriginal groups, recreational fishing stakeholders, environmental groups and local action groups.

People approached for interviews were largely willing to participate. Numbers were limited only by the availability of researcher time. In total, 140 people were interviewed across Victoria (see Table 7).

Table 7. Types and numbers of participants

Group	Number
Fishers/fishing industry (including families)	64
Aquaculturists	19 (5 eels) ¹²
Co-ops, processors, wholesalers, etc.	14
Non-fishing/aquaculture industry (e.g., local gov, tourism, eNGOs, chambers of commerce, recreation, community groups, Aboriginal groups and restaurants)	48
Total	140

The majority of interviews were audio-recorded and subsequently transcribed in full. Where it was not possible to audio-record the interview (e.g., because of problems with background noise), detailed handwritten notes were taken. Interview transcripts and notes were entered into QSR NVivo, which is a software package for the analysis of qualitative data via thematic coding.

Coding involves researchers reading the transcripts to determine how their content relates to the themes of the project and tagging pieces of text in the system as relating to aspects of the themes. This is an iterative process through which the understanding of the themes and the coding framework in NVivo are built up through the analysis process (Bazeley & Jackson, 2013). The coding framework for this project was based on the coding frameworks used for similar projects in NSW (e.g., FRDC 2014-301; FRDC 2015-302), which were adjusted for the Victorian context because the domains of wellbeing were different, arising from research team workshops and feedback from the industry Steering Committee. The first draft of the Victorian coding framework was piloted by four members of the research team and iteratively refined. Coding accuracy was also cross-referenced by the four research team members to ensure consistency of coding. See **Appendix 4** for coding framework. Results from the interviews analysis were contextualised and triangulated with academic and technical ‘grey’ literature publications.

3.7 Telephone surveys

3.7.1 Overview of surveys and survey design

In addition to the qualitative interviews, we collected data via four telephone surveys, conducted by ORIMA Research. The social researchers on the team drafted the questionnaires with input from the industry Steering Committee and refined them into scripts for phone surveys with ORIMA staff (see **Appendix 3**: Phone survey scripts). Survey fieldwork was conducted from 16 May to 21 June 2019. The four surveys employed computer-assisted telephone interviewing (CATI) techniques.

¹² Eel production is a wild-catch fishery and an aquaculture industry, at different stages of the eel life cycle. Therefore, eel participants were wild-catch fishers and aquaculturists.

The four surveys were on the following topics:

1. General Victorian community—to explore general perceptions and values regarding seafood production in Victoria.
2. Tourism operators—to investigate the importance of Victorian seafood for the tourism sector.
3. Seafood wholesalers, processors and retailers—to investigate the importance of Victorian seafood for the secondary (post-harvest) seafood sector.
4. Hospitality business operators—to investigate the importance of Victorian seafood for restaurants, cafes and fish and chip shops.

3.7.2 General community survey

This survey employed random digit dialling. The average survey length was 18.2 minutes. The refusal rate—the proportion of people who answered the phone call but refused to participate—was 11 per cent. A total sample of $n = 1,154$ Victorians aged over 18 years was achieved. Within this sample, 150 were residents of 10 towns ($n = 15$ per town) that the researchers identified as having noticeable fisheries and/or aquaculture production. In addition to the general community survey, these respondents were asked some extra questions about the importance of seafood production to their town.

The survey data were weighted to align the sample distributions for age, gender and location with their respective Victorian population benchmarks from 2016 ABS Census data. As aquaculture/fishing communities were oversampled compared to their actual proportion of the Victorian population (0.5%), responses from these communities were weighted to align with population proportions for the overall results. Results presented for aquaculture/fishing communities independent to non-aquaculture/fishing communities were unweighted.

For this survey, overall percentage results for questions answered by at least 1,150 respondents had a degree of sampling error (i.e., confidence interval) at the 95 per cent level of statistical confidence of ± 3 percentage points (pp). There was a 95 per cent probability (abstracting from non-sampling error) that the percentage results would be within ± 3 pp of the results that would have been obtained if the entire population had responded. Higher degrees of sampling error applied to questions answered by fewer respondents and sub-groups of respondents, such as those in fishing/aquaculture towns.

Table 8 provides indicative confidence intervals (at the 95% level of statistical confidence) for different response sizes within this survey. T-tests were used to explore the statistical significance of apparent differences between groups, with results identified as significant having p-values less than 0.05.

Percentages presented in the report are based on the total number of valid responses made to the question being reported. In most cases, results reflected those respondents who had a view and for whom the questions were applicable. Percentage results throughout the report may not sum to 100 per cent due to rounding.

Table 8. Indicative confidence intervals at the 95% confidence level

Note: These confidence intervals are upper bound levels based on percentage results of 50%. For higher or lower percentage results, the confidence intervals will be narrower.

Response size (n)	Statistical precision (pp)
1,150	+/- 3
750	+/- 4
400	+/- 5
250	+/- 6
100	+/- 10

3.7.3 Tourism operator survey

The average survey length was 17.5 minutes. The refusal rate was 3 per cent. A total sample of n = 50 Victorian tourism businesses was achieved, drawn from a list of 1,316 tourism businesses located in fishing and aquaculture towns across Victoria. The list of tourism businesses was randomly generated from an Illumine database. The survey data were unweighted. Table 9 presents the list of regions and corresponding towns in scope for the research.

Table 9. Regions and towns with tourism businesses sampled as part of tourism operator survey.

Region	Towns	Number of responses
Near west	Apollo Bay, Portarlington	15
Far west	Port Fairy	10
Near east	San Remo, Port Albert, Port Welshpool, Port Franklin	9
Far East	Lakes Entrance, Mallacoota	11
Inland	Buxton, Alexandra	5

3.7.4 Survey of seafood wholesalers, processors and retailers

The average survey length was 14.4 minutes. The refusal rate was 2 per cent. A total sample of n = 50 Victorian seafood wholesalers, processors and retailers was achieved, comprising: n = 24 wholesalers, n = 31 retailers and n = 15 processors (n = 17 businesses belonged to more than one category).

The sample was drawn from a list of seafood wholesalers, processors and retailers in Victoria compiled by the researchers. Business names for the sample were acquired from the Victorian government website and contact details for each business were found via internet searches. The researchers sent a primary approach letter to suppliers to maximise participation in the research. Suppliers were provided the option to opt-in to the research process if they wished to ensure they were contacted, although only two respondents opted in.

The survey data were unweighted. Percentage results for questions answered by all respondents to the survey had a degree of sampling error at the 95 per cent level of statistical confidence of ± 14 pp. Higher degrees of sampling error applied to questions answered by fewer respondents and to results for sub-groups of respondents. The same questionnaire was used for all business types, although we have analysed some the data according to sub-groups of business types (e.g., results for retailers). Due to small sample sizes, caution should be exercised when interpreting results presenting differences between sub-groups.

3.7.5 Hospitality business survey

The average survey length was 12.3 minutes. The refusal rate was 2 per cent. A total sample of $n = 50$ Victorian hospitality businesses was achieved, drawn from a list of approximately 800 hospitality businesses in Victoria. The list of hospitality businesses was randomly generated from an Illumine database.

The survey data were unweighted. Percentage results for questions answered by all respondents to the survey had a degree of sampling error at the 95 per cent level of statistical confidence of ± 14 pp. Higher degrees of sampling error applied to questions answered by fewer respondents and to results for sub-groups of respondents. Due to small sample sizes, caution should be exercised when interpreting results presenting differences between sub-groups.

3.8 Co-design and validation of results with industry stakeholders

Consultation with stakeholders was an important part of the project methodology. At the start of the project, a Steering Committee was formed with a small group of eight interested people from industry, who were identified through the exploratory project (FRDC 2016-263). Early discussions informed the design of the economic survey, data collection protocol and questions for qualitative interviews. The Steering Committee also provided extensive input into the telephone survey scripts.

After analysis was completed, researchers took presentations of preliminary findings on a 'roadshow' to the main study regions during late August and early September 2019. Seven workshops were conducted—Lakes Entrance, Welshpool, San Remo, Melbourne, Drysdale, Apollo Bay and Port Fairy—to ensure those who participated in the project could attend one within a reasonable distance of where they lived. Professional fishing and aquaculture industry people were invited, as were interested others from community groups, municipal councils and government agencies. A total of 53 people attended the seven workshops (range: 4–17 participants). Findings were validated with participants, with questions addressed in writing up the project in this report.

As part of these workshops, participants were given a short six-question survey to measure the level of importance of the different types of contributions made by the seafood industry to communities. The questions matched the questions given to community members in fishing and aquaculture towns as part of the public survey.

3.9 Limitations

One limitation of the study was that it encompassed the entire state of Victoria. This very broad coverage meant it was not possible to go into great depth in any particular location, so the study could not capture the full nuance of situations in each place that has a seafood production industry.

Another limitation was that the different methodologies employed were only partially integrated. There was substantial overlap, and the interviews and phone survey analyses provided insight for the economic analysis. However, to gain the most value from each method, they were pursued in the form that best suited each method. For example, the economic analysis required the use of ABS data, so the study regions were lined up with ABS statistical areas. However, for the phone survey, it would have been difficult to achieve a representative sample within those boundaries, with very little improvement to the research findings. For the phone survey, the main spatial area was 'Victoria', with a subset of particular fishing/aquaculture towns, and all participants were asked various questions about their visits to 'the coast'. Likewise, to ask participants to limit their answers to particular statistical areas would have been difficult and yielded minimal improvement to research findings, so participants referred to relevant spatial areas. The spatial areas and communities receiving contributions as evidenced by each method are specified in the discussion of results.

A third limitation was that each domain of wellbeing did not have an equal weighting of quantitative, semiquantitative and qualitative data and analysis methods. To more clearly state the extent of contributions and explore the effects of the contributions on the domains of wellbeing, more thorough data collection and analysis across all the domains would be useful. Within the constraints of the project scope and budget, efforts in this project were aimed at the important domains of local economies, food supply, and connections to tourism, recreation and hospitality sectors, whereas less data were collected on the other domains.

For further discussion on ways the methodology could be improved or further developed, see **Section 10**.

Corner Inlet Garfish
Credit: Kirsten Abernethy



4 Results—economic resilience and diversity

Domain of community wellbeing	Dimensions of wellbeing	Contributions of Victorian seafood production	Indicators	Data collection methods (and types)
Economic diversity and resilience	Material (regional income, household income, employment, etc.)	Primary economic impact through direct revenue and business profitability Secondary economic impacts (or multipliers) Employment	GVA, GVP Business profitability and employment Regional inputs (multipliers), including value added, household income and employment Investments FTE positions Types of work, i.e., entry-level v. skilled	- Government production and price data (quantitative) - Economic questionnaire (quantitative, financial) - Interviews (qualitative, values and perceptions)
	Relational (existence of mutually supportive elements in the economy)	Clients for service and supply businesses Supply raw material and experiences for post-harvest businesses Provide baseline year-round economic activity in contrast to seasonal tourism activity	Value of the secondary (post-harvest) seafood sector, including wholesale, processing, retail, hospitality, tourism Post-harvest supply chain characteristics Importance of Victorian seafood production to the post-harvest sector	- Government production and price data (quantitative) - Economic questionnaire (quantitative, financial) - Interviews (qualitative, values and perceptions) - Phone questionnaires (semiquantitative, values and perceptions)
	Subjective (perception that the economy is healthy)	A community sense that seafood production adds diversity and increases activity in the regional economy	Belief that seafood production is important to regional economies (including among recreational fishers)	- Phone questionnaires (semiquantitative, values and perceptions) - Interviews (qualitative, values and perceptions)

4.1 Overview

This section presents the economic contributions made by professional fishing and aquaculture to Victoria and its regions, including:

- Quantitative results from the economic surveys and analysis at the state level to determine the economic contribution of professional fisheries and aquaculture to the Victorian state (see **Section 4.2**).
- Quantitative results from the economic surveys and analysis at the regional level to determine the economic contribution of professional fisheries and aquaculture to regional Victoria (see **Section 4.3**).
- Analyses of qualitative interview and phone surveys data to develop further insights and nuance to the economic contribution of professional fishing and aquaculture to Victoria and to regional communities (see **Sections 4.2 and 4.3**).

Key findings

The economic contributions of professional fishing—state and Commonwealth fisheries operating in Victoria—and aquaculture to Victoria for the 2016–17 financial year were:

- \$155 m GVP (\$54 m State professional fisheries, \$48 m Commonwealth professional fisheries, \$48m aquaculture). Previously, Commonwealth fisheries have not been included in Victorian fisheries GVP estimates, yet they are often integrated with state fisheries.
- \$323 m of added value (\$112 m State professional fisheries, \$111 m Commonwealth professional fisheries, \$100 m aquaculture).
- \$186 m of household income (\$55 m State professional fisheries, \$74 m Commonwealth professional fisheries, \$56 m aquaculture).
- 3,101 FTE jobs (909 State professional fisheries, 1,205 Commonwealth professional fisheries, 987 aquaculture).

Processing is included in the above economic contribution estimates. Processing derived from Victorian seafood production is estimated to contribute \$37 m of added value and 645 FTE jobs. In this study, processing did not include wholesale or other parts of the secondary seafood sector such as retailing or food services. In the phone survey of seafood wholesalers, processors and retailers, 94 per cent of respondents said Victorian product is important to the success of their business, and the majority said that past fishery closures have caused job losses, loss of profits and loss of customers in the sector.

It was beyond the scope of this project to undertake a full quantitative value chain analysis, due to the lack of data about prices along supply chains to retail. However, we captured aspects of value chains through interviews and phone surveys.

Regional modelling confirmed the importance of professional fishing to regional Victoria for the 2016–17 financial year:

- Far East Coast (East Gippsland): \$76 m of added value, 810 FTE jobs.
- Near East Coast (Gippsland, Mornington Peninsula): \$26 m of added value, 298 FTE jobs.
- Melbourne area (Melbourne, Geelong): \$28 m of added value, 276 FTE jobs.
- Near West Coast (Bellarine Peninsula, Great Ocean Rd): \$22 m of added value, 198 FTE jobs.
- Far West Coast (west of Warrnambool): \$42 m of added value, 352 FTE jobs.

Regional modelling confirmed the importance of aquaculture to regional Victoria for the 2016–17 financial year:

- Coastal aquaculture: \$35 m of added value, 427 FTE jobs.
- Inland aquaculture: \$52 m of added value, 447 FTE jobs.

Contributions to economic wellbeing were rated as being the most important of the five domains of wellbeing contributions to Victorian regional communities in interviews and phone surveys. Key contributions to community economic wellbeing that were not captured in the economic modelling analysis emerged in the social analysis, including:

Seafood production is valued because it adds to the diversity of economic opportunities, which is critical for economic resilience in regional towns, especially in places in which there are few alternative industries and where it can alleviate dependence on large sectors or companies.

- Fishing and aquaculture contribute to economic stability of communities because they provide a year-round baseline of activity, which keeps local regional economies ‘ticking over’ when other industries (e.g., tourism) operate seasonally or intermittently.

The social analysis provided context and nuance regarding how the seafood industry contributes to the types and nature of employment opportunities in regional communities:

- Interviews described the diversity of jobs in fisheries and aquaculture production, the diversity of business types that provide inputs into production, and the diversity of post-harvest businesses, including those jobs associated with transport, processing, wholesaling, and retailing Victorian seafood. In-depth interviews indicated that the professional fishing and aquaculture industries consciously make efforts to support local businesses in the region they operate.
- Interviews and secondary sources revealed that employment in seafood production requires a diverse and often high-level specific skillset, but also provides entry-level jobs.
- The seafood industry provides jobs for people who might find it difficult to get work elsewhere, people who may have struggled in life, or who may not easily fit into mainstream life.
- There are opportunities for young people to enter the seafood industry. However, the professional fishing industry struggles to attract young people, while the aquaculture industry attracts young school leavers or graduates into entry-level work.
- The Victorian seafood industry tends to be male-dominated with low percentages of women in the production sectors. However, in the processing sector, there appears to be a more equal gender balance.
- The professional fishing and aquaculture sectors are not very ethnically diverse. However, the post-harvest sector in Victoria has always been characterised by ethnic diversity, with a large proportion of the post-harvest sector born outside of Australia.

4.2 Economic contribution of professional fisheries and aquaculture to Victoria

The economic contribution of the seafood industry to Victoria at the state level in 2016–17 is measured using several economic indicators. In this section we report on:

1. GVP
2. business profitability
3. industry investment
4. the regional economic modelling analysis at the state level (analysis at the regional level follows in **Section 4.3**).

GVP and the estimated economic profit among fishing and aquaculture business operators relates to the revenue generated directly by the industry (primary production). They were examined through existing catch and price data obtained from the VFA and ABARES and the economic questionnaire of Victorian fishing and aquaculture businesses. Investments in the Victorian state professional fishing industry were identified from the economic survey responses, and the level of aquaculture investment was analysed through examination of capital investment. The economic impact of professional fishing and aquaculture production to the Victorian state economy was quantified using expenditure estimates inserted into a model of the Victorian regional economy.

The economic approach taken in this study focused on seafood sold in Victorian markets, although it is important to consider the role of exports. The total value of seafood exported from Victoria was \$202.5 m dollars in 2016–17, which represented 11,004 t of product (ABARES, 2018). This indicates that the Victorian market is a hub for seafood exports because the total production of the Victorian fishery in 2016–17 was 4,845 t. The remainder of fisheries produce comes from Victorian-based Commonwealth fisheries, which according to our analysis was 10,190 t in 2016–17, or from fisheries in other states, which passes through Victoria’s distribution networks.

Any interstate trade activity through Victoria will be additional to the estimates made in this report. Over the past few years, several free trade agreements have reduced tariffs in export markets. Exports have altered to capitalise on these more advantageous export distribution paths. The influence of China is particularly strong in the Rock lobster and abalone export markets and in increasing levels of investment in seafood businesses.

4.2.1 GVP

4.2.1.1 Professional fishing GVP

For professional wild-catch fishing, GVP is a revenue measure estimated from the available catch and price data and is a gross measure of the economic activity of the wild-catch fishing industry to the Victorian economy. GVP relies on catch logbook, landings and estimated price data from VFA and ABARES. It is the production value at the first point of sale and does not include the secondary seafood sector (e.g., processors, wholesalers and retailers). Victoria’s production from state wild-catch fisheries was 4,845 t in 2016–17 and had a GVP of \$54.36 m (ABARES, 2018; VFA, 2018b).

The Victorian state professional fisheries GVP is dominated by the abalone and Southern Rock lobster fisheries, which together represent 78 per cent of the total GVP in 2016–17. The remaining other species are finfish and other crustaceans and molluscs, such as those reported in Table 10.

Table 10. Victorian state professional fisheries by weight in tonnes and value (GVP) 2016–17

Source: (ABARES 2018).

Group & species	Tonnes	Value \$'000
Crustaceans		
Southern Rock lobster	262	22,856
Prawns	74	931
Crab	10	127
Other	105	964
Total crustaceans	451	24,878
Molluscs		
Abalone	716	20,499
Squid	33	363
Octopus	45	149
Other	46	265
Total molluscs	840	21,276
Fish		
Australian sardine	2,344	1,711
Black bream	48	538
Southern garfish	61	460
Shark	19	105
Snapper	54	517
Eel	93	1,308
Australian salmon	265	162
King George whiting	115	1,990
Other	555	1,416
Total fish	3,554	8,207
Total wild-catch fisheries	4,845	54,361

The existing catch records held by the VFA were used to develop the GVP of the catch in each of the five regional study areas along the Victorian coast (see Table 11). The detail of the regions—Far West, Near West, Melbourne, Near East and Far East—are given in **Appendix 1**.

Table 11. The GVP by fishery and study region for Victorian state fisheries 2016–17

Source: VFA data request and ABARES data and VFA (2018b).

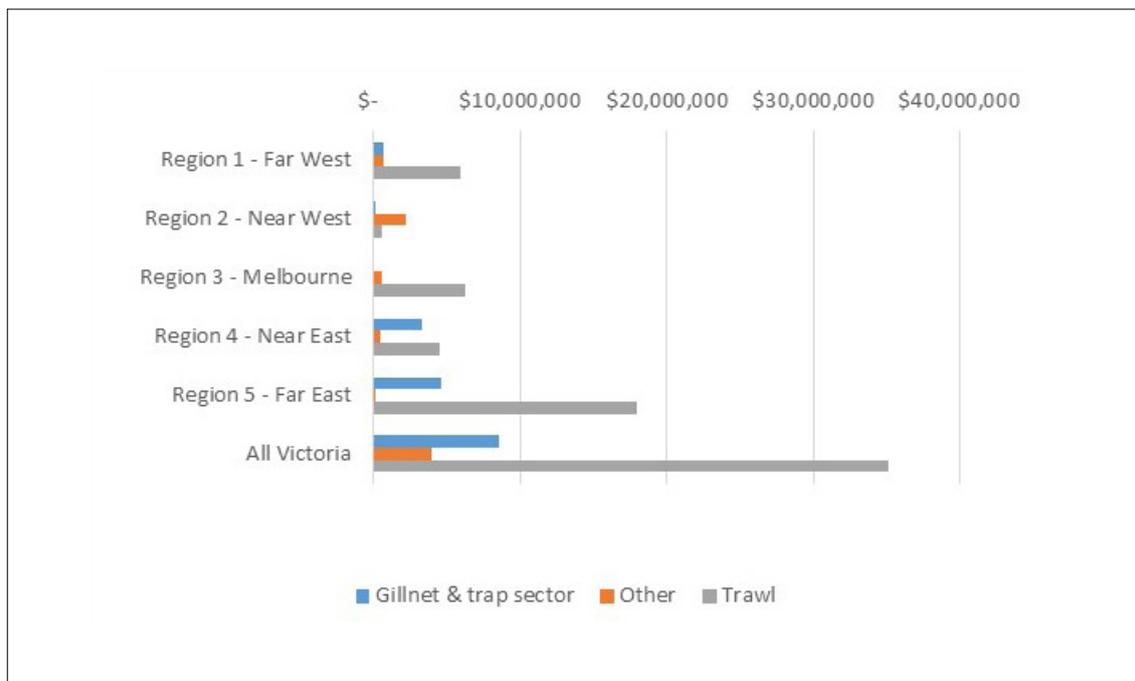
Region	Abalone \$	Southern Rock lobster \$	Other species \$	Total \$	% total GVP
Far West	1,803,690	14,102,180	870,224	16,776,094	31%
Near West	2,719,850	4,902,786	607,138	8,229,774	15%
Melbourne	2,719,850	962,868	1,516,147	5,198,865	10%
Near East	2,719,850	1,544,549	3,882,890	8,147,289	15%
Far East	10,535,840	-	5,474,164	16,010,004	29%
Total	20,499,080	21,512,383	12,350,563	54,362,026	100%
% Total GVP	38%	40%	23%	100%	

In Victoria, finfish price data for state wild-catch species are not available for GVP calculations. Price data are collected by VFA for the abalone and Rock lobster fisheries, but records from the sale of finfish at the Melbourne Seafood Centre (MSC) are not recorded for market sales. The VFA are required to estimate the GVP and approach ABARES to use price data available for Commonwealth fishery finfish species and other sources interstate, to estimate Victorian state finfish prices. During fieldwork, we obtained price data from a sample of wholesale agents at the MSC. Comparisons with ABARES price data indicated a potential underestimate in current GVP of up to \$1.5 m during 2016–17 due to specific finfish data not being available from Victorian state fisheries. This remains an issue for industry and government to jointly address.

Commonwealth fisheries production landed in Victoria was 10,187 t in 2016–17 and had a GVP of \$47.57 m (ABARES, 2018). This was from the SESSF and squid fishery landings in Victoria. The distribution of the GVP in each study region is reported in Figure 14. These data indicate that 73.8 per cent of GVP is from the trawl fishery, 18 per cent from the gillnet and trap fishery and 8.2 per cent from other methods. The Far East region has 48 per cent of the Commonwealth professional fishing GVP in Victoria, with Near West region 6 per cent and the other regions between 14–17 per cent (ABARES data request).

Figure 14. The GVP by region for the Commonwealth professional fishing landings in Victoria—trawl, gillnet, hook and trap and other methods—during 2016–17

Source: ABARES data supplied to the researchers upon request.



4.2.1.2 Aquaculture GVP

For the aquaculture industry in Victoria, GVP is estimated from the production data available from the VFA and then estimated average price per species obtained from industry contracts by VFA. This provides a GVP estimate at the first point of sale. This does not include the secondary food sector (e.g., processors, wholesalers, retailer or food services) nor inputs and services to aquaculture businesses.

Victoria’s production from aquaculture was 3,150 t in 2016–17 and had a GVP of \$48.27 m (VFA, 2018b). Of the state total, \$22 m (46%) was produced by coastal aquaculture and \$26.2 m (54%) by inland production (see Table 12).

Table 12. The production and GVP by study area of different aquaculture species produced in coastal and inland Victoria in 2016–17

Source: VFA (2018b).

Note: * Only numbers of fish are given for ornamental sector.

Region	Species sector	Weight (tonnes)	Value (%'000)	% of value
Coastal	Abalone	462	17,716	37%
Coastal	Mussels	1,136	4,316	9%
	Total Coastal	1,598	22,032	46%
Inland	Salmonids	1,282	14,674	30%
Inland	Native finfish	256	11,565	24%
Inland	Yabby	3		
Inland	Other	6		
Inland	Ornamental	2,283*		
	Total Inland	1,547	26,239	54%
	Total	3,145	48,271	100%

4.2.2 Business profitability

4.2.2.1 Professional fishing business profitability

Knowledge of fishing business profitability is important to understand the economic contributions of the Victorian professional fishing industry. Profitable businesses can invest in their operations and make larger scale contributions to their regional economies and are also indicative of the economic security of the future of managed professional fisheries. The financial and economic survey of the operations of Victorian fishing businesses was used to determine business profitability. The full results are reported in **Appendix 1**.

The survey of state professional fishing operators had 46 survey responses from 200–250 businesses, an 18.4–23 per cent response rate, from businesses that represented 31.7 per cent of state-wide fishing revenue. The responding businesses had more gross revenue from fishing activity than the non-responding businesses and we can comment accurately on their profitability. However, when making inferences about state-wide fishing profitability, readers should recognise that non-respondent fishers may have had less fishing activity with unknown associated profitability.

The number of survey responses meant that the sample was sufficient to complete an analysis of the performance of businesses within the Southern Rock Lobster Fishery and to examine the Western and Eastern Zones, into which the fishery is divided for management. However, for abalone divers, limited survey responses prevented dividing results by fishing zones (there are three management zones) due to fewer than five responses per zone, which created confidentiality issues in our reporting with results for individual businesses potentially visible. Therefore, the assessment is limited to abalone operators, some of which may own licences and some quota, although most do not.

Business profitability was determined from the profit and loss accounts of fishers with certain adjustments being made (see **Appendix 1**). Economic profitability requires the opportunity costs of labour and capital to be included with accounting results. An economic profit is when a level of return is more than a normal return to capital, which attracts investment or new entrants into a fishery. The opportunity cost of capital follows ABARES values applied in fisheries surveys, at the rate of seven per cent per year (George & New, 2013). This exceeds the real interest rate that could be earned on an investment elsewhere and accounts for some investment risk in the fishing industry. An economic loss, as seen in a negative economic rate of return, means that a business forgoes the opportunity costs of capital and labour, but can still be at a level at which fishing operations continue.

Often a fishing business may operate at a financial surplus, although not at a sufficient level to offset the potential earnings if they choose to invest in an alternative industry. The annual survey method was a snapshot of a given financial year (2016–17) and did not enable us to assess the long-term sustainability of the observed results, particularly for fisheries where inter-annual variability is a feature. The fish stocks underpinning the fisheries would have to be included in much larger bio-economic modelling exercise to comment on the economic sustainability of the industry.

The results for state professional fishing business profitability are divided into the following groupings:

- Southern Rock lobster—Eastern Zone (RLE)
- Southern Rock lobster—Western Zone (RLW)
- Victorian abalone (AB)
- Restricted Access 1 (RA1)
- Restricted Access 2 (RA2).

The two restricted access fishing businesses comprised the remainder of the Victorian state professional fishing businesses, who primarily catch finfish. These were divided into two groups to reflect the differing amount of capital in businesses and size of vessel, often being much smaller for inshore and bay fisheries. The RA1 category included fishing businesses who fished for wrasse, pipi collectors, bait fishers, and bay and inlet fishers in Gippsland Lakes, Corner Inlet and Port Phillip Bay. RA2 businesses included inshore trawlers and ocean access fisheries, with some of these businesses also fishing using Commonwealth entitlements, which we apportioned out by asking the operators to apportion state and Commonwealth fish catch revenue. The survey results were from a diverse range of businesses and small sample sizes, so averages should be interpreted with caution.

The business operating results indicated the businesses in the different groupings were viable and had operating profit under traditional accounting measures. This was a positive result, which required further analysis to determine the economic profitability (see Table 13 and **Appendix 1**).

The professional fishing businesses in the RLE had a return to capital of –2.3 per cent in 2016–17, and the RA1 group (i.e., smaller, less capitalised businesses) had –1.1 per cent, just under a normal economic rate of return to capital (see Table 14). The Victorian abalone divers had a normal return to capital of 0 per cent, and the RLW had –0.1

per cent, both normal economic returns. The RA2 group (i.e., larger more capitalised offshore businesses) returned an economic surplus of 14.5 per cent. However, this finding requires some caution in interpretation. In the RA2 group, the value of fishing licences are not well established in these fisheries and while they have restricted catch limits, they do not operate under an individual transferable quota (ITQ) system like rock lobster and abalone, which have known ITQ values. Additionally, the vessels are old. Having fully depreciated capital assets meant the rate of return could be misleading in this small sample size for RA2 (n = 8 vessels). The results may also include some Commonwealth fishing activity not fully apportioned in survey responses. **Appendix 1** includes a fuller discussion of the economic performance results and assumptions.

Some of the fishing businesses who owned quota (e.g., Southern Rock lobster and abalone) chose to lease it out to other operators rather than fish it themselves. The survey findings also showed that RLW businesses had quota leasing expenses of an average \$191,287, which exceeded those of the RLE, which averaged \$28,099. The abalone diving businesses in both regions surveyed were paid on a contracted per kilogram of catch basis and had no lease expenses.

The survey indicated that higher product prices aided economic returns in these ITQ-managed fisheries.

Table 13. Revenues, costs and economic rates of return for a representative wild-catch fishing vessel in Victorian state fisheries

Source: project economic survey.

Note: * Licence values estimated from limited available data.

#	Revenue or cost	RA1	RA2	RLE	RLW	Abalone (divers)
	Observations (n = 46)	17	8	8	8	5
1	Gross Revenue (\$)	230,866	538,249	176,064	665,056	226,434
	<i>Less costs (\$)</i>					
	Cooperative commission	8,756	37,586	460	0	0
	Bait	13,878	455	11,539	27,685	0
	Boat fuel	9,493	23,701	11,196	31,368	6,232
	Repairs and Maintenance	11,731	14,823	4,718	17,917	6,923
	Gear replacement	5,672	4,617	2,084	6,715	637
	Other items	2,072	1,394	100	411	3,107
	Other costs	3,376	338	1,283	20	70
	Protective Clothing/ other	388	313	198	1,073	1,504
	Vehicle Fuel	3,953	1,132	4,609	1,482	3,776
	Freight	8,140	2,485	79	5	0
	Labour—paid	34,991	183,772	16,840	96,752	69,167

#	Revenue or cost	RA1	RA2	RLE	RLW	Abalone (divers)
2	Labour—unpaid	31,519	12,923	27,975	12,466	0
3	Total variable costs (\$)	102,450	270,616	53,108	183,428	91,416
	Boat registration	1,586	9,840	4,068	4,645	444
	Brokerage	0	0	290	3,100	23
	Vehicle registration & repair	761	4,221	789	899	1,384
	Insurance	2,855	5,742	3,302	7,763	3,533
	Licence fees	4,613	4,131	9,571	16,411	1,067
	Accounting and legal	2,410	2,820	1,976	2,830	3,086
	Litigation	13,851	50	77	0	0
	Telephone	2,279	1,506	1,257	2,000	3,607
	Power	5,395	1,971	485	3,759	130
	Rates and rent	4,385	733	268	658	1,953
	Bank charges	1,146	501	202	356	166
	Building/plant repair	207	0	8	689	0
	Vehicle repair	615	255	1,051	926	317
	Travel	108	426	152	2,151	5,392
	Memberships/other	169	135	186	350	168
	Other costs	3,239	4,100	2,868	5,210	2,067
4	Interest	9,569	1,326	648	25,760	2,000
5	Leasing	0	4,091	28,099	191,287	0
6	Total fixed costs (\$)	53,189	41,848	55,297	268,794	25,339
7	Total boat cash costs (\$)(3 + 6)	155,638	312,464	108,406	452,222	116,755
	Boat gross margin (\$)(1 – 3)	128,416	267,633	122,956	481,628	135,019
2	Unpaid labour	31,519	12,923	27,975	12,466	0
	Gross operating surplus (\$)(1–7+2)	106,746	238,708	95,633	225,300	109,680

#	Revenue or cost	RA1	RA2	RLE	RLW	Abalone (divers)
8	Boat cash income (\$)(1-7)	75,227	225,785	67,658	212,834	109,680
9	Depreciation (economic)	17,958	38,500	7,382	9,634	6,119
10	Boat business profit (\$)(8-9)	57,270	187,285	60,277	203,201	103,561
11	Profit at full equity (\$)(10 + 4 + 5)	66,839	192,702	89,024	420,248	105,561
12	Boat capital (CV) (\$)	289,297	410,000	111,024	297,320	98,863
	Boat capital (RC) (\$)	430,331	1,883,138	318,259	499,666	298,236
	Licence/quota value*(\$)	310,000	425,000	1,200,000	5,600,000	1,400,000
13	Total capital (\$)	599,297	835,000	1,311,024	5,897,320	1,498,863
	Rate of return on boat capital	23%	47%	80%	141%	107%
	Rate of return on total capital	67%	22%	35%	60%	33%
8	Boat cash income (\$)(1-7)	75,227	225,785	67658	212,834	109680
	Unpaid labour	31,519	12,923	27975	12,466	0
	Opportunity cost of capital (7%)	41,951	58,450	91772	412,812	104920
9	Depreciation (economic)	17,958	38,500	7382	9,634	6119
	<i>+ interest, leasing, management fees</i>					
	Interest	9,569	1,326	648	25,760	2000
	Leasing	0	4,091	28,099	191,287	0
	Net economic returns (\$)	-6,630	121,329	-30,722	-5,030	640.56
14	Economic rate of return to capital	-1.11%	14.53%	-2.34%	-0.09%	0.04%

The economic performance of the Commonwealth fisheries in Victoria is monitored by ABARES. Economic surveys of the Commonwealth trawl sector, the gillnet, hook and trap sector fisheries in Commonwealth waters off Victoria were reported Bath et al. (2018). The economic net return in 2016–17 for the Commonwealth Trawl Sector was \$4.2 m across the fishery, and for the gillnet, hook and trap sector \$1.57 m, which exceeded normal returns (Bath et al., 2018).

4.2.2.2 Aquaculture business profitability

The in-depth qualitative interviews were conducted before the economic surveys were attempted with the Victorian aquaculture industry. During these interviews, only ten aquaculture businesses indicated that they were prepared to discuss and share economic data on their businesses. This low response rate limited data that were gained and how we could present results within confidentiality constraints.

The economic surveying approach was altered to focus on the viability of the main species cultured in each study area: salmonids (inland) and abalone (coastal). Information from past surveys (e.g., Econsearch, 2011c, 2011e, 2011f) was adapted to 2016–17 price levels using the consumer price index and developed into a profile of a ‘representative’ farm and a ‘state-wide summary’ for each sector. Those willing to participate were called and given the choice to amend the projected data estimates, rather than completing the original survey. Telephone calls and email were used to refine the estimates to make a ‘representative farm unit’ and a ‘state-wide industry projection’.

The projections for abalone farms indicated that the 100 t unit and state-wide industry may have an estimated rate of return to capital of 24 per cent and an economic rate of return to capital of 16 per cent. The projected estimates indicated that the abalone farming sector had a return over the opportunity costs of capital (8%), which would attract businesses to enter the industry. The trout sector had a projected 4 per cent economic return, which reflected trout production and other recreational ‘fishing out’ income. Discussions with operators indicated that returns in the trout sector varies significantly with the farm business model, the scale of the operation and across a variety of site locations and different farm configurations.

4.2.3 Industry investment

4.2.3.1 Professional fishing investment

Past and current investments in the Victorian state professional fishing industry were identified from the economic survey responses. The economic survey asked about the assets held by fishing businesses and the age of assets to assist with depreciation calculations.

Of the 46 businesses with boats who responded, there was only evidence of three businesses (two in RLW and one in the RA2 group) who were repaying recent investments in boat capital. This suggests there is some security in the RLW management regime and market prices for product, with a few businesses prepared to go into longer term investments in boat capital with associated debt.

The survey asked about interest and debt repayments for capital expenditure and fishery access, such as licences or quota. Overall, 66 per cent of the fishing businesses had no debt. A total of six from eight RLW interviewed had taken on debt of different amounts for quota purchases with average interest repayments of up to \$25,760 per annum. For RA1 businesses, 8 from 17 surveyed had taken on debt for a range of purposes, with interest repayments averaging \$9,569 per annum (see Table 13).

The survey results indicated that many fishing businesses spent a maintenance level of annual capital expenditure to keep vessels operating rather than going into debt for new vessels. There were signs of some Southern Rock lobster businesses borrowing to fund new vessels and purchasing fishing quota, which demonstrated confidence in the future.

Investment in Commonwealth fisheries was evident in the SESSF, in which capital was made giving rise to debt (Bath et al., 2018). While the capital investment, depreciation and debt were assessed by ABARES in the course of their surveys, the specific amount of new annual investment was not reported (Bath et al., 2018).

4.2.3.2 Aquaculture investment

Capital investment in the aquaculture industry occurs in the form of site purchases, building farms and ponds and major equipment. There are also short-term capital investments in other infrastructure, farm equipment, vehicles and smaller machinery.

Investment is a strong sign of economic health and reliable information about future prospects. Capital outlay has occurred in several instances, which indicated healthy investor sentiment among informed operators. Several such indications in the aquaculture industry were as follows:

- Applications to double the size of an abalone farm at Portland in Far West Victoria and another at Indented Head on the Bellarine Peninsula.
- Release of 41 additional Crown lease sites in Port Phillip Bay and Western Port in 2017, which were successfully subscribed to by existing industry participants.
- Expansion in the native finfish Barramundi hatchery and culture sector.
- Industry investment developing salmon, Rainbow trout and Brook trout *Salvelinus fontinalis* roe.
- Expansion opportunities surrounding Murray cod *Maccullochella peelii* with the successful Australian Securities Exchange fundraising undertaken by Murray Cod Australia Ltd.

These investments in the sector were an indication of the future value to be captured in return for current outlays. This investment and the growth of the aquaculture sector and the information on profit in the salmonid and abalone culture sectors indicated a healthy aquaculture sector with prospects in Victoria.

4.2.4 Regional economic modelling—state level results

The estimation of regional economic contributions was undertaken by the regional development research organisation WRI (see **Appendix 2**). The expenditure estimates were inserted into a model of the Victorian regional economy to calculate the economic impacts of professional fishing and aquaculture production on regional coastal economies, and at the Victorian state level. Modelling was undertaken for the 2016–17 financial year. Detailed results of the WRI regional analysis of five areas for Victorian state and Commonwealth wild-catch fishing and aquaculture production are presented in **Appendix 2**. The results for processing in the secondary sector are presented in **Appendix 1**.

The economic impact results from the regional economic modelling commenced with the overall state-wide contributions in state and Commonwealth fisheries and aquaculture, including the impacts of processing and the indirect impacts of inputs and services into the industries (see Table 14). The regional results are presented in the next section. The disaggregated tables behind the summary tables presented in these sections are reported in **Appendix 1**.

Table 14. A combined total economic impact for state and Commonwealth professional fishing and aquaculture in Victoria

	Output (\$ m)	Added value (\$ m)	Household income (\$m)	Employment (FTE)
All Victoria state fisheries				
Direct				
Catching sector	51	32	13	346
Processing		18	10	197
Indirect		61	32	366
Total impact (direct + indirect)		112	55	909
All Victoria Commonwealth fisheries				
Direct				
Catching sector	44	19	17	452
Processing		11	13	258
Indirect		81	44	495
Total impact (direct + indirect)		111	74	1,205
All Victoria aquaculture				
Direct				
Aquaculture production sector	44	14	11	334
Processing		8	10	190
Indirect		77	36	463
Total impact (direct + indirect)		100	56	987
Combined state, Commonwealth & aquaculture				
Direct				
Catching + Aquaculture production sectors	138	65	40	1,132
Processing		37	33	645
Indirect		220	112	1,324
Total impact (direct + indirect)		323	186	3,101

Box 1. Explanatory note: differences between this study and the National Fisheries and Aquaculture Contributions Study (FRDC 2017-210) on contributions from Victorian professional fisheries and aquaculture

Two FRDC projects (2017-092 Valuing Victoria's wild-catch fisheries and aquaculture industries and 2017-210 National Fisheries and Aquaculture Industry Contributions Study) included studies that produced estimates of the economic contribution of Victorian fisheries and aquaculture industries to the Victorian economy. The two independent studies reported contributions for 2016-17 and 2017-18, respectively. Both studies used the input-output regional modelling approach and reported estimates of direct and indirect contributions to GVA, Employment (FTE) and Household Income (HI), for state and Commonwealth fisheries and aquaculture catch/production and processing sectors.

Overall, estimated total direct and indirect contributions for fishing and aquaculture combined was higher for each of the three indicators in the national study (2017-210). This is consistent with higher levels of GVP reported in 2017-18 for the catch/production sectors for Victorian state and Commonwealth fisheries and for aquaculture than for 2016-17. Given the differences in GVP, the difference in estimated contributions is quite small. Likely explanations are:

1) The proportion of GVP that comprises business spending on intermediate goods is higher in the Victorian study, which translates to larger proportionate indirect effects. This difference is most marked in the Commonwealth fisheries and aquaculture sectors. While part of this difference may reflect actual production cost structures, it may also reflect differences in the cost of production data used in the two studies, possible small definitional differences and slightly different treatment of some cost categories. Consistent with the different purposes of the two studies, the national study relied on best available data at the time of the study and on a process of data matching to fill data gaps, whereas the Victorian study used industry survey data collected as part of the Victorian study. Differences in the ways in which some categories of business expenditure were allocated across expenditure categories in the two studies may have further contributed to relatively higher estimates of intermediate good spending by businesses in the Victorian study, and hence larger estimated indirect effects. In both studies, the ranking of state and Commonwealth fisheries and aquaculture by business spending on intermediate goods as a percentage of GVP was the same.

2) Methodological differences between studies in the treatment of the processing sectors for both fisheries and aquaculture may have contributed to the proportionately small difference in estimated contributions, with direct contributions for the processing sector in the Victorian study being higher relative to direct contributions for the catch/production sector for all three indicators and industries. The difference was most marked for GVA. Both studies acknowledged limitations with estimates of contributions for the processing sectors.

4.2.5 Contributions along value chains

As demonstrated by the economic modelling in this study, seafood production contributes economically, but also through synergies with other types of businesses upstream and downstream. Our regional analysis only measured the processing activity because reliable data on the market chain were not available. However, we could use observed prices for key species to give an indication of what value was being added in the marketing chain. The gross margins in the marketing supply chain for several popular wild caught species are displayed in Table 15:

Table 15. Prices along the value chain for Gummy shark, flathead and prawns

Source: project interviews.

Note: * The secondary margin is gross not including costs per kilogram after initial fish purchase.

Species	Landed price (\$/kg)	Recovery %	Processed price (\$/kg)	Retail price (\$/kg)	Restaurant (\$/kg)	Fish and chips (\$/kg)
Gummy shark	11	70	15.71	28	40	40
	Gross retail margin per kg*			12.29	24.29	24.29
Flathead (Case i)	6	30	20.00	35	40	40
	Gross retail margin per kg			15.00	20.00	20.00
Flathead (Case ii)	8	30	26.67	35	40	40
	Gross retail margin per kg			8.33	13.33	13.33
Prawns	15	100	15	24	24	26
	Gross retail margin per kg			9.00	9.00	11.00

The landed prices are prior to processing, where the extent of recovery leads to an equivalent price per kilogram of processed seafood. This indicates the primary and secondary sector at the gross price level. The retail price, less the processed price, is a gross retail margin per kilogram. However, in the case of prawns, there is no secondary processing. The costs of processing each species of fish and the costs involved in retailing are not available to provide a profit per kilogram. Profit and costs are also influenced by the volume of available product. While the apparent gross margin for flathead may exceed another species, there may be less availability than for another more available and lower-priced species.

Aquaculture produce is harvested and initially cleaned before entering the secondary value chain. There are no centrally recorded prices for aquaculture products in the secondary sector because these food businesses often prefer to maintain commercial transactions in confidence to protect their business interests and livelihoods.

The in-depth interviews revealed that seafood production supports businesses for mechanics, welders, engineers, food suppliers (for fishing trips), fuel suppliers, net makers, gear suppliers, transport, post-harvest processing, wholesaling and retailing, and the hospitality industry, which sells seafood.

So you've got all the trades—plumbers, electricians, the carpenters—you've got—as well as all the other things—the refrigeration mechanic ... Then you've got the transport people that are transporting the fish coming through. Then we're also connected to all the suppliers. We've got a packaging supplier, we deal with wholesalers.

– (Fishing industry participant, San Remo)

If the fishing industry was to fail, the flow-on effects would be disastrous. All the local restaurants, your diesel mechanics, your welders, engineers, the flow-on effects would just keep going. So many different industries would be directly impacted.

– (Fishing industry participant, Lakes Entrance)

Similarly, aquaculture farms rely on a range of services to input to farm activities. Farms support a range of related businesses in the communities in which operations are based. As aquaculture operations in Victoria are largely controlled environments for breeding and growing fish, they require considerable technical support, and trades are important for aquaculture which often rely on finely calibrated equipment for aquatic circulatory systems. These connections are part of the regional economic analysis:

Beyond [our employees] we also use electrical contractors. A range of others, earth moving, plumbers, all sorts of other tradesmen that work in our business as well. And we spend a lot of our money at the local hardware [store] and all those sorts of things in town.

– (Aquaculture farm manager, Goulburn Valley)

We'll just directly here locally of course there's fuel for the boats. Then there's the obvious things, all the people that do work on my boats, the hydraulics, the engines, all that. We spend a lot of money on these boats. It's a big part of my expenditure. That's all local. We also buy a lot of material that is manufactured in Melbourne ... We deal with all local companies, but some of the ropes and stuff like that are manufactured these days overseas and they come in from outside the country. But there's still a lot of stuff that is manufactured that we use inside the country. Then locally we have an effect because mussels are promoted very strongly in this area. So all the local restaurants cover—have mussels on their menu—these days we've got some really nice wineries that operate food seven days a week.

– (Aquaculture industry participant, Bellarine)

In-depth interviews indicated that the professional fishing and aquaculture industries consciously make efforts to support local businesses in the region they operate.

Yeah, so I try to look after the local companies as much as I can and that also goes for sourcing materials. We use disinfectants for disinfecting our tanks. That's just a truck wash. A lot of the stuff comes from Warrnambool. A lot of our infrastructure—our suppliers—will come from [the local hardware store in] Port Fairy here. We look after them as much as possible ...When we go to process [the abalone] it goes down to [a local processor] in Portland so there's jobs there. They also process for wild abalone down there but wild can be sporadic in terms of when it comes in, so we pretty much keep them ticking over five days a week.

– (Aquaculture Industry participant, Port Fairy)

The phone survey of the post-harvest sector demonstrated that Victorian professional fishing and aquaculture producers are a significantly important contributor to the economic activity of Victorian post-harvest businesses (see Figure 15). The survey results showed that the Victorian professional fishing and aquaculture producers are important to all post-harvest businesses, more so for regional post-harvest businesses, and less so for businesses operating in the Melbourne/Geelong area (see Figure 16).

Figure 15. The level of importance of the Victorian professional fishing and aquaculture industries to the success of post-harvest businesses

Note: n = 50

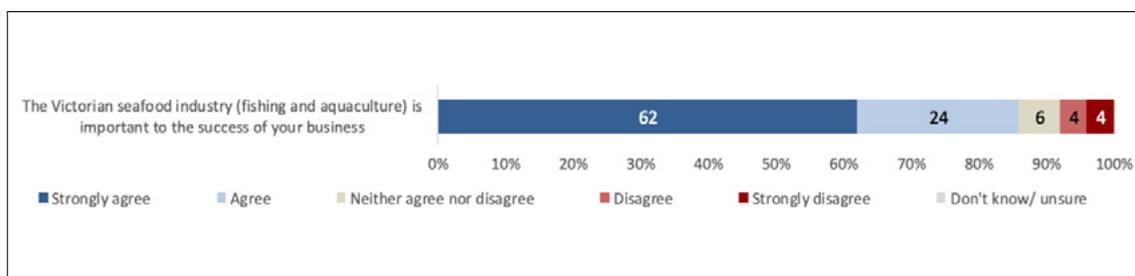


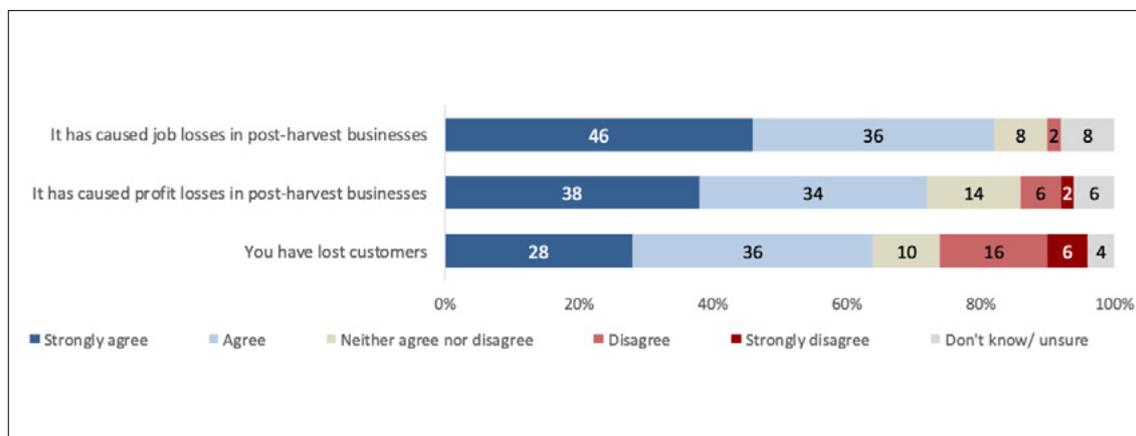
Figure 16. Percentage of post-harvest businesses that agree that the Victorian professional fishing and aquaculture industries are important to the success to their businesses, by type and location of post-harvest business and operations

	Overall (n=50)	Type of business		Location of operations		
		Wholesale only (n=19)	Retail only (n=26)	Local or regional (n=33)	Throughout Victoria (n=10)	Australia and overseas (n=7)
The Victorian seafood industry (fishing and aquaculture) is important to the success of your business	86%	74%	92%	94%	70%	71%

When post-harvest businesses were asked about the effects of past closures of Victorian professional fisheries, 82 per cent of respondents agreed past closures caused job losses in the post-harvest sector, 72 per cent agreed past closures caused profit losses in the post-harvest sector and 64 per cent felt they lost customers as a result of past closures (see Figure 17).

Figure 17. Impact of past closures of Victorian professional fisheries on post-harvest businesses

Note: n = 50



4.2.5.1 The importance of economic flows to tourism

In-depth interviews and phone surveys with the public and tourism operators indicated a range of ways in which the professional fishing and aquaculture sectors support and enhance the economic potential of the tourism sector. These synergies are discussed in detail in **Section 6**.

4.3 Economic contribution of professional fisheries and aquaculture to regional Victoria

There were five study regions west to east along the Victorian coast, and there are two aquaculture regions: inland and coast (see **Section 3.4**).

Table 16 displays the overall direct and indirect economic impacts generated by professional state and Commonwealth fishing and aquaculture separately to each of the seven regions. It aggregates professional wild-catch fishing and aquaculture economic contributions for Western coastal Victoria and Eastern Victoria (including inland), and includes processing (see Table 16).

The West Coast professional fisheries of Victoria with coastal aquaculture (located in the west and Port Phillip Bay) contributed a total added value of \$99 m to communities in the West Coast region of Victoria during 2016–17. This contribution was less than the contribution of Melbourne and East Coast fisheries, which contributed an added value of \$130 m. If inland aquaculture is included with East Coast fisheries (most inland aquaculture is in the east of the state), the contribution of eastern fisheries and aquaculture was \$182 m added value to the Eastern Victorian region during 2016–17. Methodologically, the sum of West and East areas 2,808 FTE (Table 16) is less than considering ‘All Victoria’ 3,101 FTE (Table 14), which captures economic interactions between the East and West areas.

If regions are compared, the economic impacts of state and Commonwealth professional fishing are highest in the Far East and Far West regions of Victoria.

Aquaculture made a large economic impact in the inland areas in the east of Victoria. Coastal aquaculture made an important economic impact along the Victorian west coast, which is growing due to abalone aquaculture expansion.

Table 16. Overall summary of the regional estimates for state and Commonwealth professional fishing and aquaculture

Regions	Total impact (direct + flow-ons)	Output (\$m)	Value added (\$m)	Household income (\$m)	Employment (FTE)
Professional fishing (state and Commonwealth)					
Far West	Professional fishing	22	42	22	352
Near West	Professional fishing	10	22	9	198
Melbourne	Professional fishing	11	28	17	276
Near East	Professional fishing	14	26	14	298
Far East	Professional fishing	37	76	45	810
Aquaculture					
Coastal	Aquaculture (prof. fishing areas 1, 2, 4)	19	35	19	427
Inland	Aquaculture (prof. fishing areas 3, 5 & inland)	25	52	28	447
West Coast					
West Coast	Professional fishing regions	32	63	31	549
West Coast	West Coast regions and Coastal aquaculture	51	99	50	976
East Coast					
Melbourne + East Coast	Professional fishing regions	62	130	77	1,385
Melbourne + East Coast	Inland aquaculture	87	182	104	1,832
	Sum of West and East Coast regions	138	280	154	2,808

Table 17 includes processing and shows that in 2016–17, the professional state and Commonwealth fisheries in the Far West had a greater economic contribution than the Near West. In the Far West—the coastal region between Warrnambool and Portland—the total direct and indirect impacts of professional fishing to the region were \$41.7 m of added value, \$22.4 m of household income and 352 FTE jobs. In the Near East—the coastal region including the Great Ocean Road, the Surf Coast and the Bellarine Peninsula—the total direct and indirect impacts of professional fishing to the region were \$18.4 m of added value, \$8.7 m of household income and 187 FTE jobs.

Table 17. Regional estimates of contributions from state and Commonwealth professional fishing in Far West and Near West regions, and coastal aquaculture

Source: Adapted from WRI report (see **Appendix 2**).

1 Far West Coast professional fishing (state and Commonwealth)				
Total expenditure (\$16.92 m)	Output (\$ m)	Value added (\$ m)	Household income (\$ m)	Employment (FTE)
Initial	22.0	10.4	5.4	115
Flow-on		16.2	7.3	108
Total		26.6	12.7	224
Processing		15.2	9.7	128
Total impact (direct + flow-ons)		41.7	22.4	352
Percentage of region		0.8%	0.8%	0.9%
2 Near West Coast professional fishing (state and Commonwealth)				
Total expenditure (\$7.58 m)	Output (\$ m)	Value added (\$ m)	Household income (\$ m)	Employment (FTE)
Initial	10.3	5.5	2.8	87
Flow-on		6.2	2.1	31
Total		11.7	4.9	119
Processing		6.7	3.8	68
Total impact (direct + flow-ons)		18.4	8.7	187
Percentage of region		0.4%	0.5%	0.7%
6 Coastal Aquaculture (Professional fishing areas 1, 2 and 4)				
Total expenditure (\$17.51 m)	Output (\$ m)	Value added (\$ m)	Household income (\$ m)	Employment (FTE)
Initial	19.02	7.0	5.5	189
Flow-on		15.6	5.3	83
Total		22.5	10.7	272
Processing		12.8	8.2	155
Total impact (direct + flow-ons)		35.4	18.9	427
Percentage of region		0.05%	0.06%	0.11%

Coastal aquaculture primarily occurs along in the Far West of Victoria (abalone) and in Port Phillip Bay (abalone and mussels), in the same areas as the Far West and Near West professional fishing regions. The total direct and indirect impacts of coastal aquaculture to the region were \$34.4 m of added value, \$18.9 m of household income and 427 FTE jobs.

Table 18 demonstrates that, out of the Melbourne and East Coast regions, the Far East region, which is made up primarily of professional fishing activities out of the Gippsland Lakes and Mallacoota, had the highest economic impact in Victoria, with total direct and indirect impacts of \$75.8 m of added value, \$45.1 m of household income and 810 FTE jobs contributed to the region. The contribution of professional fishing to the economy in the Far East region was 3.5 per cent of the local regional economy, which demonstrates the high level of relative economic contribution to the state in this region. Generally, the professional fishing contribution is less than 1 per cent of the local regional economy.

The economic impacts of the Near East coastal region, from the Mornington Peninsula to Corner Inlet, and the Melbourne region, which includes Geelong, were less, with professional fishing in the Near East contributing \$26.4 m of added value, \$14.2 m of household income and 298 FTE jobs to the region, and professional fishing in the Melbourne/Geelong region contributing \$27.6 m of added value, \$17.4 m of household income and 276 FTE jobs to the region.

Inland aquaculture had significant direct and indirect economic impacts, generating \$51.8 m of added value, \$27.7 m of household income and 447 FTE jobs.

Table 18. The regional estimates for state and Commonwealth professional fishing in Melbourne, Near East and Far East regions and inland aquaculture

Source: Adapted from WRI report (see **Appendix 2**). Further details of the regional analysis and components results are available in **Appendices 1** and **2**.

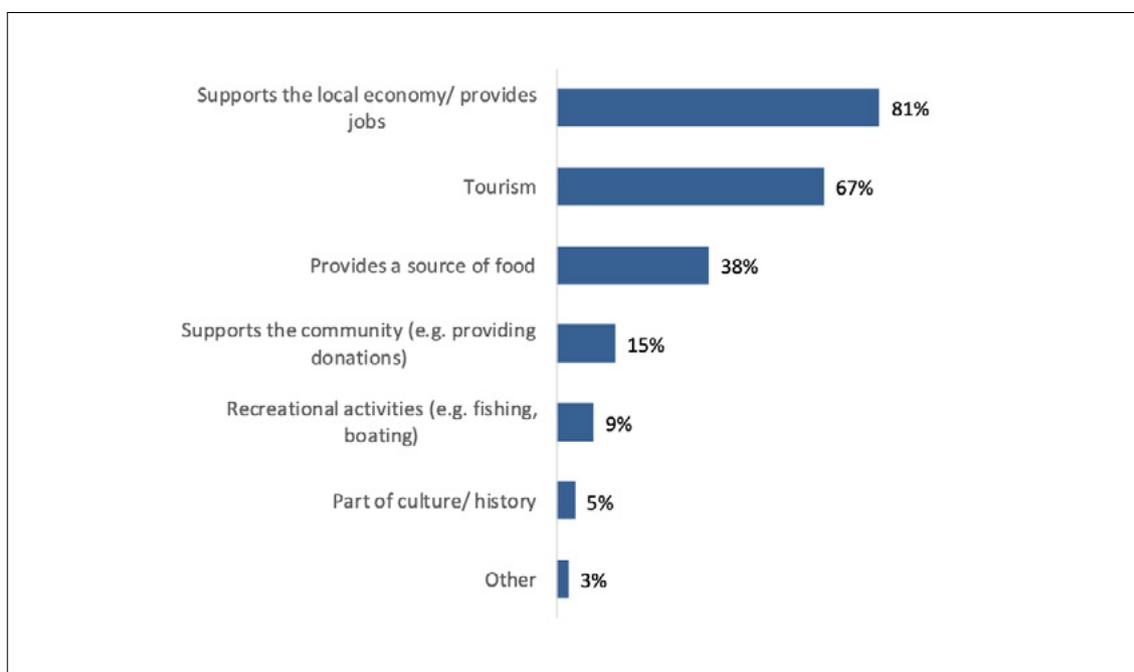
3 Melbourne professional fishing (state and Commonwealth)				
Total expenditure (\$8.95 m)	Output (\$ m)	Value added (\$ m)	Household income (\$ m)	Employment (FTE)
Initial	10.7	5.5	3.7	107
Flow-on		12.1	6.1	68
Total		17.6	9.8	176
Processing		10.0	7.5	100
Total impact (direct + flow-ons)		27.6	17.4	276
Percentage of region		0.01%	0.01%	0.02%

4 Near East professional fishing (state and Commonwealth)				
Total expenditure (\$11.0 m)	Output (\$ m)	Value added (\$ m)	Household income (\$ m)	Employment (FTE)
Initial	14.1	8.1	5.0	145
Flow-on		8.8	3.1	46
Total		16.8	8.1	190
Processing		9.6	6.2	108
Total impact (direct + flow-ons)		26.4	14.2	298
Percentage of region		0.16%	0.22%	0.34%
5 Far East professional fishing (state and Commonwealth)				
Total expenditure (\$28.9 m)	Output (\$ m)	Value added (\$ m)	Household income (\$ m)	Employment (FTE)
Initial	37.1	21.3	13.1	343
Flow-on		27.0	12.5	172
Total		48.3	25.6	516
Processing		27.5	19.6	294
Total impact (direct + flow-ons)		75.8	45.1	810
Percentage of region		2.08%	2.35%	3.48%
7 Inland aquaculture (Professional fishing areas 3, 5 & inland)				
Total expenditure (\$22.28 m)	Output (\$ m)	Value added (\$ m)	Household income (\$ m)	Employment (FTE)
Initial	24.64	7.4	5.1	145
Flow-on		25.5	10.6	140
Total		33.0	15.7	285
Processing		18.8	12.0	162
Total impact (direct + flow-ons)		51.8	27.7	447
Percentage of region		0.01%	0.01%	0.02%

Victorian fisheries and aquaculture industry's contribution to regional economies was recognised by the residents of fishing and aquaculture communities who participated in the general community phone survey (see **Section 3.7**). Eighty-one per cent of respondents identified the most important contribution made by the local seafood industry to their community was in supporting the local economy and providing jobs (see Figure 18).

Figure 18. Most common responses (coded) to the open question: ‘In what ways do you think the fishing/aquaculture industry makes the most important contribution to your community?’

Note: n = 150



However, the economic contributions of the seafood industry to fishing and aquaculture communities have changed over time. There has been a contraction of Victorian state and Commonwealth professional fishing fleets, which has reduced their ability to make economic contributions to regional communities. Simultaneously, there has been growth in the Victorian aquaculture sector, albeit the sector is still dominated by a small number of larger farms. In terms of fisheries and aquaculture economic contributions, while many appear stable economically, there is much concern over the future of the professional fishing industry.

I think in 10 years' time our kids won't be able to get fish caught locally, it will all be from overseas. I think that's really sad.

– (Community participant, Warrnambool)

Some coastal communities in Victoria have experienced decline to the point at which the industry is almost invisible, but encouragingly in a couple of communities, the fishing and aquaculture sectors are proactively attempting to improve their economic contribution to their community through shifting the way they do business, such as by focusing more on selling seafood direct and locally, and through collaborating with other sectors, such as the tourism and recreational fishing sectors, to generate new economic opportunities.

The story of decline in economic contributions was most evident in the coastal communities on the Bellarine Peninsula, in the Near West coastal region of Victoria. The professional fishing fleets that had operated out of the Bellarine have contracted for decades for a range of reasons. For example, the Port Phillip Bay scallop fishery was closed in 1997 and the introduction of marine parks in 2002 affected the number of abalone and Southern Rock lobster vessels working out of the region. With fleet contractions, the post-harvest sector has also contracted in the region and post-harvest businesses closing down.

Where we were at Queenscliff we had our [abalone] cannery, we also had a live seafood and fresh seafood outlet there. Then there was a co-op up the road from that. So, you could get any amount of seafood.

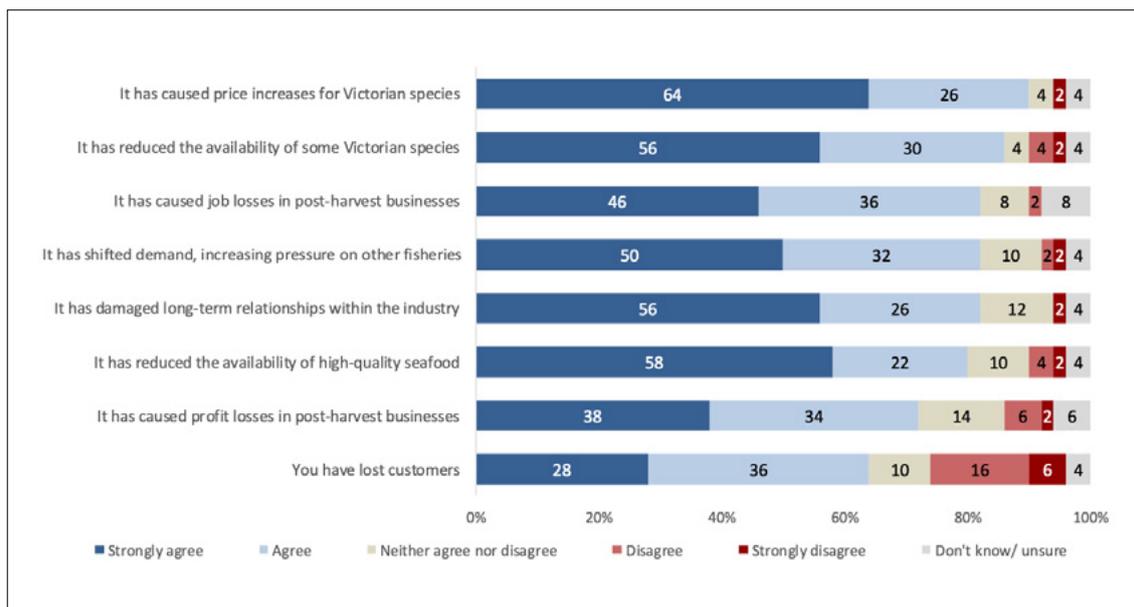
– (Fishing industry participant, Bellarine)

In 2015, the Victorian Government passed legislation to remove 43 commercial net licences in Port Phillip Bay for the purpose of improving recreational fishing experiences. This 170-year-old fishery was the last major fishery operating from the region, and in 2014–15, before the buy-out process began, supplied 822 t of seafood to the local and Melbourne markets (VFA, 2018c). Now, the professional fisheries sector on the Bellarine consists only of a small number of vessels operating in several fisheries dispersed across the region, including wrasse, Port Phillip Bay, Southern Rock lobster, abalone, and Commonwealth fisheries.

The phone survey of post-harvest businesses revealed some of the impacts of recent closures of Victorian bay and inlet fisheries. These included job losses in post-harvest businesses, profit losses, and lost customers (see Figure 19).

Figure 19. Impact of past closures of Victorian professional fisheries on post-harvest businesses

Note: n = 50



Conversely, San Remo, in the Near East region and located adjacent to Phillip Island, has been experiencing a renewal of the professional fishing industry. While also having experienced fleet contraction, a change in the management of the San Remo Cooperative and the emergence of retail outlet Bass Strait Direct, which both focus on providing local seafood from local boats to tourists and the local community, has generated an increased economic contribution to the town and region:

They've really turned the co-op around into a positive direction ... the fishing fleet is obviously an identity and it's the core of the town, but the co-op and the fish and chips [they now sell] ...it's going from strength to strength. [They have] really taken the reins and turned it around and it's just booming. It's good because it's not just good for the co-op, it's good for the town.

– (Fishing industry participant, San Remo)

The future of the aquaculture industry is considered to be positive. While the industry is changing, and there has been some decline in the number of trout farms and production in eels, largely due to issues related to water availability and access in the past 20 years, abalone, mussel and barramundi finfish aquaculture have expanded production over the past 10 years. The sector remains strong and key challenges emerge not from a lack of policy support for expansion, but from social perceptions that aquaculture has negative environmental impacts.

4.3.1 Employment in regional Victorian communities

Employment generated through professional fishing and aquaculture is important to regional Victorian communities (see Figure 20), although its importance varies. It is integral to communities such as Lakes Entrance (Far East region), which has the largest professional fishing fleet in Victoria, and to Apollo Bay (Near East region), where professional fishing is one of the main employers:

There wouldn't be too many people that I've spoken to, when they find out what I've done, who haven't said to me, I worked at the co-op at some stage, or my dad did, or my brother did, or my sister did, or something like that. Everyone you speak to has probably spent time working in here [at the co-op], and if not here, certainly on boats.

– (Fishing industry participant, Lakes Entrance)

If you actually look at all the people who are involved in some way, shape or form, within industry—the fishing industry—if you took all of those direct and indirect relationships into account, it's probably the biggest employer in the town

– (Fishing industry participant, Apollo Bay).

However, employment now plays a less central role in a few places such as the Bellarine Peninsula (Near West region), Port Fairy (Far west region) and around Melbourne. The employment contribution in these areas was greater in the past:

Like I keep saying, we have become ghosts.

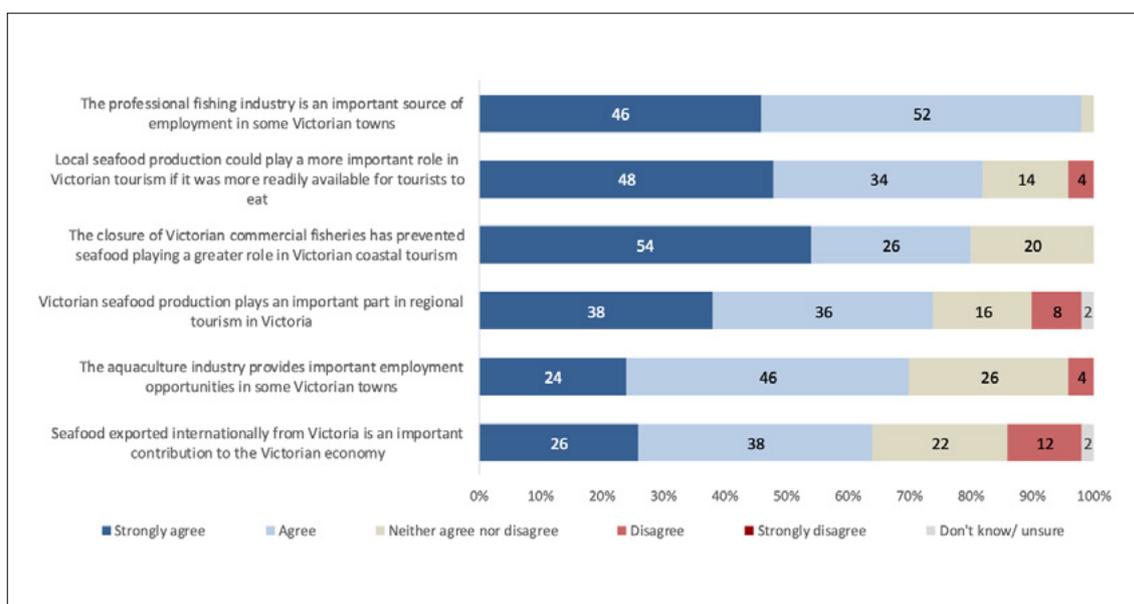
– (Fishing industry participant, Bellarine)

I don't think the fisheries are very visible anymore in this region ... the pubs used to be full of fishermen

– (Community participant, Port Fairy)

Figure 20. The perception of importance of employment generated through professional fishing and aquaculture to Victorian towns by the post-harvest sector

Note: n = 50



For aquaculture, investment patterns indicated that for some species, such as freshwater finfish, abalone and mussels, the prospects for increasing employment appeared strong. However, participants noted that there are limitations, particularly inland, due to the difficulty of obtaining water licences:

If these farms are able to continue to grow there's a huge job prospect in aquaculture, [even] just in mussel farming locally. One of [the] farms has now an association with another farm in Tassie. They've developed the shellfish processing facility in Geelong. There's more job creation and on-flow work from that.

– (Aquaculture industry participant, Bellarine)

Interviews indicated that professional fishing and aquaculture provides employment for people local to the regions. For example, some aquaculture farms, in particular trout farms, reported a preference for locally sourcing workers and internally training them to undertake increasingly technical roles. This provides a long-term contribution to the local economy, by providing a pathway for some upward mobility and training in careers that do not require moving away from regional areas to seek training or new employment opportunities.

We feel we get better [experiences] with blokes locally. Blokes who grow up in the local community who are tied into the local community, play footy and their mates are all here. You know, we've got pretty good operating procedures and stuff that are all written up and we train them in those and so they learn the job and they're the ones that stick around. The qualifications are less important to me than someone who's tied to the local community and really keen and willing to work.

– (Aquaculture farm manager, inland region)

There are three professional fishing cooperatives in Victoria—Lakes Entrance, San Remo and Apollo Bay. Co-ops were reported by participants to be important to the communities in which they are located for employment, but also to financially support the professional fishing industry. Co-ops in Victoria also have either a retail and/or a fish and chip shop attached, which provide a variety of jobs.

The co-op was central to the development of the seafood—the commercial seafood industry in Apollo Bay—which is going back over 100 years, but the interesting thing is that it’s still central to that. Without the co-op a lot of the resources, the access to marketplaces are not available without the co-op.

– (Fishing industry participant, Apollo Bay)

A big employer [in town] is the co-op ... they employ about 30 people and those people go and spend money at the petrol station, at the supermarket, pub, with electricians, plumbers. Because they live here

– (Fishing industry participant, Mallacoota).

4.3.1.1 Diversity in employment in the Victorian seafood industry

The Victorian seafood industry contributes a range of job opportunities in the primary production and post-harvest sectors. Participants described employment in the seafood sector as being diverse in various ways, including the diversity of job types. Primary production employment includes jobs on boats as skippers and deckhands across various types of professional fishing, from dive fisheries to offshore trawlers, as well as jobs on aquaculture farms, which require labourers, technicians, researchers and managers. In both sectors, there are associated administrative and financial jobs. Post-harvest employment includes those jobs associated with transport, processing, wholesaling, and retailing domestically and overseas.

They all vary. So we have like our driver, and then we have four guys on the boats, and when they’re not on the boats, they’re up here [at the processing factory]. Then we have our packaging crew, which also help do maintenance on the boats, and then I have the café staff as well.

– (Aquaculture industry participant, Bellarine)

Industry participants considered fishing and fish farming to require high skill levels. Successful skippers need to be efficient, productive, run a profitable business, have mechanical knowledge to fix and maintain their vessel and gear, be aware of market conditions, read the environmental conditions, and maintain relationships with crew and others.

The broad skillset he has never ceases to amaze me. That he can mechanically fix the boat, that he can do all the physical work to maintain the boat and gear, he’s built boats on his own, he can make all the pots and do the ropework, and he can go out to sea and he knows exactly which time of the year, which tides, which moon, [to find] where the fish are. There is a vast amount of knowledge. That’s just so often not seen. That part of knowledge set is so unique, that not many people have. I think that that’s one of those hidden contributions

– (Fishing industry participant, Apollo Bay)

In the aquaculture sector, jobs include those that require scientific expertise to develop, apply and improve techniques. These provide well-paid jobs for workers with training at the university level and those with skilled trades.

The general manager, he’s a marine biologist. Then below we have a maintenance manager, a production manager, and she’s got a background in marine biology. Myself, I’m actually a civil engineer, but worked in agriculture. The farm manager at Dunnalley, he’s got a long history in agriculture.

– (Aquaculture farm manager, Bellarine)

The Victorian seafood industry—in primary production and post-harvest sectors—contributes to employment in regional areas, particularly part-time, casual and seasonal work. The level of part-time employment was indicated in interviews and reflected in the 2016 Australian Census of population and housing¹³ (see Table 19), which indicated that 30 per cent of overall employment was part-time and higher for different parts of the seafood industry.

Table 19. Percentage of Victorians employed in full-time and part-time in fishing, aquaculture businesses, seafood processing and wholesaling

Data Source: Census of Population and Housing, 2016, TableBuilder.

Employment	Percentage of Victorian people in each sector				
	Fishing	Aquaculture	Seafood processing	Seafood wholesaling	Total
Employed full-time	56	65	55	71	64
Employed part-time	31	32	38	26	30
Employed away from work	9	4	6	3	5
Employed, hours of work not stated	5	0	0	0	1

While the estimated number of FTE jobs is 3,156 jobs (see **Sections 4.2** and **4.3**), the total number of people who depend on the Victorian seafood industry for employment will be higher. An example is professional abalone divers and their deckhands, who are only able to fish when the conditions are relatively calm because they work on the highly productive and exposed coastal reefs, and they are subject to quota, which reduces the number of possible working days.

¹³ The Australian Census of population and housing figures may not fully capture seasonal and itinerant workers in the seafood industry. However, percentages may reflect trends.

Yeah it's a bit of balancing act and some of us—most of the other divers here—they're just operating one quota, their deckhand is part-time decky, part-time tradie, or something else.

– (Fishing industry participant, Mallacoota)

Jobs in the seafood industry can be seasonal for several reasons: fish and farm stocks can be seasonally abundant or there may be times where the season is closed in the case of professional fisheries. This can create an ebb and flow of employment throughout the supply chain, particularly in regional communities. While there are well-documented negative effects from part-time, seasonal and insecure work (e.g., Lim, 1996), many of the participants who work in wild-catch fishing and aquaculture businesses for this project appreciate the part-time and seasonal nature of the work because it allows for flexible working conditions. Conversely, some fishing business owners noted that the part-time and unpredictable nature of the work makes it difficult to attract deck hands.

Yeah, there's a lot of part-time, they get a job and they only have to do it for four months, six months and they can move on to something else. Sort of thing – stop gap jobs, that sort of go and work on the boat in between doing other things if you know what I mean? So it's good temporary, it's a good access to temporary, part-time work.

– (Community participant, Lakes Entrance)

We do target gap year kids and so on. We have a few of them. I think we've had five of them this year and we've also got about five or six uni kids that will come back in November. They work a summer and they usually work the big winter break also.

– (Aquaculture industry participant, Far West region)

Participants from the professional fishing and aquaculture sectors spoke of further employment opportunities provided through the experience and training gained from working on professional fishing boats and aquaculture farms. For example, professional fishers with skipper qualifications were employable in other marine industries, including the offshore oil and gas industry and the recreational fishing charter sector. In aquaculture, where there is often little scope for advancement on the farms, work experience results in opportunities in aquaculture elsewhere.

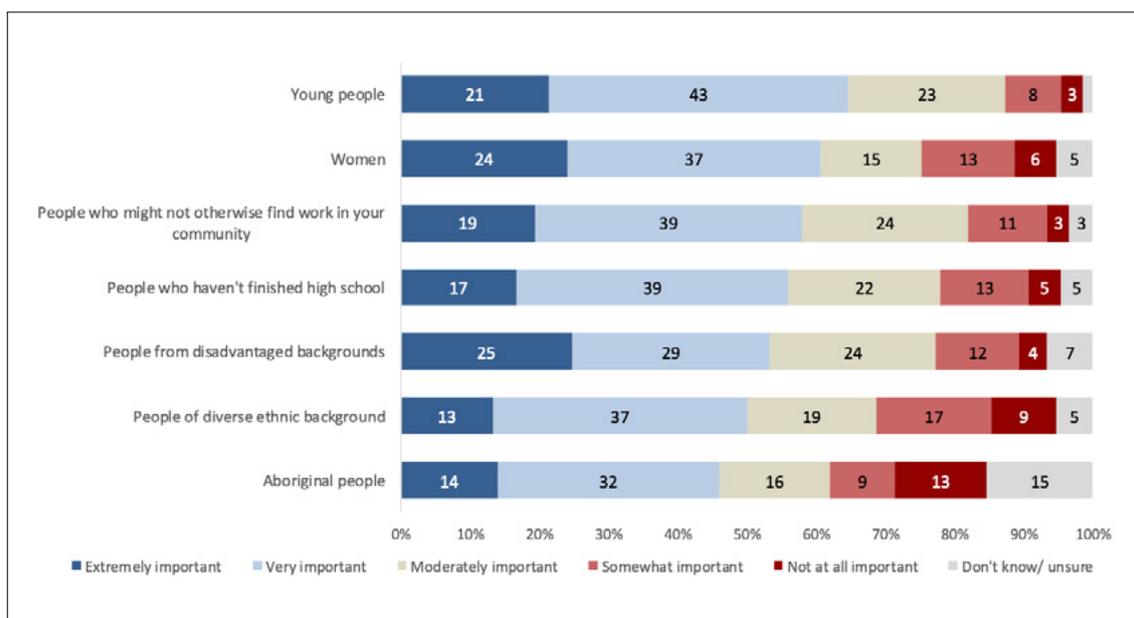
There isn't a great scope for advancement in our industry [abalone farming]. Most of the people that are holding the management roles have held them for a while—haven't really wanted to go anywhere—so it's more about them getting a foot in the door and they can be applying for jobs and that sort of thing.

– (Aquaculture industry participant, Port Fairy)

The interviews and phone survey explored beliefs about the contributions of professional fishing and aquaculture in terms of employment for diverse types of people in regional communities. The phone survey respondents from fishing and aquaculture communities perceived that the Victorian seafood industry was important to provide jobs for young people, women, people who may not otherwise find work in the community, people who have not finished high school, people from disadvantaged backgrounds, although less so for people from diverse ethnic backgrounds or Aboriginal people (see Figure 21).

Figure 21. Residents of fishing/aquaculture towns perceptions of the importance of the sector to creating jobs for different parts of the community

Note: n = 150



It is interesting to compare the perceptions of this randomised (but not statistically robust) sample of fishing and aquaculture community people, with the findings about diversity of employment from in-depth interviews with the seafood industry. There was strong agreement that the seafood industry was important to provide some jobs in certain fisheries for people who might be struggling to find work elsewhere. While both sectors are important for providing entry-level jobs in rural areas, there are difficulties in attracting young people into some types of professional fishing for various reasons, including low wages, a lack of opportunity to progress, and insecurity in the future of the Victorian industry.

4.3.1.1.1 Jobs for people who may find it difficult to find work elsewhere

An important contribution made by the seafood industry is in the provision of jobs for people who might find it difficult to get work elsewhere, people who may have struggled in life, or who may not fit easily into mainstream life. This was particularly evident when interviewing people about the Commonwealth sector, in which vessels go to sea for several days before coming back to shore:

They also employ people who otherwise wouldn't be employed. I'm not sure what I'm saying here [laughs]. You've got to have a certain type of person to work on a trawler. A cray boat's not so bad because mostly they're day boats nowadays and they get up early in the morning and go and haul their pots and come home. They're home for dinner with their partner or wife which is normal, but the trawlers are off to sea for days at a time and a normal person with a family finds that lifestyle fairly difficult.

– (Fishing industry participant, Portland)

It's the people who don't fit into normal mainstream society. I started life as a shearer and I used to shear sheep on stations in the north of South Australia and the further you go north the more misfits you find as station hands. It's a bit the same—now that I've come down here in the last 40 years sort of thing—it's a bit the same on the trawlers. It's the same sort of persons who finds it difficult fitting into mainstream society and they just fit better in outback Australia or outback ocean.

– (Fishing industry participant, Portland)

4.3.1.1.2 Jobs for young people

Interviews revealed the professional fishing and aquaculture industries provide employment opportunities for young people, although they are difficult to attract into the industry. The 2016 Australian Census of population and housing showed that 18 per cent of Victorians in fishing, aquaculture, processing and wholesaling were under 30 years old (see Table 20).

Table 20. Percentage of Victorians of different age groups employed in fishing, aquaculture businesses, seafood processing and wholesaling

Source: Census of Population and Housing, 2016, TableBuilder

Age	Percentage of Victorian people employed in different sectors				
	Fishing %	Aquaculture %	Seafood processing %	Seafood wholesaling %	Total %
10–19 years	3	4	0	1	2
20–29 years	15	21	21	14	16
30–39 years	18	20	17	24	21
40–49 years	19	24	18	25	22
50–59 years	28	19	27	23	24
60–69 years	17	8	10	10	11
70–79 years	2	5	2	3	3
80–89 years	1	0	0	0	0

In professional fishing, there are opportunities for young people to deckhand on boats, and in aquaculture, many of the labouring jobs attract young school leavers or new graduates:

[The aquaculture farm] is still very labour intensive, it's a relatively young industry in Australia, so there's quite a lot of labour work—we've got everyone from young labourers through to young uni graduates that come together.

– (Aquaculture farm manager, Bellarine)

In the professional fishing industry interviews, there were encouraging signs of young people entering the industry, particularly in the southern rock lobster fishery. However, a common theme was the difficulty in attracting young people to work on the boats. Several reasons were provided, including it being a tough job, which may require sacrificing 'a normal life', in several fisheries the pay is lower than it used to be, it is too difficult now to progress through from deckhand to owning a licence and vessel due to the expense and inability to get financing (unless it is a family business handed down), and there is a strong sense of insecurity in the future of the industry due to government shutting wild-catch fisheries down in Victoria:

Yeah, fishing is a struggle. There's no doubt about it. It's a pretty tough job and that, and there's not too many boys and girls who want to do it.

– (Fishing industry participant, San Remo).

If there's money in it, you attract people and then that's the way it is to put up with the hours you're at sea for the week. You're not home in your own bed or you don't have the same ... social life as everyone else. You don't have weekends as other people do.

– (Fishing industry participant, Portland).

The incentive's not there because there's no security. Simple as that.

– (Fishing industry participant, Lakes Entrance).

There's nobody coming on—most of the boats with young people on them are family boats, and they've taken over the boat. But other than that, that's the biggest worry at the end of day is if we end up with just all leased operators because they can't afford to buy the quota for a start; I think it's about \$700,000 a ton or something, so it's just getting beyond the average person to run—to get into the industry.

– (Fishing industry participant, Portland)

4.3.1.1.3 Jobs for women

While 61 per cent of community phone survey respondents felt that the seafood industry was extremely or very important for employment of women, interviews with fishing and aquaculture operators revealed that the professional fishing and aquaculture industries, especially in fishing and aquaculture production, are very male-dominated. The proportion of women we interviewed for this project (see Table 21) was roughly the same as for the industry averages in fishing and aquaculture (see Table 22).

The findings from interviews were also reflected in the 2016 Australian Census of population and housing, in which 25 per cent of Victorians across the four sectors of the seafood industry were women (see Table 22). The Census revealed that in fishing businesses, 13 per cent were women, while in aquaculture 24 per cent were women. In seafood processing, there were more women, making up 44 per cent of the industry. The Census data also revealed that men were more likely to be employed full-time than women in all sectors (see Table 23).

Table 21. Gender of participants

Participant category	Women %	Men %
Aquaculture industry	14	86
Aquaculture non-industry	50	50
Fishing industry	24	76
Fishing non-industry	23	77

Table 22. Percentage of men and women employed in fishing, aquaculture businesses, seafood processing and wholesaling in Victoria

Source: Census of Population and Housing, 2016, TableBuilder.

Gender	Percentage of Victorian people employed in different sectors				
	Fishing %	Aquaculture %	Seafood processing %	Seafood wholesaling %	Total %
Male	85	76	57	74	75
Female	13	24	44	26	25

Table 23. Percentage of men and women employed full-time and part-time in fishing, aquaculture businesses, seafood processing and wholesaling in Victoria

Source: Census of Population and Housing, 2016, TableBuilder.

Employment	Percentage of men and women employed in different sectors							
	Fishing		AQ		Processing		Wholesaling	
Fishing employment	Men	Women	Men	Women	Men	Women	Men	Women
Employed, worked full-time	59	26	68	44	69	34	76	55
Employed, worked part-time	27	60	26	45	27	53	21	39
Employed, away from work	9	8	6	11	4	7	3	5
Employed, hrs of work not stated	6	6	0	0	0	0	0	0

Interviews revealed that while there are some women fishers and aquaculturists, the workforce outside of administrative roles is mostly male. It was noted by participants that the gender division of labour in the seafood industry is changing and should be encouraged:

Women are very passionate about the industry and quite often they're the daughters of former fishermen. They're well-educated, most of them now, and they've got a great amount to contribute and so it's very pleasing to see.

– (Fishing industry participant, Port Fairy)

The mix of males and females is increasing [in aquaculture]. We are trying to get more females into our industry. It's been a focus from us and there's no reason why there can't be, so yeah, that's seemed to improve.

– (Aquaculture industry participant, Portland).

A similar shift in more women entering the seafood industry was noted by the post-harvest sector:

We're ... seeing a lot more females come through, taking over dads' businesses because they haven't got sons but they still want to do it. It's a tough industry but it's a different mindset. [Women] seem to [run] the businesses differently.

– (Post-harvest participant, Melbourne).

4.3.1.1.4 Jobs for people of diverse ethnic backgrounds, including Aboriginal people

Only half of respondents from the community phone survey felt that the seafood industry was important for employment of people from a diverse ethnic background. This was inconsistent with findings from in-depth interviews at the production level, in which the emphasis was on employing local people from regional communities, which were arguably less culturally diverse than Victoria's cities (Victoria State Government, 2017b). The 2016 Australian Census of population and housing also showed that only 12 per cent of Victorians in fishing businesses and 20 per cent of Victorians in aquaculture businesses were born outside of Australia (see Table 24).

However, it was noted that some Commonwealth fishing boats operating out of the Far East region, who had difficulty employing local deckhands, employed overseas migrants, mainly from South-East Asia. It was also noted that the Port Phillip Bay net fishery operating close to Melbourne from the mid-1800s until it was closed in 2016, had a high proportion of operators from Mediterranean countries, particularly Greece and Italy:

Port Phillip Bay has quite an interesting sort of like migrant [history], you know migrants who came into the industry as well. So in a way there’s diversity, or was diversity in the industry ... and they were all community oriented people ... more community oriented [than other] Australians ... Greeks and Italians were very very family and community oriented. So those communities will [now] miss out on what they brought to the community as a fishing group.

– (Fishing industry participant, Bellarine).

In-depth interviews revealed that diverse ethnicities play a large role in the post-harvest seafood sector and have done so historically since the professional fishing sector began during the nineteenth century. Participants spoke of the importance of migrants after the Second World War from Greece and Italy entering the post-harvest sector, including establishing retail outlets that also did fish and chips:

Most of the fish sold in Victoria pre-World War II, you had old families had migrated. Could’ve been some Spanish, other Europeans, like some early Greeks, and a few Italians, and a lot of Anglo-Saxons who had fresh fish outlets. Then World War II came and the influx of the migrants—the Greeks and the Italians—and with the Greeks, in Victoria, came hand-in-hand with fish and chipperies. A lot of them went into fish and chipperies and sold fresh fish.

– (Post-harvest participant, Melbourne).

Participants also noted that contemporary post-harvest sector is characterised by ethnic diversity:

I think we’re one of the most diverse industries. Like I said to you, I could talk about our market floor down there—Vietnamese, Chinese, Indians, Greeks, Italians, Australians—Anglo-Saxons. Talking about diversity that way? Yeah. Very much so.

– (Fishing industry participant, Melbourne).

This finding is supported by the 2016 Australian Census of population and housing data, which showed that 53 per cent of Victorians employed in seafood processing and 52 per cent of Victorians employed in wholesaling were born outside of Australia (see Table 24).

Table 24. Percentage of Victorians employed in fishing, aquaculture businesses, seafood processing and wholesaling who were born in Australia or outside Australia

Source: Census of Population and Housing, 2016, TableBuilder.

Place of birth	Percentage of people employed in different sectors			
	Fishing	Aquaculture	Seafood processing	Seafood wholesaling
Born in Australia	88	80	47	48
Born outside Australia/unknown	12	20	53	52

Participants explained that in part, the level of ethnic diversity is driven by the demand for seafood from different cultures in the suburbs of Melbourne:

You've got to understand, we've got a strong Asian influence. A strong Vietnamese influence. There are Vietnamese suburbs in the south-east ... the north and the west—strong fish-eating suburbs. And strong fish retail locations.

– (Post-harvest participant, Melbourne).

Across the state, we found scattered examples of people who identified as Aboriginal being involved in professional fishing or aquaculture. The 2016 Australian Census of population and housing showed that there are very few people who identify as Aboriginal or Torres Strait Islander employed in the seafood industry, only 1 per cent of people in fishing businesses (see Table 25) The exception was in the eel fishery in western Victoria, which is further discussed in **Section 8.2**. There were no reported Aboriginal or Torres Strait Islander employees in the aquaculture, processing and wholesaling sectors in the 2016 Census (see Table 25).

Table 25. Percentage of Aboriginal people employed in fishing, aquaculture businesses, seafood processing and wholesaling in Victoria

Source: Census of Population and Housing, 2016, TableBuilder.

Aboriginal/non-Aboriginal	Percentage of people employed in different sectors			
	Fishing	Aquaculture	Seafood processing	Seafood wholesaling
Non-Aboriginal or Torres Strait Islander	98	100	99	100
Aboriginal or Torres Strait Islander	1	0	0	0
Not stated/unknown	2	0	1	0

We received feedback from some participants that they would like to see more opportunities for Aboriginal people within the seafood industry, whether that is through owning fishing or aquaculture businesses or being employed in aquaculture, processing or retail operations. We discuss this further in **Section 11.5**.

4.3.2 Diversity and ongoing activities in regional economies

While the economic modelling measured the annual total economic impact of the Victorian seafood industry on regional communities, interviews and survey material revealed that in coastal communities, the professional fishing and aquaculture industries contribute to the economic stability and resilience of regional communities and help to keep families in regional Victorian towns in two main ways:

- in regional communities, resilience is aided by having diversity in their economies
- professional fishing and aquaculture provide year-round employment and economic activity that sustains communities during the tourist off-season:

That's what this town's always been about, is working together to create economic and socio viability—if there are viable businesses to be had here, people will have their families here. They'll live here, and again, the whole thing is going to feed on itself.

– (Fishing industry participant, Apollo Bay)

The professional fishing and aquaculture industries in regional communities contribute to diversity in business and employment opportunities, particularly given that professional fishing and aquaculture operates in places where there may be few alternative industries:

[If the fishing industry were to disappear] the impact would be massive. Yeah, of course it would be. I mean obviously we don't generate the money that the aluminium smelter does, but it would still leave a pretty big hole, and of course Portland's been a fishing centre since it began. It began as a fishing centre and it's still got a fairly solid—commercial fishing still contributes pretty solidly doesn't it.

– (Fishing industry participant, Portland)

But if you took a little town like Skipton, Skipton Eels would be one of the main stayers in that town. The primary production of sheep and cattle around there and the eel fishery, that's probably one of the main stayers in that town. So, from that perspective it's probably very important.

– (Community participant, Far west region)

Professional wild-catch fishing contributes a baseline of economic activity in coastal communities year-round, which is important when other major economic activities such as coastal tourism is seasonal and transient:

After the NSW school holidays finish, that's when people leave ... So from now [April], 'til December ... we're really relying on each other [in the fishing industry]. We've got this eight months where people are—have to survive. People rely on each other and a handful of tourism.

– (Boatbuilder, Mallacoota)

Phillip Island is so seasonal, you have three months of winter where everyone goes into hibernation. Then you had this sort of four or five month period through summer where we are just hammered with people. So yeah, the servicing side [of commercial boats] just ticks over all the time.

– (Community participant, San Remo)

The aquaculture industry plays an important role in providing year-round employment in the communities in which it operates, because consistency of production throughout the year is crucial to business viability. While the numbers employed in aquaculture operations may not be high, respondents highlighted that consistency of employment over time is a key benefit of aquaculture farms, particularly for smaller communities.

For some communities, aquaculture has been one of the most consistent primary production businesses through periods of considerable economic change:

In a small rural community we're a significant employer of 25 full-time equivalents. You know that's obviously making a contribution to a lot of household incomes. Certainly, for several the people we employ it'll be their chief breadwinner [in the family] working here.

– (Aquaculture farm manager, Goulburn Valley)

There's not a lot of other job opportunities down here unless you're like working at one of the local wineries now ... Three years ago, you'd say that mussel farming was the only employee down here, but now that tourism's got bigger, like the local cafés and wineries and stuff, there's employment for that. But of course, that's just lunch times and stuff. So the mussel industry is really the only one that employs a lot of people.

– (Aquaculture industry participant, Bellarine)

Some communities are more dependent on the professional fishing and aquaculture sectors than others. This is evident in towns such as Lakes Entrance and Apollo Bay, in which the money spent in towns by fishing and aquaculture families on goods and services is important for the viability of other businesses in town:

This is an example, some years ago they opened up a Safeway store in Lakes, and I was talking to one of the local supermarket owners at the time, I said, what would be the effect if you lost the fishing industry? This came up in the conversation because I carry a lot of their fishing boat food accounts, and he said, we'd shut the doors.

– (Fishing industry participant, Lakes Entrance).

I can vouch for that, my wife and I own a sports store in town, which is as far removed from the fishing industry as you can get, but certainly when there's a downturn in fishing there's a downturn in ours, so 100 per cent downturn in our store. That's not necessarily saying [fisherman X is coming in] to buy a pair of shoes, but the people that it affects down the line aren't coming in.

– (Fishing industry participant, Lakes Entrance).

That also contributes to the [economy] of Apollo Bay because those people have to rent or buy houses. They have to buy their groceries ... Their kids—when they have kids, will go to the school ... The [extra] population keeps the hospital and the medical centre going. So, it is a flow-on.

– (Fishing industry participant, Apollo Bay).

The phone surveys with the community and tourism businesses concurred with the interviews regarding the importance of Victorian professional fishing and aquaculture to help create economic diversity in the community and support the community during

the tourist off-season. Eighty-five per cent of respondents from fishing and aquaculture communities in the public phone survey agreed that fishing and aquaculture creates economic diversity in their community (see Figure 22). Seventy-six per cent of respondents from the community phone survey, and 80 per cent of tourism operators who responded to the survey, perceived the fishing and aquaculture industries to be important for supporting their community during the tourist off-season (see Figure 22 and Figure 23).

Figure 22. Perceived importance of the professional fishing and aquaculture industries for a) creating economic diversity in the community and b) supporting the community during the tourist off-season, by members of fishing and aquaculture communities

Note: n = 150

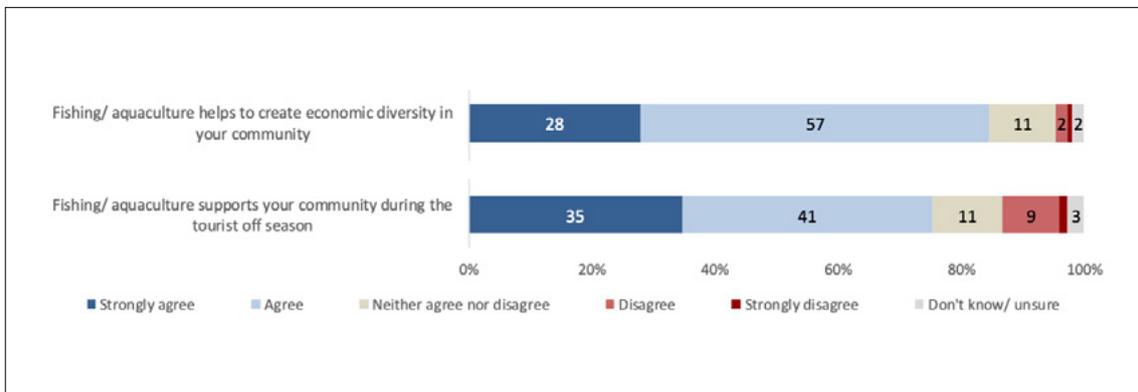
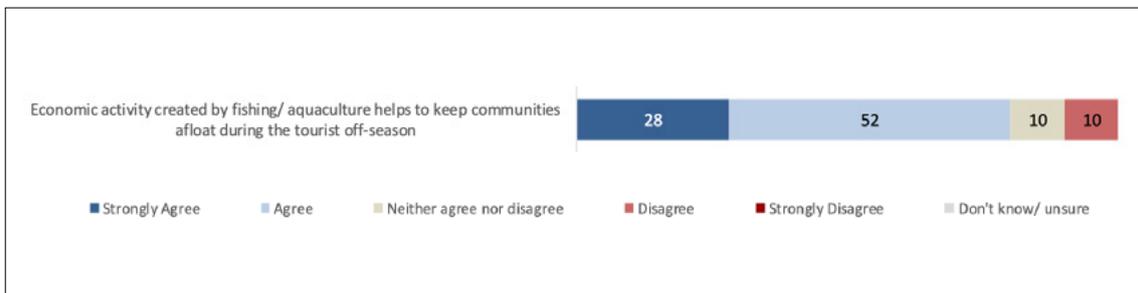


Figure 23. Perceived importance of the professional fishing and aquaculture industries for supporting the community during the tourist off-season, by respondents of the tourism phone survey

Note: n = 50



5 Results—food supply

Domain of community wellbeing	Dimensions of wellbeing	Contributions of Victorian seafood production	Indicators	Data collection methods (and types)
Food supply	Material (having access to enough food and desired foodstuffs)	Contributes to nutritional needs of local communities Provides a diverse range of foodstuffs desired by communities	Purchasing patterns regarding locally produced seafood	<ul style="list-style-type: none"> - Phone questionnaires (semiquantitative, values and perceptions) - Interviews (qualitative, values and perceptions) - Government production and price data (quantitative)
	Relational (existence of supply chains and logistics that support access to food)	Seafood producers participate in and help build channels for local supply	Sufficiency of purchasing channels—local seafood	<ul style="list-style-type: none"> - Phone questionnaires (semiquantitative, values and perceptions) - Interviews (qualitative, values and perceptions)
	Subjective (perception that the food available is sufficient and of the desired types)	Provides high-quality seafood types desired by communities at different price points	Beliefs about the quality, availability and prices of locally produced seafood Preferences for locally produced seafood	<ul style="list-style-type: none"> - Phone questionnaires (semiquantitative, values and perceptions) - Interviews (qualitative, values and perceptions)

5.1 Overview

The professional fishing and aquaculture sectors in Victoria are important suppliers of seafood to metropolitan and regional markets around the state. The nutritional benefits of fresh seafood are well established (McManus et al., 2009) and Victorians consider seafood to be an important part of their diet. In the case of professional fisheries, the industry provides access to a public resource source of food that would otherwise be unavailable to people who are not successful recreational anglers.

In outlining the contribution of the professional fishing and aquaculture sector, the key aspects of food supply that we discuss in the following sections are:

- The context for seafood production in Victoria, including outlining the balance between import and export volumes, and the consumption habits of Victorians (see **Section 5.2**).
- Why post-harvest businesses and their customers value Victorian-produced seafood (see **Section 5.2**).
- Victorian preferences for ‘local’ seafood, the role of diversity in preferences, and the increasing interest in food provenance (see **Section 5.3**; noting that the relationship between food and tourism are discussed in **Section 6**).

Key findings

Contributions to food supply from professional fishing and aquaculture was rated as being the second most important of the five domains of wellbeing contributions to Victorian regional communities in interviews and phone surveys.

In 2016–17, professional fishers in Victoria produced 4,845 t from state fisheries and 10,187 t from Commonwealth fisheries. Aquaculture operations produced a further 3,147 t of seafood.

Melbourne has one of the largest post-harvest sectors in Australia, manufacturing, processing, wholesaling or retailing well over 55,000 t of seafood per year. During 2016–17, over 37,000 t were overseas imports. The Melbourne post-harvest sector also handles significant, although unknown, quantities of interstate-produced seafood.

While the seafood produced in Victoria may be a small part of the overall seafood landscape in Victoria, it is highly valued by post-harvest seafood businesses, including the hospitality sector, and seafood consumers for several reasons:

- Aside from selling local produce because of its own appeal and value, retailers and wholesalers suggested that local produce was important to their overall image. Having Victorian produce helps them to project an image of freshness and quality.
- Eighty-six per cent of surveyed post-harvest businesses believe the Victorian seafood industry is important to the success of their businesses.
- Sixty-two percent of surveyed post-harvest businesses said they experience greater demand for Victorian seafood than they can supply, with 80 per cent saying they experience greater demand for Victorian seafood than seafood from other countries, and 58 per cent experiencing greater demand for Victorian seafood than from interstate producers.
- Ninety-six per cent of the surveyed hospitality businesses said their customers want to know the origin of their seafood.
- Victorian-produced seafood caters for diversity in species preferences, price points and ethnicity of Victorian seafood consumers, although diversity has reduced in Victoria with the closure of Victorian bay and inlet fisheries.
- Food localism among consumers is a growing trend, which benefits seafood businesses around the state.

Victorian seafood consumers value Victorian seafood:

- Eighty-five per cent of Victorians prefer Australian seafood and 24 per cent prefer Victorian seafood. The preference for Victorian seafood is stronger for residents of Victorian coastal fishing towns, where 40 per cent prefer seafood from their town or region.
- Seventy-four per cent of surveyed Victorians feel it is very or extremely important to know where their seafood comes from. Of these Victorians, respondents who identified as recreational fishers, as well as older and wealthier respondents were significantly more likely to consider the origin of their seafood to be 'very' or 'extremely' important.

- Victorians prefer local seafood because they believe it is fresher and higher quality, they want to support the Australian economy and fishers, and they believe it is safer to eat and from cleaner waters.
- Interviews suggested that people go to considerable effort to buy Victorian or more localised product. Several fish retailers spoke of customers who regularly travel substantial distances to visit their shop and 'stock up' on local seafood.

Ninety per cent of Victorians believe it is important to produce seafood in Victoria and reduce reliance on imports (over 70% of seafood consumed in Australia is imported).

5.2 Seafood supply and consumption in Victoria

5.2.1 Production, imports and exports

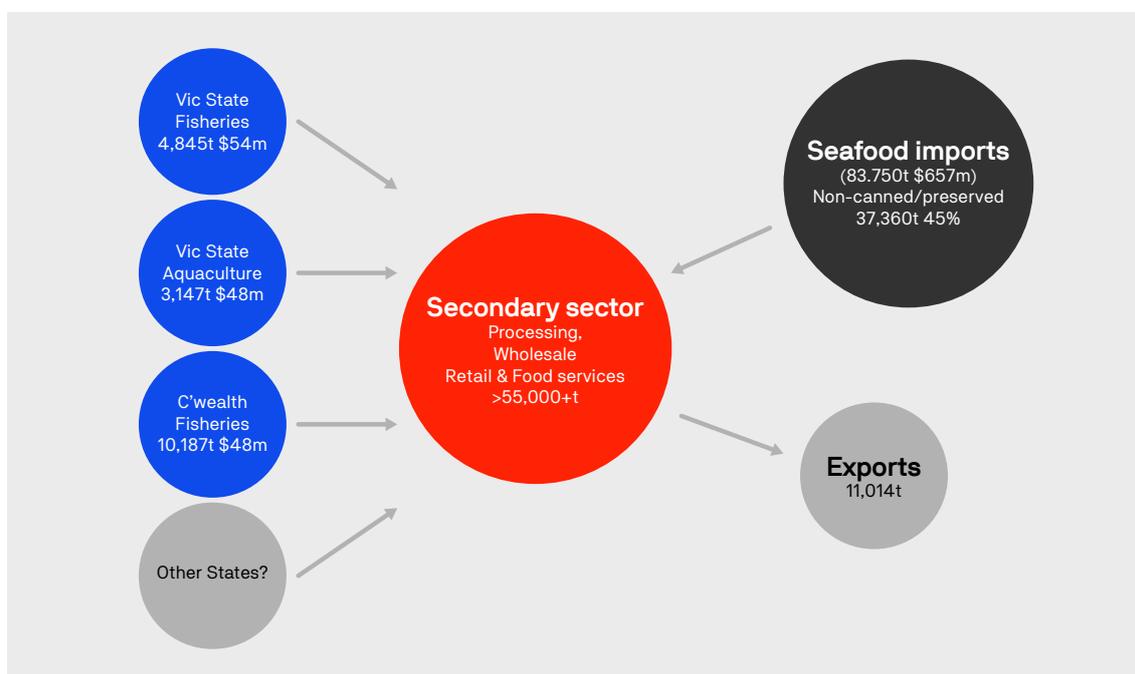
Professional fishers in Victoria produce 4,845 t per annum from state fisheries and 10,187 t from Commonwealth fisheries. Aquaculture operations produce a further 3,147 t of seafood (ABARES 2018).

Seafood imports, exports and Victorian production in Victorian markets are complex because of the flow of seafood traded through Melbourne to and from different interstate and overseas sources. International seafood exports from Victoria in 2016–17 totalled 11,014 t, which was valued at \$202.63 m (FRDC, 2019; see Figure 24). In 2016–17, the exports averaged 1,500 t per month in the July to November period and then 300 t per month in the December to June period (FRDC, 2019). However, not all of these exports were supplied by Victorian fisheries. Melbourne is also an export hub for seafood from other states. For example, the production of Victorian abalone in 2016–17 was 716 t and rock lobster 262 t, but the exports from Victoria were abalone 826 t and rock lobster 1,249 t. The excess represented additional economic activity for Victoria, such as seafood trading, freight and possibly processing not included in the current report. The quantity of seafood imported from other Australian states into Victoria is unknown.

The seafood consumed in Victoria is made up of imports from overseas and interstate as well as local production (see Figure 24). In 2016–17, 83,730 t of edible seafood was imported from overseas to Victoria, which was valued at \$657.7 m (FRDC, 2019). The flow of imports is reasonably steady and varies between 6,000–8,000 t per month, which makes Victoria one of the largest importers of seafood in Australia. International imports include many canned and preserved fish products for supermarket retail, which we estimate make up approximately 55 per cent of the total imports by volume (see Figure 24). This leaves 37,680 t of non-canned/preserved imports, which join Victorian fisheries produce in supply chains. Non-canned/preserved imports include sizeable quantities of frozen fish (9,665 t of imports from New Zealand) and miscellaneous seafood for the seafood manufacturing sector from Asia (e.g., China 14,774 t, Vietnam 8,305 t and Indonesia 4,598 t). Added to the overseas imports is the seafood imported from other Australian states. Melbourne is a significant market hub for interstate-produced seafood. There are no firm data on the total amounts going into the manufacture of seafood products, processing or the retail and food service industry, although we estimate it to be over 55,000 t per year.

Figure 24. Summary of the Victorian seafood market using available import and production data for 2016–17

Source: VFA (2018a, 2018b), FRDC (2019), ABARES (2018).



While locally produced seafood is a small part of the overall seafood landscape in Victoria,¹⁴ it is important for the wholesale and retail sector. Aside from selling local produce because of its appeal and value, retailers and wholesalers suggested that local produce was important to their overall image. Having at least some Victorian produce helps them to project an image of freshness and quality. This might be considered a broadening of the ‘halo effect’—an association between one attribute of a product, such as its origin, and another, such as quality (e.g., Dopico, 2002). In this way, the attractiveness of one group of products (i.e., fresh local fish) can boost the attractiveness of the overall retail offering, including imported product.

Commercial establishments like ours gain some kudos in accessing fresh fish. So it does have a positive effect

– (Restaurateur, Lakes Entrance).

It’s the showcase ... Having access to that sort of resources where the fish is that fresh is really something impressive you know?

– (Seafood wholesaler, Melbourne).

[It’s] also the fact that you can put it on the counter and it looks so fresh ... it is really important with whole fish especially ... you can tell when something has come from NZ and [when it’s come] from Australia ... something that is only been caught for a couple of hours ago, caught in a quicker time and sold to a customer... it is just more fresh

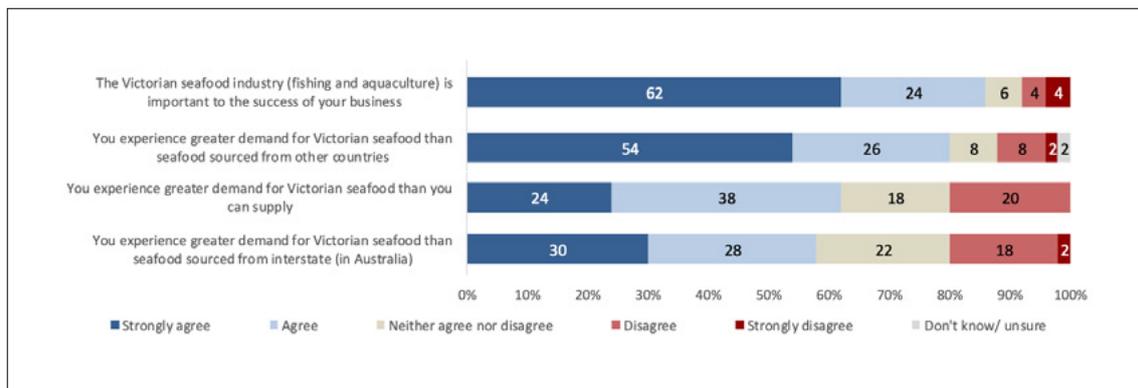
– (Seafood retailer, Melbourne).

¹⁴ Lack of data discussed in the previous paragraph makes it impossible to accurately quantify the proportion of locally produced seafood.

The survey of post-harvest businesses in Victoria indicated the importance of Victorian seafood for their businesses (see Figure 25), with 86 per cent agreement with the statement that the Victorian seafood industry is important to the success of their businesses and 62 per cent of respondents who said they experience greater demand for Victorian seafood than they can supply. Eighty per cent of respondent said they experience greater demand for Victorian seafood than seafood from other countries, and 58 per cent said they experience greater demand for Victorian seafood than from interstate.

Figure 25. The importance of Victorian seafood post-harvest businesses

Note: n = 50



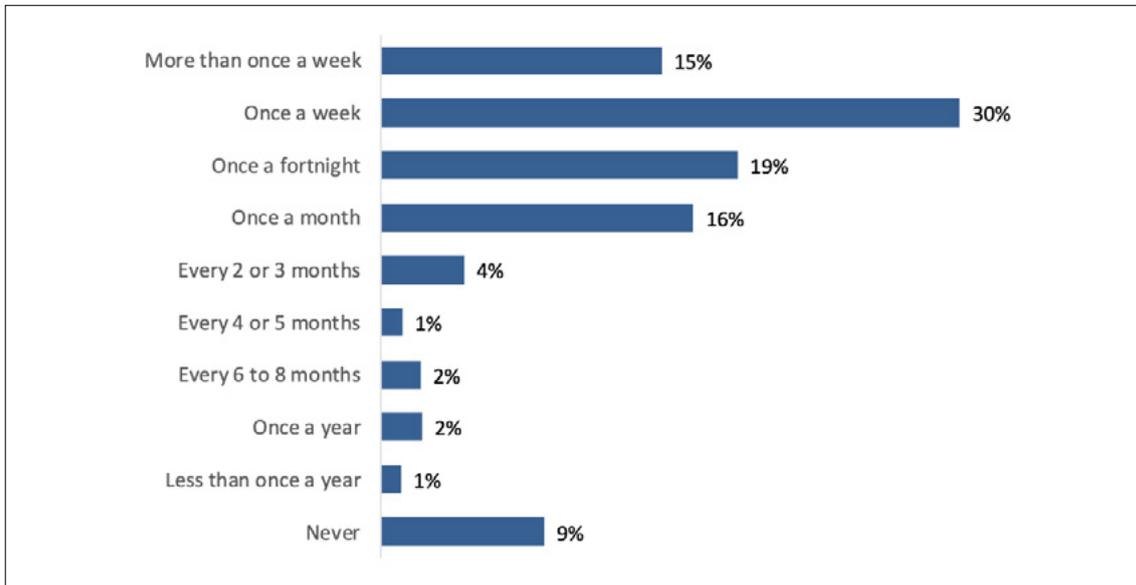
5.2.2 Purchasing and consumption

To understand the contribution of the professional fishing and aquaculture sector to food supply, purchasing and consumption behaviours in the Victorian community need to be determined. Results from our survey of the Victorian public indicated:

- Eighty-five per cent of respondents reported purchasing or ordering some form of seafood during the last six months.
- Ninety per cent reported eating fish at least annually. Four out of five (80%) purchased seafood at least monthly (see Figure 26).
- Of people who had purchased or ordered seafood in the last six months, most (81%) had purchased fresh seafood (see Figure 27). Almost two-thirds (59%) had purchased cooked or prepared seafood (i.e., from a restaurant or take away shop).
- Most respondents reported purchasing/ordering fish (96%; see Figure 28). Almost two-thirds (59%) purchased/ordered prawns and around half purchased/ordered octopus, squid or calamari.

Figure 26. How often survey respondents usually purchase seafood

Note: n = 1,154

**Figure 27. Type of seafood respondents had purchased or ordered during the past six months**

Note: n = 1,005

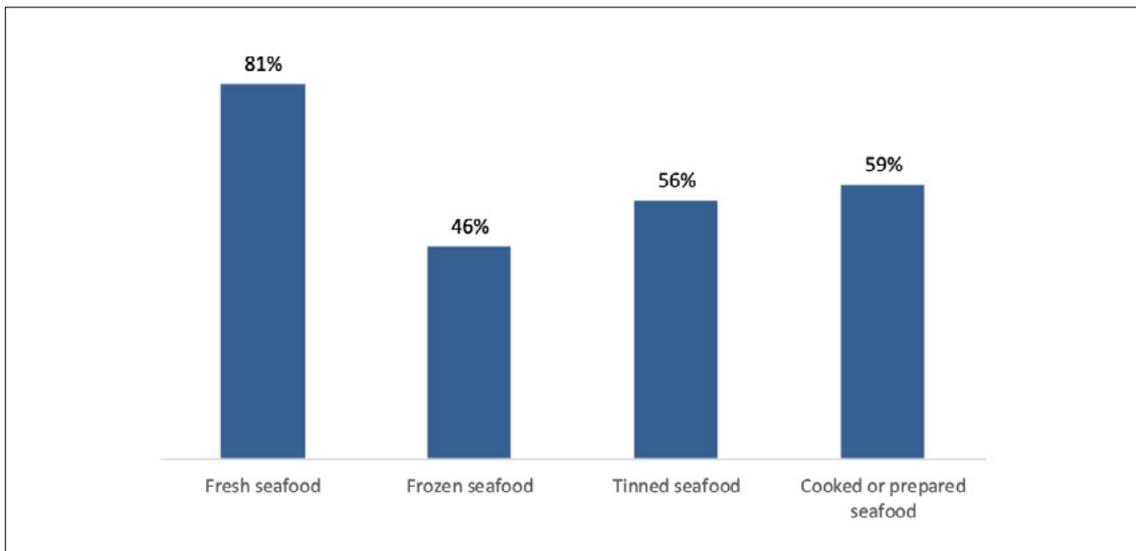
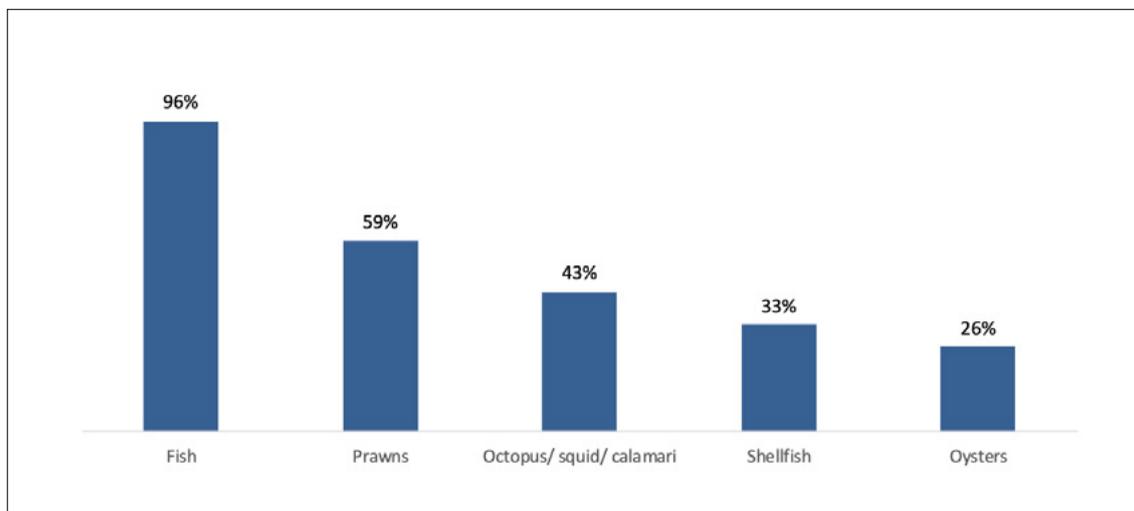


Figure 28. Type of seafood purchased by survey respondents during the past six months

Note: n = 1,005



Purchasing behaviour varied by:

- Age, with a smaller proportion of respondents in the 18–39 age bracket regularly purchasing seafood than those in older age brackets.
- Income, with those in higher income brackets more likely to report purchasing fresh seafood or cooked/prepared seafood than those on incomes of less than \$60,000 (see Table 26).

These results are consistent with previous work on purchasing and consumption behaviours in Victoria. For example, a 2004 survey of Melbourne households found that 97 per cent had eaten fish in the preceding year and had an average annual consumption of 12.5 kg/year (Ruello & Associates, 2005). As is the case here, the same study also found seafood consumption to be lower among low-income households.

Retailers and other industry participants noted that diversity in the types and available price points of fresh seafood was important for different consumers. Having species that are affordable is important for low-income earners. However, what is affordable has changed over time as broader community preferences, demand and prices changed. For example, fishers and wholesalers noted during interviews that species like flathead, which were once largely ignored and cheap, have now become a highly desired and expensive species. Conversely, species such as Australian Salmon and Mullet have continued to be relatively inexpensive.

Participants noted that with the closure of bay and inlet fisheries, the diversity of species landed had reduced and there was a reduction in catches of the more affordable species. It is also important to have species that cater to diverse cultural backgrounds and preferences. For example, abalone are a prized delicacy in many Asian countries, urchins are valued by Maori and Pacific Islanders, and octopus and whole fish are sought after by those with Mediterranean backgrounds.

We are now catering for, not just an Australian market, we're catering for all different types of nationalities. Greeks love octopus. Chinese love octopus. Chinese love crabs. At one time you couldn't sell a crab here. You catch a crab today and put it alive on the boat, you'll get \$10 a kilo for it

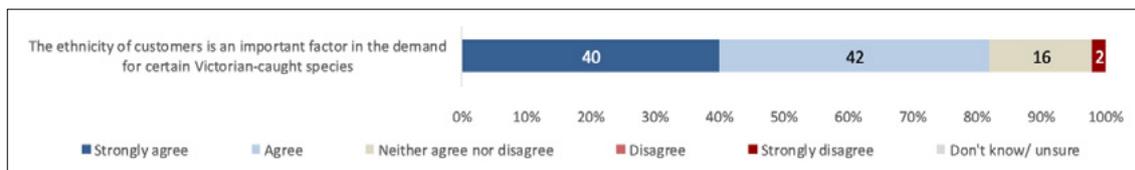
– (Fishing industry participant, Lakes Entrance).

In my dad's generation, something like calamari started as bait and ended up as a \$20 a kilo product. Now we're finding with a lot of what was considered by-product fish in the past, like silver biddies and small garfish and small whiting and those types of things, they were once not even pet food but got sort of cast back ... Now they're utilised and used, because they're a similar fish to what, say the Vietnamese get in their waters or what Sri Lankan people get in their waters

–(Seafood wholesaler, Melbourne).

In the survey of the post-harvest sector, 82 per cent of respondents said that the ethnicity of customers was an important factor in the demand for certain Victorian-caught species (see Figure 29).

Figure 29. The importance of ethnicity in the demand for Victorian-caught species



In terms of where Victorians tend to purchase their seafood, the majority (70%) of survey respondents indicated that they usually bought their seafood from supermarkets (see Figure 30). Around a third (34%) used fresh fish shops. Far fewer respondents sourced seafood from fishing co-ops (4%), wholesalers (3%) or directly from fishers or aquaculture facilities (1%). Approximately one-third of respondents reported buying seafood from fish and chip shops or cafes and restaurants (33% and 32%, respectively), although this was presumably cooked/prepared seafood rather than fresh or frozen seafood.

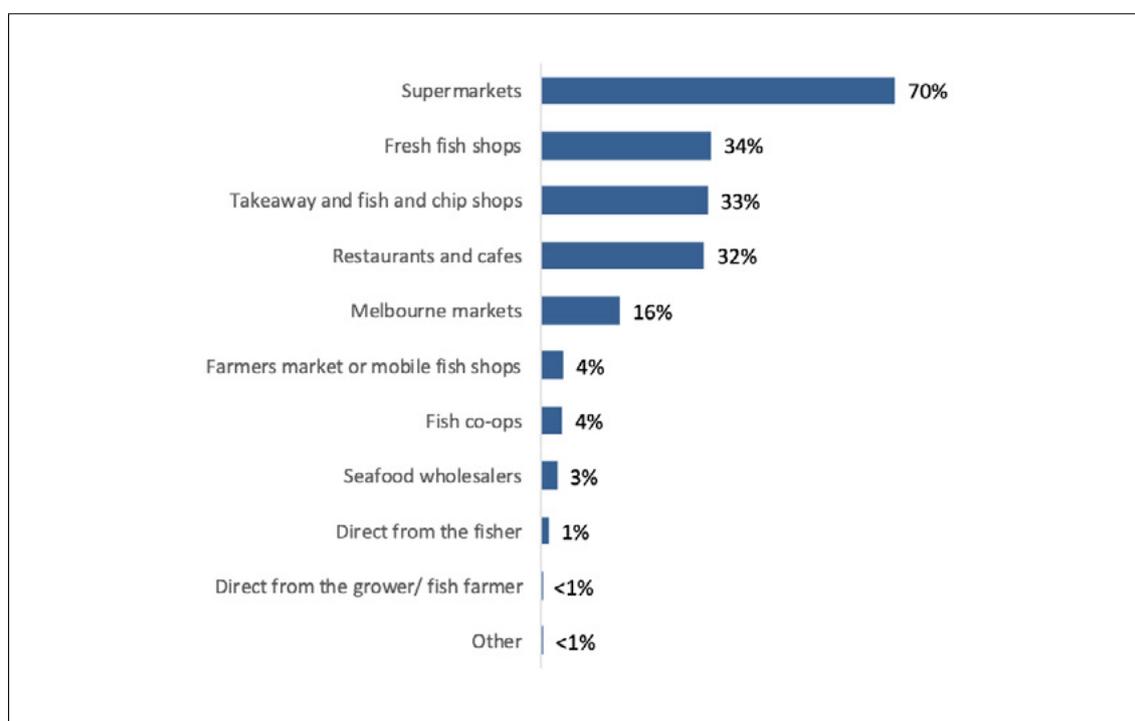
Table 26. Key demographic factors that appeared to influence purchase behaviours

Note: Red colouring within the table shows groups that are significantly different to the others (t-tests; $p < 0.05$, see Section 3.7).

Demographic variable	Purchased/ordered		
	Any seafood in the last six months	Fresh seafood	Cooked or prepared seafood
Age			
18–39	75%	80%	71%
40–54	91%	82%	62%
55+	92%	81%	47%
Annual household income			
less than \$60,000	86%	72%	48%
\$60,000–\$119,000	88%	84%	60%
\$120,000 and over	88%	93%	68%

Figure 30. Where respondents usually purchase their seafood

Note: Respondents could choose multiple answers (n = 1,056).



Broader trends—based on national data—point to an overall growth in Australia’s consumption of seafood.¹⁵ ABARES (2018) estimated that total seafood consumption in Australia grew from 313,450 t in 2005–06 to 357,623 t in 2016–17. However, this growth appeared to be driven by population growth, rather than per capita increases, with the apparent consumption per person falling from 15.0 kg per person in 2006–07 to 14.5 kg per person in 2016–17. The same changes would be expected in Victoria, which has a population growth rate of around 2.2 per cent, or approximately 140,000 people per year (ABS, 2018b).

Given the growing demand for seafood and the inability to satisfy this demand with local produce, there are a range of important implications for seafood supply in Victoria. Notably, any further loss of Victorian wild-catch production has the potential to flow through to increased levels of imports and/or higher prices for what remains. This increases the demand for and potential viability of new and expanded aquaculture operations in Victoria. It also has potentially negative impacts, including:

- Exacerbating environmental impacts from poorly managed international fisheries that supply imports to Victoria, as well as potentially affecting food security in source countries.
- Increasing demand for species typically sold in Victoria from other state fisheries, creating price hikes for Australian consumers in other states.

These outcomes are important to consider given the strong preferences for and value attributed to fresh, local seafood. The following section explores this topic further.

5.3 Seafood preferences and the meaning of ‘local’

5.3.1 Ways in which local is important

One of the clear themes that emerged from interviews across stakeholder groups was the importance of fresh, locally produced seafood. Among participants and survey respondents:

- definitions of ‘local’ varied, including Australian and Victorian seafood in different contexts
- there was a stated preference for seafood from Australia and Victoria
- there was a growing cultural shift towards valuing local produce.

In this context, seafood produced (either caught or farmed) in Victoria has an important role to play in the wellbeing of Victorians in terms of their food supply. As such, we discuss each of the points raised above in the sub-sections below.

5.3.2 Definitions of local

Local seafood was defined differently by different groups (see Figure 31). The Victorian community most frequently considered ‘local seafood’ to be anything from Australia (45%), followed by seafood from Victoria (29%). Around a quarter (22%) considered ‘local’ to be from their town or region. Community members from fishing/aquaculture towns were more likely than the general Victorian population to consider ‘local’ seafood as being something that had been farmed or caught in their town/city (40%) or their region (23%).

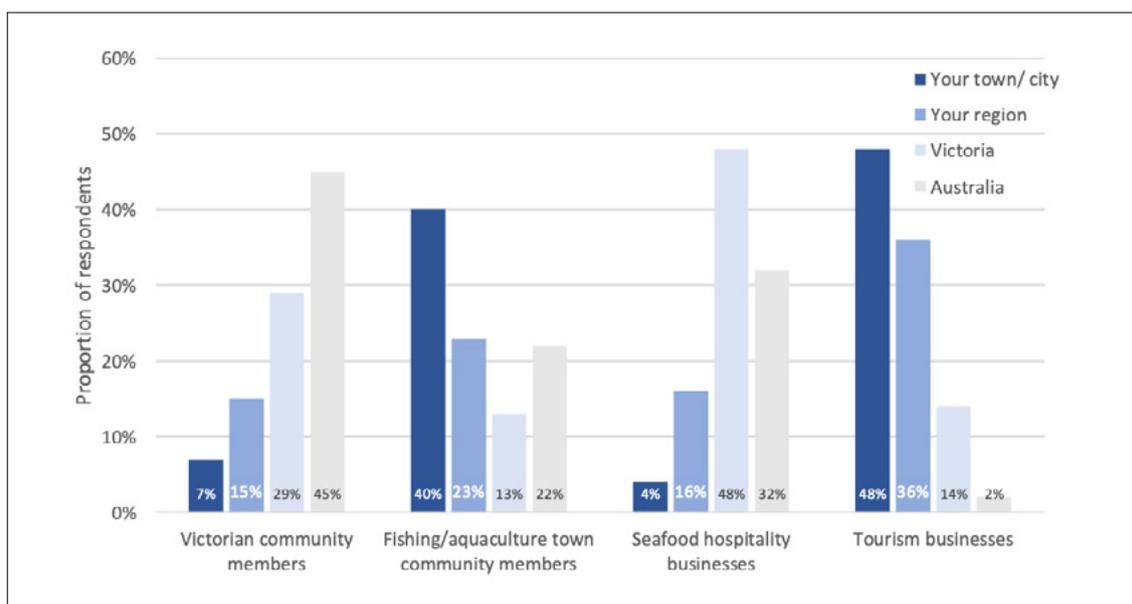
¹⁵ Consumption was estimated from the balance of production, imports, exports and fish food.

Seafood hospitality businesses had a similar pattern of responses to the general Victorian community, although they were more likely to indicate 'local' to be from Victoria (48%) than from Australia (32%). As with the pattern for community in fishing/aquaculture towns, tourism businesses operating in those towns were also more likely to indicate that 'local' was from their town (48%) or region (36%).

The differences in these results suggest that there is an important contextual element to understanding what 'local' means. For almost half of the general Victorian public, 'Australian' seafood is local. However, this appears to depend on whether they are travelling or not, with the vast majority (88%) agreeing or strongly agreeing with the statement: 'you expect to eat local fish or seafood from the local region when you visit the coast'. This more subtle understanding is perhaps reflected in the responses of tourism business operators, for whom the concept of 'local' was more salient.

Figure 31. What different stakeholder groups considered to be 'local' fish or seafood

Note: Data from general community survey (n = 1,054), survey of community members in fishing/aquaculture towns (n = 150), survey of seafood hospitality businesses (n = 50) and tourism businesses operating in fishing/aquaculture towns (n = 50).



5.3.3 Preferences for Victorian and Australian seafood

The majority (85%) of survey respondents reported that they had a preference for Australian seafood—and around a quarter (24%) preferred seafood from Victoria (see Figure 32). Fifteen per cent of survey respondents noted that they have no preference for where their seafood comes from. This was most commonly cited among respondents who purchased seafood less than once a month.

Among those with a preference for Australian seafood (see Figure 32):

- Survey respondents from fishing/aquaculture towns were more likely to nominate their town or region (40%) as their preferred source of seafood than respondents from elsewhere in Victoria (11%).

- Around three-quarters (74%) felt it was 'very' or 'extremely' important to them to know the origin of their seafood (see Figure 33).
- Respondents who identified as recreational fishers (22% of respondents) were significantly more likely to consider the origin to be 'very' or 'extremely' important (82%) than non-fishers (72%). The policy to replace professional fishing with recreational fishing in coastal areas has adverse effects for Victorians in terms of their preferred access to local seafood, including recreational fishers.
- Respondents who were older (55+) were significantly more likely to consider the origin to be 'very' or 'extremely' important (78%) than those aged 18–39 (69%) or 40–54 (76%).
- Wealthier respondents (annual household income > \$120,000) were also significantly more likely to consider the origin to be 'very' or 'extremely' important (88%) than those with lower house incomes (< \$120,000; 73%).

These results correspond with the views of survey respondents from the hospitality sector, who agreed that (see Figure 34):

- their customers want to know the origin of their seafood (96%)
- that they experience greater demand for Victorian seafood than seafood from other countries (80%)
- that they experience greater demand for Victorian seafood than from interstate (58%).

Figure 32. Survey respondents' preferences for where their seafood is caught/produced

Note: n = 1,053.

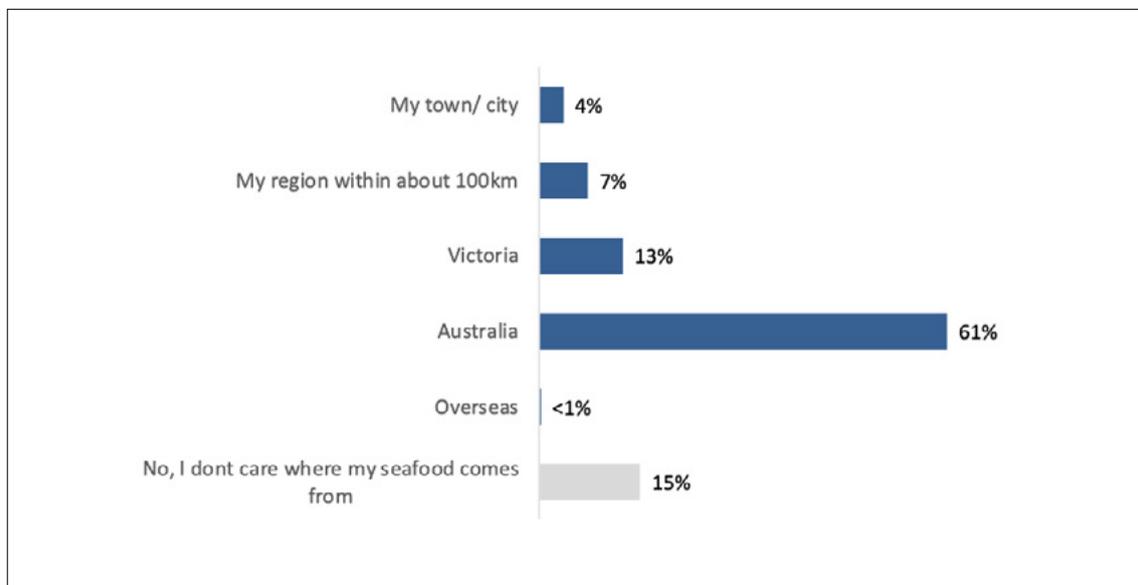


Figure 33. Importance of knowing the origin of seafood to survey respondents

Note: n = 905.

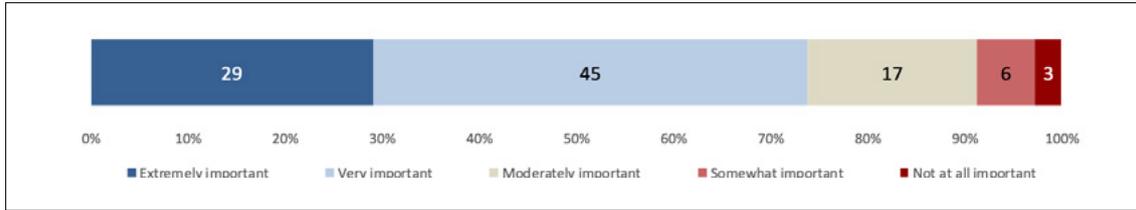
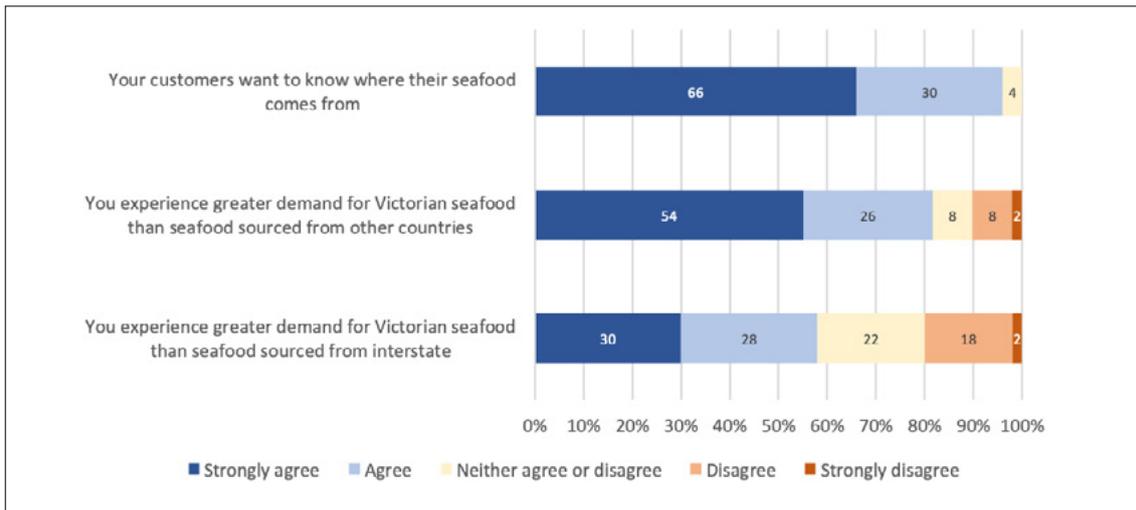


Figure 34. Hospitality respondents' perceptions of their customers' preferences for seafood

Note: n = 50.



Flowing on from preferences, nearly half (46%) of those who purchase seafood at least once a year indicated that they purchase seafood caught or farmed in Victoria (see Figure 35). A further quarter (25%) assumed that they were buying Victorian or were unsure.

There is a difference between the percentage of those that said that it is important to know the origin of their seafood (74%), those that said they prefer Victorian seafood (24%), and the percentage of those that said they purchase Victorian seafood (46%). This suggests that 28 per cent of people feel the origin of seafood is important but do not translate that into buying local seafood in Victoria. Those who prefer Australian also say they buy Victorian.

Of those who said they purchase Victorian seafood, almost half (41%) said they purchased it 'often' or 'always' (see Figure 36). This suggests that, of Victorians who purchase seafood at least once a year, around a quarter (23%) often or always purchase Victorian seafood (or what they assume is Victorian seafood).

Recreational fishers also said they buy Victorian seafood (56%) compared to respondents who did not fish themselves, of whom only (44%) said they buy Victorian seafood.

Further, interviews suggested that people will go to considerable effort to buy Victorian or more localised product. Several fish retailers spoke of customers who regularly travel substantial distances to visit their shop and 'stock up' on local produce. Others talked of holiday makers and people from other regions diverting out of their way to visit shops that supply high-quality local produce. As one fisher in Lakes Entrance noted:

From Christmas through to now, if you go down the street, especially on weekends, there's a queue anywhere that's selling prawns off the wharf. A lot of people ... they've got no need to go through Lakes, but they divert into Lakes to get prawns on their way back to Latrobe Valley or the eastern suburbs of Melbourne

– (Fishing industry participant, Lakes Entrance).

Similarly, a non-fishing industry participant who did not live in a coastal town:

I travel up through Lakes Entrance fairly regularly now and I make a point of stopping there to buy fresh seafood, rather than going and getting it from the supermarket

– (Community participant).

Figure 35. Whether respondents purchase Victorian seafood

Note: n = 1,056.

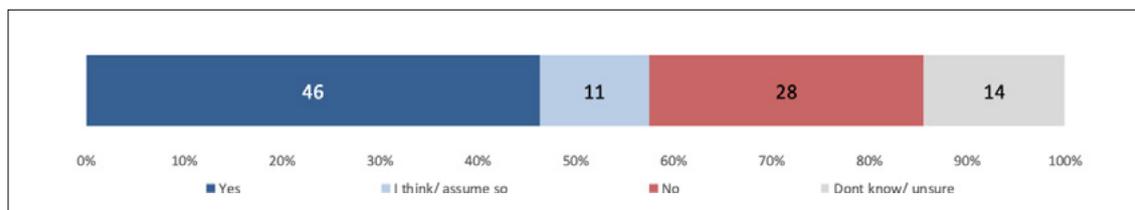
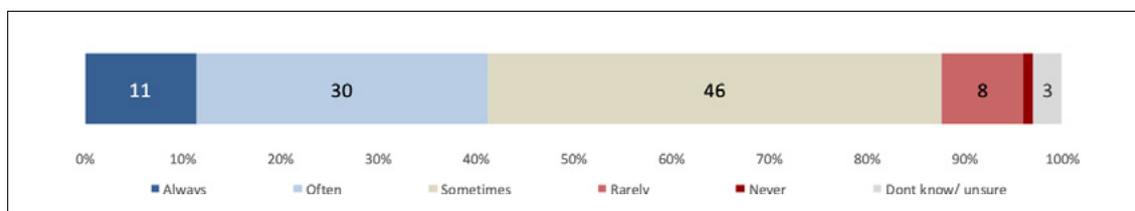


Figure 36. How often respondents purchase Victorian seafood

Note: n = 647.



The key reason respondents cited for preferring Australian, Victorian or regional produce was because they considered it to be fresher and higher quality (see Figure 37), including the idea that their food has 'not travelled far'. This was particularly the case for Victorian and regionally sourced seafood, with around two-thirds of respondents who preferred these sources citing freshness and proximity as a reason for their preferences. Other key reasons across respondents were:

- to support the Australian economy and fishermen

Mainly because I like the idea of supporting Australia more than anything else

– (Victorian public phone survey respondent).

- because the seafood is safer to eat, from cleaner water, has better standards and quality control and is more trustworthy (particularly important among those with a preference for Australian seafood)

It is important because you hear things on the news about how they catch the fish and what they put in the fish. It's a worry if they come from overseas

– (Victorian public phone survey respondent).

However, beyond its origins, people also considered a broader range of factors when purchasing seafood (e.g., Lawley et al., 2015). When prompted about some of these factors (see Figure 38), 91 per cent of survey respondents agreed that they choose seafood that 'looks the freshest'. This concurred with their main reason for purchasing Australian, Victorian or local seafood (see Figure 37). However, there were also high levels of agreement with factors such as:

- seafood that they are familiar with cooking and eating (87%)
- nutritional/health considerations (70%)
- sustainability of the seafood (69%; recreational fishers, respondents over 40 and residents of fishing/aquaculture towns were most likely to report choosing seafood that is sustainably harvested)
- ease of preparation (67%).

Price was only reported as being an important factor by about half of respondents (52%) and cultural background/preferences was a factor for about a third (34%). People who said they do not buy seafood or only buy it less than once a year were not asked whether price was a factor in their decision.

The relatively high interest in sustainability (69%) was not generally reflected in why they preferred Australian, Victorian or local seafood—in which only 7–10 per cent mentioned this being as a reason. Given the generally high level of management of Australian commercial fisheries and aquaculture, this likely reflects a disconnect in the general public's understanding of Australian fisheries. Lawley's (2015) work supports this:

- one in three consumers have no idea or an incorrect idea of what sustainability means in relation to seafood
- sustainability was a lower consideration than price, country of origin or species.

Figure 37. Reasons for why respondents preferred seafood from Australia, Victoria, their region or their town

Note: Australia (n=624), Victoria (n=126), their region (n=89), their town (n=66)

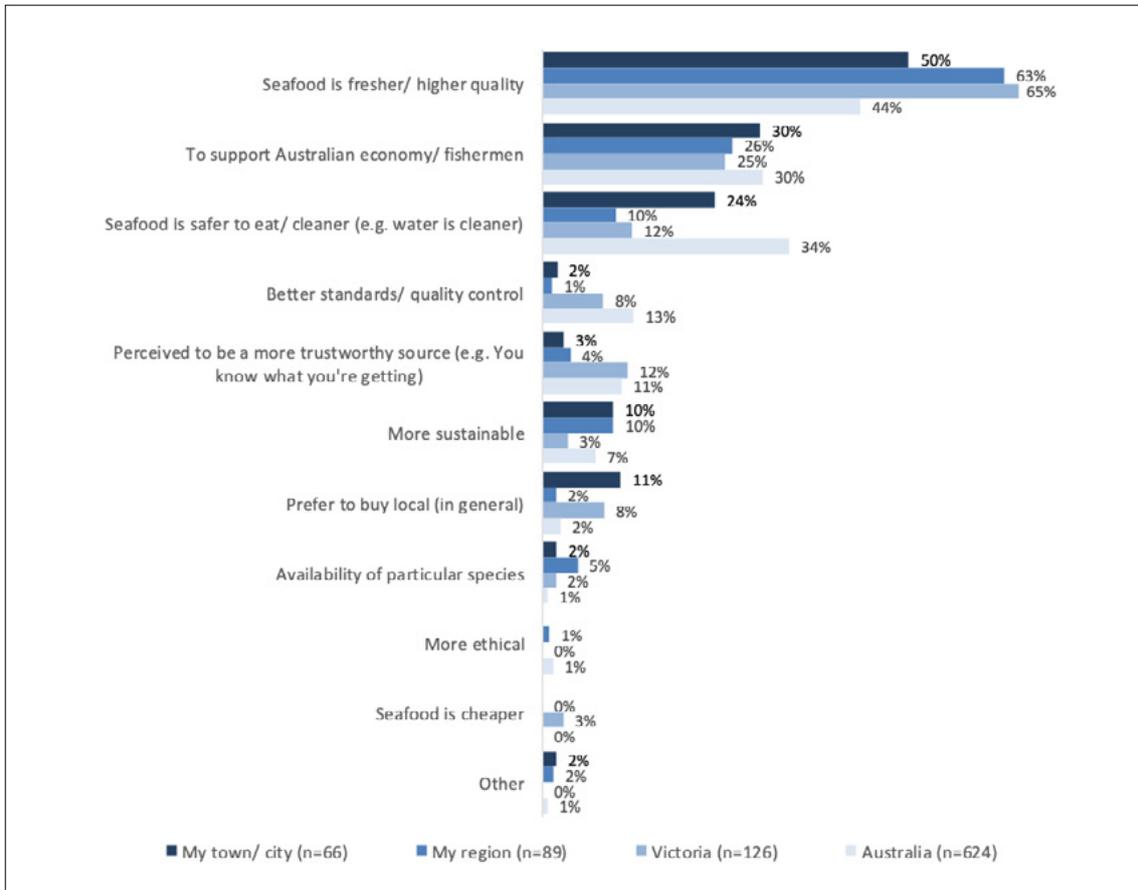
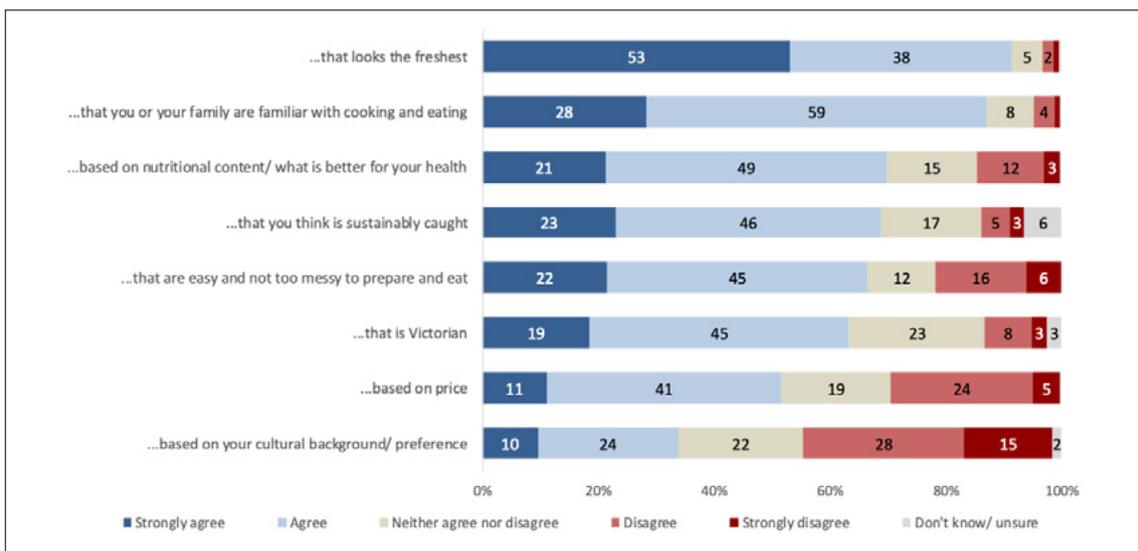


Figure 38. Respondents' level of agreement with reasons why they choose particular seafood

Note: n = 1,056.



5.3.4 The growing culture around valuing local food production

The results above highlight the interest in Victorian and locally sourced seafood. This appears to be largely driven by perceptions of freshness, an interest in supporting local economies and the cleanliness of the environment in which the seafood is caught or farmed.

Interviews in the regions also suggested that this interest in 'local' also forms part of a broader cultural shift towards valuing and understanding the provenance of products. While this applies to food production more broadly than seafood, it is particularly important for highly perishable products such as seafood:

In a contemporary sense, even following on from the likes of Master Chef, the whole culture has changed where fresh local has really become the narrative that is now really important. So people are looking for that. Whether it's food or wine. Just as we love to be able to source our local beef or our local lamb, it's probably even more critical from a seafood point of view recognising the delicate nature of seafood and that it's always been 'fresh is best'

– (Community participant, Geelong).

Almost two-thirds (62%) of seafood hospitality businesses surveyed agreed that the demand for local produce is growing. Similarly, over a third (38%) of tourism businesses surveyed indicated that they had observed an increase in interest in and demand for local seafood in recent years.

This was apparent among retail and restaurant businesses that we interviewed in the regions, including a range that have grown their businesses from a reputation for quality, local produce (see Box 2). While some of this was driven by the strong links between tourism and seafood (see **Section 6.2**), it was also about a more locally minded ethos:

It's important to us to be able to say these restaurants are providing local produce. That's incredibly important to us. We don't want to have to say, 'this fish has come from Vietnam'. That's vitally important. [It's about saying] you're not just supporting local businesses, but you're supporting local families as well. That's part of what we do. If you look at some of the fridges here, it says 'eat, drink, local'. That's what we do

– (Tourism manager, Gippsland Lakes).

As a fish wholesaler noted, a sense of location and context helps create a story and association with the product:

Our focus is mainly on the local market ... People are very proud of the fish that come from the local waters ... so it's a bit of a drawcard for customers, being able to have that product here. Also we're strong believers in the local industry having a local identity, because it creates an interest in seafood. Like people go to Lakes Entrance and get the little school prawns and they're nice and sweet. They'll actually travel or they'll ask for them from here, or they might say 'I had this beautiful flathead or small whiting from Lakes Entrance or from San Remo'. They'll actually ask for that, that ... so the familiarity [with the fish] out there breeds familiarity in the city
– (Seafood wholesaler, Melbourne).

Box 2. Growing businesses with local produce: San Remo Co-op and Bass Strait Direct

San Remo sits at the eastern entrance to Westernport Bay. It has a long history of fishing stretching back over 100 years. While the fleet is not as large as it once was, there are still a small number of crayfish boats, shark fishers and trawlers operating from the port. From this fleet, and surrounding suppliers in Lakes Entrance, Corner Inlet and elsewhere in Victoria, two seafood businesses have grown and built strong reputations through using fresh, local product.

The first is the San Remo Fisherman's co-op, which sits alongside the wharf where San Remo's small fleet is berthed. It includes a small-scale processing operation, a retail outlet and a fish and chip shop. For the co-op, the story is one of renewal. Under new management it has reclaimed a reputation for quality local seafood that had been lost because of the poor quality of its fish and chips, which were largely frozen imports.

Don't forget, I'm a local and I know the reputation of the place. I hadn't eaten fish and chips here for probably five years, because it was no good ... There were some local fish sold, but the fish and chip part of it, which should be the driver was ... it was kind of a laughing stock
– (Fishing industry participant, San Remo).

To turn the business around, the new manager made a clear commitment to supplying local produce from the local fishers, noting the clear interest from customers:

One of the biggest questions that the customers ask when they are looking up on the fish and chip board, can you tell me what's local? They want the local fish, all of the time
– (co-op manager, San Remo).

Across the bridge to Phillip Island, nestled in the backlots of Newhaven, Bass Strait Direct is another small-scale processor, retailer and wholesaler of fresh fish that has grown a business off the back of local supply. The owners noted that, at the time of starting the business:

There was so much talk about fresh fish in the area and so many people saying, ‘why can’t we get local fresh fish?’ ... you couldn’t get fish—not good quality stuff—in San Remo. You couldn’t even get a feed in the pub. It was all imported stuff

– (Owner, Bass Strait Direct).

Starting in a back shed and selling initially to farmer’s markets, Bass Strait Direct sources much of its product from local fishers, including a Danish seine fishing boat owned by one of the proprietors. Now operating out of a custom-fitted retail shop front, they attribute their success to the same interest noted by the San Remo co-op—the growing interest in and demand for local produce from both locals and visitors.

It is good to see how many people actually do want to know where their food comes from. I think that’s a big thing the last five years or so is that it’s one of the main factors in what you eat. They want to know where it comes from. ‘Is it sustainable’? All the really good questions that you’d expect them to ask

– (Owner, Bass Strait Direct).

For the San Remo co-op, the journey towards changing the source of their seafood started with discussions and relationship building with local fishers, trialling small amounts of local supply and gradually building up over time.

The very first thing was going and talking to the shark fishermen, and listening to them ... a lot of talking, a lot of meeting people and whatever, and we started small ... I think we got 50 kilos of carcasses the first month. One fish bin. We brought it in and we filleted it and we cooked it, and everyone was like, ‘oh my God, this is bloody beautiful’. So we did 50 kilos here and there ... and then it just grew. And now, we buy 500 kilos at a time, minimum

– (co-op manager, San Remo).

The co-op has since doubled its turnover and is continuing to grow by tapping into the flow of tourists on their way to Phillip Island.

We can now proudly say, local gummy, off the boats. There’s pictures on the walls. We put it on social media, the whole lot ... It’s still an excellent product when it’s frozen, because we’re freezing it while it’s still in really good nick, but when we’re cooking fresh gummy off the boats, the frequency of five star reviews that come through Google and everything does increase

– (co-op manager, San Remo).

Bass Strait Direct similarly continues to grow. On their opening day in 2016 they were expecting 20–30 customers. Instead, they had over 140. Now with seven permanent staff on the books, and more casual staff over summer, the business has won numerous awards from the local council and the seafood industry. They have even helped some of their local customers increase their fish consumption, simply because of the quality of the product

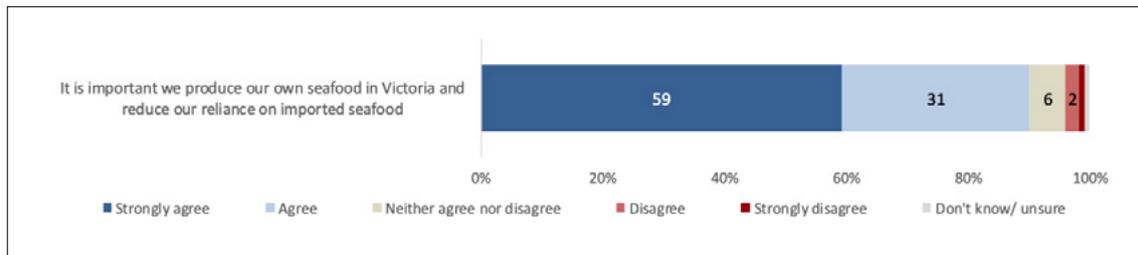
We do get a few customers that actually say, oh now that you're here I eat fish twice a week, which is awesome

– (Fish retailer, San Remo).

The narratives around local, fresh seafood that supports a local economy translated into very high levels of support for locally produced seafood. Nine out of ten (90%) surveyed Victorian community members agreed that it is important to produce Victorian seafood and reduce reliance on imported product (see Figure 39). This support, together with the range of benefits discussed above, provides a range of opportunities for the sector to consider, discussed in **Section 11.2**.

Figure 39. Respondents' level of agreement with the importance of producing Victorian seafood and reducing reliance on imported product

Note: n = 1,154.



However, there are significant challenges to increasing the amount of local seafood available in regional areas, including:

- Having a consistent, reliable supply of fish. The supply of fresh and local fish can often be highly variable, depending on weather and season. This creates challenges in developing menus, but also setting expectations among customers with respect to price, which can vary from week to week.
- Having the skills to deal with different species. As above, when there is not a consistent supply of the same species, chefs need to have the skills and repertoire to be able to adapt to preparing different species.

Could I buy a better product that's caught locally? If I do, how often is it available? It fluctuates massively in price a lot of the time and then do I have the staff who have got the skill to be able to prepare something

– (Chef, far west region).

- Being able to compete with restaurants that serve less costly, imported product. Underpinning this challenge is the assumption by seafood consumers that, in the absence of labelling, fish will be Australian in origin. In a national survey, over 50 per cent of consumers assumed that the seafood purchased was Australian if the country of origin was not identified (Lawley, 2015). It is not a legal requirement to identify the country of origin for seafood sold in restaurants in Victoria, so it is generally not identified.

These issues are less problematic for those establishments that have access to the more stable supply of food from aquaculture, such as mussels on the Bellarine Peninsula.

Well as I said nothing is more powerful than to be able to say to people ... 'well see those little dots in the water out there? They are actually the mussel farms'. All of a sudden people go, 'Wow! Wow! I'm eating [something] that was caught there, on the plate here'. It is local. It is fresh

- (Tourism manager, Geelong).

6 Results—tourism and recreation

Domain of community wellbeing	Dimensions of wellbeing	Contributions of Victorian seafood production	Indicators	Data collection methods (and types)
Tourism and recreation	Material (access to desired tourism and recreation experiences)	Raw material for hospitality sector Bait for recreational fishing Infrastructure and services for recreational boaters Aquaculture produces stocks for recreational fishing Professional fishing and aquaculture experiences for tourists (e.g., fresh local seafood, fishing town atmosphere)	Use of locally produced seafood in hospitality sector Size of locally produced bait market Extent of infrastructure and services for seafood production also used by recreational boaters Extent of recreational fishing supplied by aquaculture production Value of seafood-related experiences for tourism sector	- Interviews (qualitative, values and perceptions) - Phone questionnaires (semiquantitative, values and perceptions) - Literature review
	Relational (functional relations among the sectors supporting tourism and recreation experiences)	Fishing and navigational knowledge shared with recreational boaters and fishers Professional fishers assist with rescues and incidents at sea	Extent of sharing of fishing and navigational knowledge Extent of professional fishing involvement in rescues	- Interviews (qualitative, values and perceptions) - Literature review
	Subjective (perceptions that tourism and recreational experiences are sufficient and of desired quality)	Perception in communities that locally produced seafood is important for tourism and recreational experiences The level of importance recreational users put in the provision of local services and infrastructure from seafood producers	Importance of locally produced seafood for human consumption and bait to recreational users Importance of services and infrastructure to recreational users	- Phone questionnaires (semiquantitative, values and perceptions) - Interviews (qualitative, values and perceptions)

6.1 Overview

Leisure and recreation are important aspects of human wellbeing, with tourism being a significant leisure activity and a significant industry in Victoria, particularly along the coast. Recreational angling is also an important leisure activity in Victoria on the coast and along inland waterways. The professional fishing and aquaculture industries contribute to tourism and recreation through the provision of services and experiences.

In outlining the contribution of the professional fishing and aquaculture sector to tourism and recreation, the key aspects that we discuss in the following sections are:

- food tourism (see **Section 6.2**)
- value of town character and appeal (see **Section 6.3**)
- specific contributions to the recreational angling sector (see **Section 6.4**).

Key findings

The main tourism and recreation beneficiaries of contributions from Victorian seafood production are:

- tourism businesses
- regional communities, especially in coastal regions and some river areas
- Victorian, interstate and international tourists
- Victorian recreational anglers.

Sixty-seven per cent of residents surveyed from regional Victorian towns believed the most important contribution the local seafood industry makes to communities is through the interactions and benefits flowing to tourism.

Consuming local seafood in regional Victorian communities is part of the travelling experience and one of the key things to do for international and domestic visitors:

- Tourists visiting regional communities place increasing importance on local food provenance and experiences relating to local food production. Ninety-four per cent of tourism businesses surveyed said eating locally produced seafood is an important part of the Victorian tourism experience.
- Ninety per cent of Victorian tourism operators say tourists expect to eat local seafood when visiting the coast.
- International visitors, particularly Asian tourists, are the most interested group of visitors in eating local seafood. Victorian seafood producers have a particularly desirable product for international visitors because of cultural delicacies, such as abalone and rock lobster, and the clean environment from which local seafood is caught/farmed.
- There is also strong interest within the Victorian community in accessing local seafood when visiting coastal/waterside towns. Eighty-one per cent of Victorians surveyed said eating local seafood is an important part of their coastal holiday experience and 88 per cent of Victorians expected to eat local seafood when visiting the coast.

There is considerable unmet demand in terms of availability of local seafood for tourists, with 54 per cent of tourism businesses surveyed reporting that regional tourism suffers from a lack of access to locally produced seafood.

The tourism–seafood connection is apparent with the emergence of regional seafood festivals in Victoria. In recent years, several festivals have grown and developed into substantial events on the tourism calendar. Interviews revealed that seafood festivals had made noteworthy contributions through building linkages between the seafood and tourism industries.

Tourists also enjoy contributions from seafood producers through non-food related experiences. The fishing industry is important to the character and appeal of coastal towns, whether they are a ‘fishing village’ or a ‘working port’. Walking the fishing wharves in Victorian coastal towns is a popular activity:

- Eighty-eight per cent of Victorian tourism operators surveyed said the fishing industry adds to the character of coastal towns, attracting visitors.

- Eighty-six per cent of Victorian tourism operators surveyed said the history of fishing is an important part of the tourism offering.
- Sixty-nine per cent of Victorians surveyed enjoy watching professional fishers working while on holiday.

Professional fishing and recreational fishers are often portrayed as being at odds, although we found evidence throughout Victoria that the professional fishing and aquaculture sectors have important synergies with, and benefits to recreational anglers. The surveyed tourism businesses all agreed that, from a tourism perspective, there is a need for the professional and recreational fishing sectors to co-exist:

- Recreational fishers are more interested in professional fishing than the non-fishing public.
- Recreational fishers are more likely than non-fishers to buy local Victorian seafood and to consider the origin of their seafood to be 'very' or 'extremely' important.
- Recreational fishers are more confident than non-fishers that the local fishing industry will act in ways that sustain fish production and that the aquaculture sector will act to sustain environmental health.
- Over 80% of recreational fishers prefer to use local commercially caught bait because they believe it is better for the community and the environment than imported bait.
- The marine infrastructure—including wharves, boat ramps and slipways—that serves commercial fishing is available to recreational users.
- Professional fishers often provide advice on fishing and sea conditions to recreational fishers.
- Aquaculturists support inland recreational angling through stocking recreational target species into publicly accessible waterways.
- Aquaculture infrastructure, such as mussel ropes, offer good habitat and act as fish attracting devices for recreational fishing.
- Fifty-eight per cent of Victorian professional fishers have assisted recreational users of the sea (e.g., anglers, wind surfers and jet skiers) in distress in the past five-year period, supporting maritime safety for all.

6.2 Seafood experiences in tourism

There is significant overlap between the contribution described here, and that of seafood-connected businesses discussed in **Section 4.2.5** (e.g., flows to the tourism sector as part of economic resilience and diversity). If this part of the study were quantitative, it would be important to avoid double-counting. However, for this project, the analysis for this domain was qualitative and semiquantitative, and we have taken care to not repeat the discussion from the economics section, but to focus on how local seafood contributes to tourism experiences.

6.2.1 A growing interest in local, and in experiences

Tourism and industry participants noted that the consumption of local seafood is part of the travelling experience and one of the key things to do when travelling to a new area:

Your general tourist, going to a new region, will seek out the local produce. Where can I get locally farmed things—the local honey, or whatever. Is there any wine grown locally? All that sort of stuff. In a seaside town, of course, they’re going to search out the local seafood ... it’s like, people have that romantic notion of, where’s the local seafood?

– (Tourism manager, San Remo).

As with changes to food culture more broadly (see **Section 5.3.4**), tourism-related stakeholders highlighted that tourists in rural and coastal regions place increasing importance on local food provenance and experiences relating to local food production.

The vast majority (94%) of tourism businesses surveyed agreed that eating locally produced seafood is an important part of coastal or waterside holiday experiences (see Figure 43). Ninety per cent agreed that visitors expect to eat local seafood when they visit the areas in which respondents’ businesses operate:

My business would cease to exist, which is a restaurant and a fish and chip shop, if we didn’t have access to fresh local fish, because that’s the only point of difference that makes my business work. I’m not the only business like that [here]. There’s a lot that rely on [local seafood] as a drawcard to the area, so the tourism industry is intrinsically linked with the commercial fishing industry here from that perspective

– (Restaurateur, Corner Inlet).

As several participants described, the local seafood consumption is about the ‘story’—whether it is the story for visitors to tell of their experience, or the story of the food for them to hear and understand:

[It’s about] the fact that you can tell a story to your friends when you go back. Not only have I had the food, but I had this seafood where it was processed. It adds to that narrative, that special story that really enhances their own reputation and makes people go, ‘oh gee wow’

– (Tourism manager, Geelong).

[It’s] where a local chef finds out about a local product. They think it’s fantastic, it’s really unique and it’s got that wow factor. Then suddenly you start seeing the stuff appearing on people’s menus ... it generates enthusiasm for local produce. It’s about the stories. The stories of the guy who catches the sea urchins. Or, the stories of the fisherman who comes in with his catch

– (Community participant, Lakes Entrance).

Similarly, a wild-catch fishing industry member described how they market their food experience:

We promote that in a visual aspect - that this is where we are ... but we also describe it too—‘come and get some fish and chips and walk on to the jetty and check out the boats’, that sort of thing—because that’s all part of the experience

– (Fishing industry participant, San Remo).

Despite this interest, participants highlighted that local seafood is not always available and that the experience of enjoying fresh, local produce can sometimes be difficult to find. For example, despite substantial volumes of seafood flowing through the port in Portland, participants suggested that there are few places where local seafood is a prominent feature of restaurants:

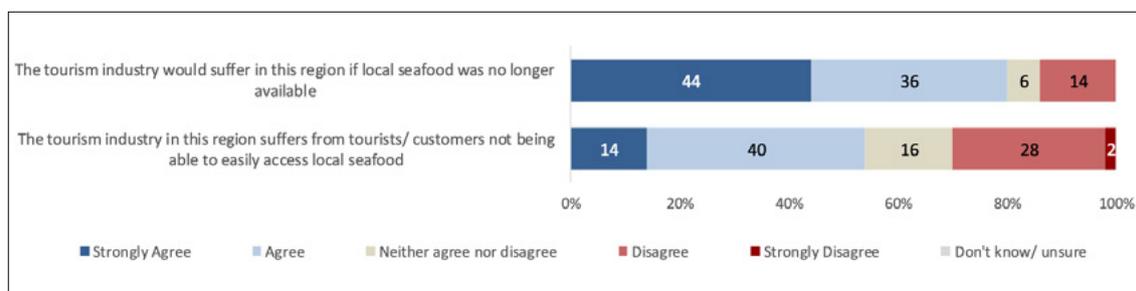
All the time, people are saying ‘where can we buy a local crayfish?’ Or ‘where’s the seafood restaurant?’ We don’t have one

– (Fishing industry participant, Portland).

Around half of surveyed tourism businesses (54%) agreed that the local tourism offering in their region suffers from a lack of easy access to local seafood (see Figure 40). Several chefs interviewed indicated that there are a range of challenges in filling this gap (see **Sections 5.3.4** and **11.2**).

Figure 40. Tourism businesses’ perspectives on the importance of seafood availability

Note: n = 50.



Food tourism extends, in some cases, to where fishing businesses and tour operators have aligned—or are starting to align—their businesses to create an ‘experience’ with the seafood industry. This includes combining seafood meals with tours, running tours of seafood facilities and providing seafood diners with ‘more than a meal’. Examples include:

- Tours of rock lobster processing/holding facilities in the far west region.
- Boat-based tours of mussel farms in Portarlington.
- Tour companies that build a locally sourced seafood meal into their day trip to the penguins on Phillip Island.
- A river cruise in Lakes Entrance from the wharf to a winery, which serves fresh local fish along the way.
- Tours of urchin processing in Mallacoota, followed by an urchin meal:

There was huge demand, people loved it

–(Tourism manager, Gippsland).

- Ad-hoc efforts to provide a broader experience than simply a seafood meal, as noted by one fisher in Apollo Bay:

There was a family there [at the co-op] and I feel like I need to show them my industry. I get a big cray out and I wop on their table and it's still alive. Then I say, come with me and I'll show you some others inside. The eyes are popping out of their heads ... give them an overview on a lifecycle, the age ... I show them where a female is different and the size across the head is different. They're fascinated by it

– (Fishing industry participant, Apollo Bay).

However, in most coastal regions, participants identified that there are limited fishing/aquaculture tourism activities and an opportunity to create more tourism experiences. This was particularly stressed in interviews on the Far West Coast of Victoria:

Yeah, the connection to tourism—so the fishing industry, it's this almost intangible asset. It's this intangible thing that people talk about and they identify with and feel very connected to. But [when my family] went down to the Mornington Peninsula they sent me a photo of this cute little stall that said, mussels \$12 a bag. They are picking them and filling up the bag. It's this whole sensory experience. Then they go home and cook up bowls of mussels. I don't know why we don't have that here

– (Community participant, Port Fairy).

6.2.2 Food tourism and the international market

Many participants pointed to the growth in international tourism and the associated interest in seafood among those travellers. This was particularly the case in places like San Remo and Apollo Bay, which sit on major tourist routes.

Around half (42%) of surveyed tourism businesses believed that international tourists were more interested in accessing local seafood than domestic tourists (see Figure 41). Of these, survey respondents most frequently suggested (55%) that tourists from Asia were particularly interested in local seafood (see Figure 42).

These observations are supported by tourism statistics (Tourism Research Australia, 2019), which showed:

- International expenditure in Victoria grew 7.6 per cent to \$8.5 billion in the year ending March 2019.
- International overnight visitors to regional Victoria increased by 12 per cent, reaching 588,200 (compared to the national regional growth rate of 3.3%).
- Key increases in tourist markets were from Asian markets such as Taiwan (36%) and India (19%).

Participants also suggested that seafood can be particularly special for international tourists, something that is an attraction. From this perspective, they noted that Victorian seafood producers have a particularly desirable product for some international visitors because of:

- a general cultural valuing of seafood
- a valuing of some species as cultural delicacies, such as abalone
- the clean environment from which local seafood is caught or farmed.

As one stakeholder observed:

That’s why the Asians, for example, as part of their culture they love seafood. But that experience is so compromised. We’ve had many senior people [from Asian tourism partnerships] say that they won’t eat seafood in Asia anymore because they can’t guarantee the quality ... because again it [Victorian seafood] represents the brand of freshness, of clarity. It embodies in many ways—I reckon seafood is a real litmus test the quality of the environment isn’t it?

– (Tourism manager, Geelong).

Figure 41. Tourism businesses’ perspectives on which tourist groups are most interested in local seafood

Note: n = 50.

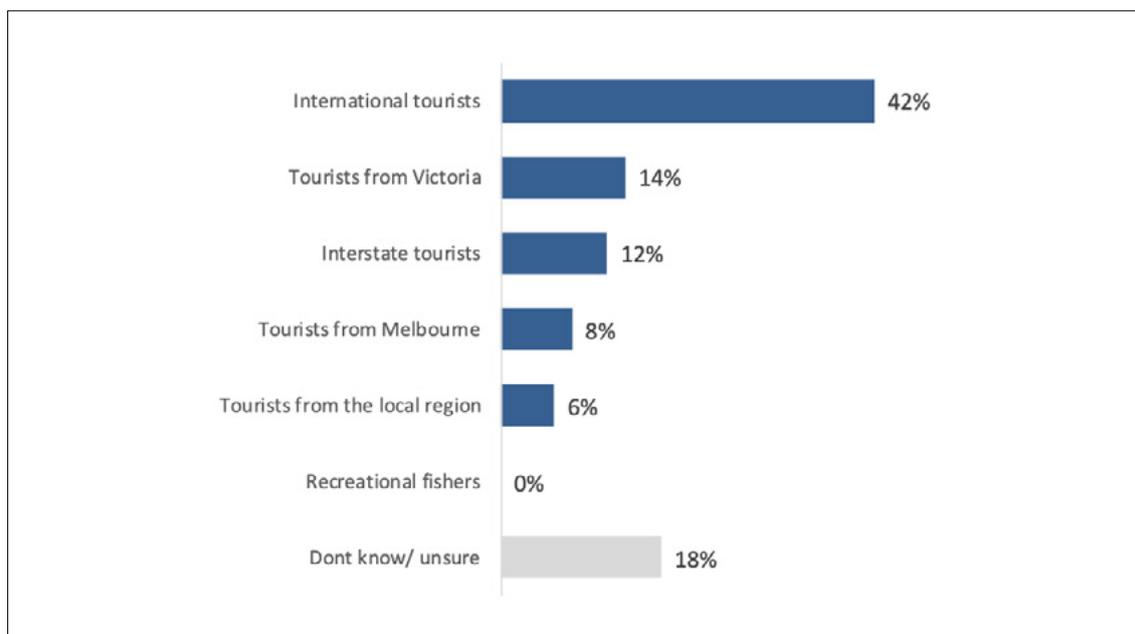
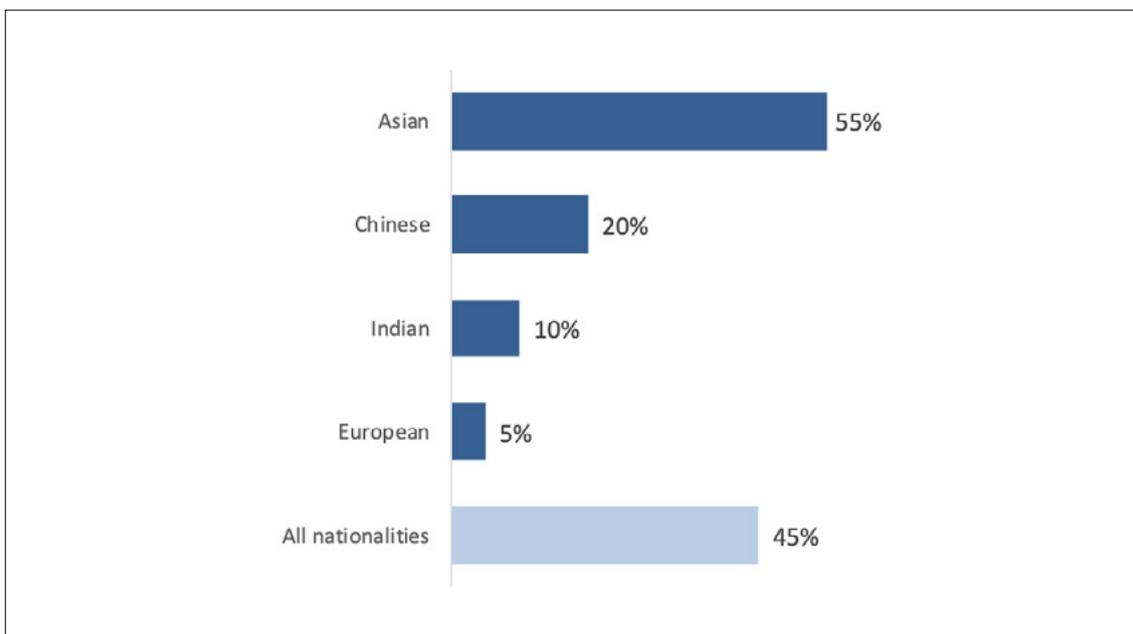


Figure 42. Tourism businesses' perspectives on the origin of international tourists interested in local seafood

Note: n = 50.



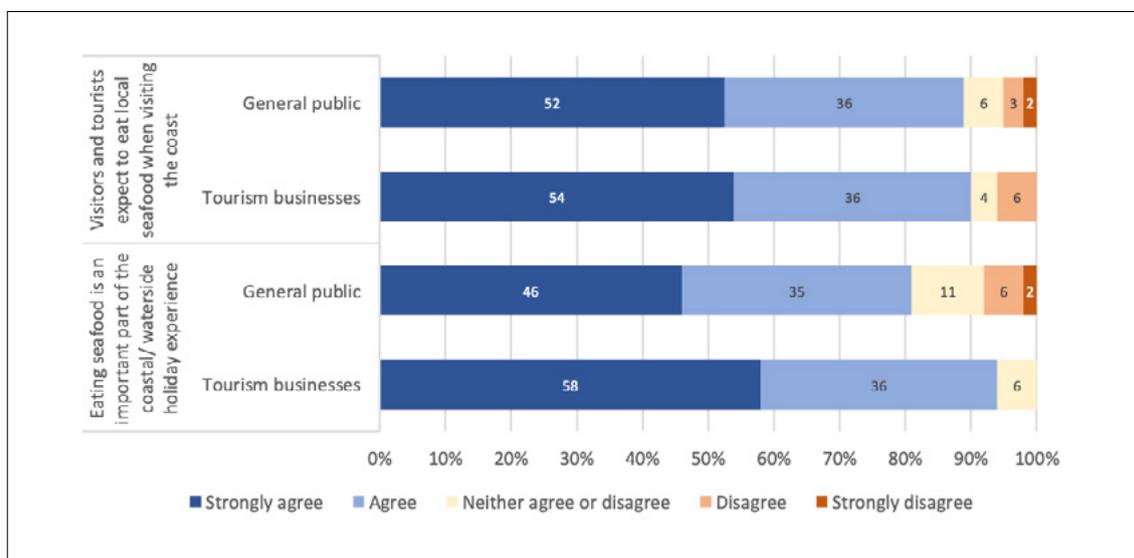
6.2.3 Food tourism among Victorian—the domestic market

Experiencing local seafood is not just the domain of international tourists. There was strong interest within the general Victorian community to access local seafood when visiting coastal/waterside towns (see Figure 43). The majority (88%) of survey respondents agreed that they expect to eat local seafood in these areas and that consuming local seafood is an important part of the coastal/waterside holiday experience (81%). Our data did not show whether a lack of local seafood would cause a proportion of visitors to no longer holiday in those areas, but it did indicate that if local seafood is unavailable, this will detract from their satisfaction. This aligns well with the perspective of tourism operators, who expressed similarly high levels of belief in the importance of local seafood to tourism (see Figure 43).

Most of the restaurants down here brag that they use the local fish, and I would guess the vast majority of people coming to Lakes Entrance for a holiday or something expect to eat fish, and they expect to eat the local fish. You've only got to go down on the wharf on the weekend when the prawns are running and you see the queue of people, 30, 40 long, to buy prawns off the wharf
– (Fisher, Lakes Entrance).

Figure 43. Victorian community and tourism businesses' perspectives on the importance of local seafood when visiting coastal/waterside areas on holiday

Note: Victoria (n = 1,154), tourism businesses (n = 50)



6.2.4 Joining food and tourism in seafood festivals

Perhaps nowhere is the tourism–food connection more apparent than the emergence of seafood festivals. In recent years, several festivals have grown and developed into substantial events on the tourism calendar. Box 3 displays the festivals mentioned in interviews that had made noteworthy contributions to developing tourism linkages based on a focus on the seafood industry or with the support of the seafood industry.

Three main benefits were realised from these festivals: 1) building linkages between seafood and tourism industries; 2) providing opportunities for the public to learn about the seafood industry and where their seafood comes from; and 3) highlighting contributions to the social fabric of communities.

The strongest contribution of festivals was building synergies between tourism and seafood industries and the many benefits this has for local economies. This includes the economic contributions of tourists through their visits during events, as described for the Apollo Bay Seafood Festival:

The Seafood Festival is not measured by the value of the seafood product. It's the 8000 people who come and stay for two or three nights, each of them spend a couple of hundred bucks each in the local community, on all the products and services around. Look what happened in Tasmania when the whole Museum of MONA was set up, and the whole arts festival around that—that has transformed Tasmania – (Community participant, Apollo Bay).

However, seafood festivals can also tie into a broader strategy around promotion, awareness-raising and branding of an area, particularly with respect to local foods and wines:

We're deliberately doing a strategy to try and get Melbourne, particularly just to come down for the day, experience what Portarlington has to offer, because we do have—it is the core of the mussel industry, but it has also got so many wineries, cheese, we've got smoked fish products. There's a whole range of things that we can showcase down here

– (Tourism industry participant, Bellarine).

A lesser but nonetheless important benefit was the opportunity for tourists to learn about the seafood industry. In some cases, simply observing the catch/unloading process can help the public to connect with food production systems in a way that is not possible in many other primary industries, for example livestock and meat production. This included learning about the seasonality and weather-dependency of the wild-catch sector:

Last year we tried to introduce an off-the-boat seafood market on the Saturday morning ... the trouble was, in the week leading up to the festival, the weather was bad, so no one could actually get out and fish, so all these people turned up, 'well, where's the fresh fish?' It's like, well, actually, sometimes, there's only fresh fish if we can go and get fresh fish. [So] that in itself was an education

– (Fishing industry participant, Apollo Bay).

Box 3. The rise of the seafood festival

Seafood and fishing festivals are now firmly on the map in Victoria as major tourist events. Six annual festivals focused on the commercial seafood industry, and bringing in substantial numbers of tourists, were discussed in interviews.

- **Portarlington Mussel festival** was begun by community groups in 2006 as a fundraising event. Today it attracts approximately 30,000 people every year, who consume up to 10 t of mussels in the single day festival, a large proportion of which are donated by mussel producers. Over 250 volunteers from a variety of local community organisations run the festival. They share the proceeds of mussel sales to fund their activities. The festival is strongly supported by local producers of food and wine, who can showcase their produce directly to tourists drawn by the festival. There is capacity to grow even more now that there is a new harbour in Portarlington and regular ferry services from Melbourne. The harbour was specifically built to support mussels, so this is prominent example of how seafood industry growth supports tourism and community level benefits.
- **Apollo Bay Seafood Festival** began as a food and wine event on the foreshore, but in recent years has relocated to the harbour area to take in the fishing fleet and port areas, and to support an 'off-the-boat' seafood market. Estimates of around 7,000 people attended the 2018 festival.
- **San Remo Fishing Festival** used to be run by the local football club as a fundraiser, but since 2017 has been revived by the San Remo Fishing Co-operative as a local community and tourism event. It involves a 'blessing of the fleet' open to both commercial and recreational boats, numerous food and wine events, and information sessions about the seafood industry.

- **Kilcunda Lobster Festival** is the annual fundraising event for the Kilcunda Community Association, held on the 26 January Australia Day public holiday each year. It attracts close to 5,000 people and includes rock lobster sales, lunches and auctions.
- **Wild Harvest Festival** in Mallacoota has only emerged in the last two years. Run by the small community of Mallacoota where there is a thriving wild abalone industry, the festival highlights the unique abundance and variety of seafood in the region and is aiming to reinvent the local region as a culinary tourism destination in its own right.
- **Slow Fish Festival** in Melbourne is run by Slow Food Melbourne. It started in 2017 and showcases the Victorian wild-catch industry. The festival goes beyond tasting local seafood, as the public learns how to cook seafood, fillet fish, and hear the stories of the fishers and the challenges facing Victorian fisheries. The Slow Fish festival gives consumers the chance to talk to and put a face to the fisher, as well as to those who market, and understand how seafood gets all the way to Victorian plates. Slow Fish also believes in defending the rights of the Victorian seafood consumers to access local fish.

Community festivals and events not specifically associated with seafood were nonetheless also noted in interviews as providing forums through which fishers could support community efforts to educate the public about the unique character of regional areas, special environmental features, and local culture and identity.

- **Lake Bolac Eel Festival** is a biannual festival run by the Djabwurrung Aboriginal community members in Western Victoria. It celebrates traditional gatherings at Lake Bolac centred around the eel harvest. Today the festival involves forums, workshops, demonstrations and displays, including by a variety of eel fishers. Its aims are to promote reconciliation between Aboriginal and non-Aboriginal groups, and promote the small town of Lake Bolac as a centre of artistic, cultural and environmental significance.
- **The Upwelling Festival** celebrates the Bonney Upwelling, an ocean upwelling which supports a wide array of marine life off the south-west coast of Victoria and particularly off Portland, where the upwelling is closest to the coast. It is run by the Rotary Club of Portland and aims to promote the special character of the town based on the upwelling, which supports vibrant fishing and tourism industries.
- **Recreational fishing days and competitions** were also seen as locally important examples of the linkages between commercial and recreational sectors. For example, the Goulburn Trout Opening Festival attracts around 1,000 visitors each year, providing opportunities for families and children to learn about trout, their life cycle and environment, and how to fish for them. Commercial trout farms have provided fingerlings and mature fish in support of the events.

6.3 Town character and appeal

Part of the contribution that the professional fishing and aquaculture sector makes is to the character and appeal of coastal towns. This is evident more in some places than in others and occurs in different ways.

In places like San Remo, Port Fairy and Apollo Bay, fishing has been part of the towns' history and they are characterised as 'fishing villages'. Features such as wharves, harbours and docked vessels help to imbue a clear sense of maritime history and provide a point of interest.

I think people love walking down the pier at San Remo and Apollo Bay and looking at the fishing boats. I think it's just a drawcard; it's a feature. It's something to do on a day when [the weather is] too crap to do anything else. It's certainly part of what people appreciate in the coastal towns

– (Tourism industry participant, Geelong).

At the western end of the state, the town of Portland is centred on the harbour. It has an active fleet of fishing vessels but also a range of other large shipping activity giving the town a more 'working port' feel. Similarly, in Lakes Entrance, the large and active fishing fleet lines the town's main promenade and is a defining feature of the town (see Box 4).

Box 4. The attractiveness and character of Lakes Entrance

Lakes Entrance has a long history of fishing, with fishers working the Gippsland Lakes and Bass Strait—through the artificially constructed entrance—from the late 1800s. It is the largest fishing port in Victoria, with a mix of trawlers, Danish seines, scallop boats, cray boats, long-liners, gill netters and trailer-mounted boats for prawning and fishing 'the lakes'. Commonwealth and state fisheries both exist in the port, and the same fisher may own multiple access licences and gear across both types of fisheries.

With this scale and variety of fishing activity, there is evidence of the sector throughout the town. This includes a prominent wharf and fishing fleet that stretches along the kilometre-long town frontage. To many people, this is a defining attribute of the town and is part of its appeal to tourists.

A big part of the attraction of Lakes Entrance, apart from the natural features and beautiful views and things, is people love walking along working ports. They love looking at boats—colourful boats and piles of nets and hardy old seafarers. To me, that's a big part of the attraction of Lakes Entrance. There's an active fishing fleet there. You can walk along the foreshore and virtually touch the boats and see people coming and going. You can watch the trawlers coming in and out over the entrance. It's kind of a pretty important part, I think, of what the attraction of Lakes Entrance is

– (Community participant, Lakes Entrance).

A tour operator echoed the importance of the stories of the fishing fleet as a point of interest for the town, something that features in his tours of the lakes:

[It's] very hard to talk about a story that you can't see. So the easy one for me, of course, is all the fishing boats ... I talk about what they catch, where they go, what they get up to and we talk both here and we also go down past LEFCOL¹⁶ and stop and have a good chat about the factory and what they do

– (Tour operator, Lakes Entrance).

Fishers also reflected on the interest of the public in watching them work on their boats or offload their catch.

There's a lot of inquisitive people out there ... Tourists—they love to sit and have a chat. And if they do, they generally get a free feed of fish and off they go

– (Fisher, Gippsland Lakes).

This has become more difficult in recent years, however, with some parts of the commercial wharves and access to the fishing boats being restricted with locked gates for occupational health and safety reasons, and food safety and fisheries management regulations making it more difficult for fishers to give away or sell fish directly to the public. While there are safety issues involved, such regulations further curtail the few opportunities members of the public have to interact with the fishing industry.

Beyond the aesthetics of having professional fishing boats and infrastructure, working fishing vessels are an attraction in and of themselves. Fishers along the coastline indicated that people often watch them unloading their catch or work on their boats, stop to ask questions about where they have been fishing and what they have been catching:

I think to my experience before I was here, I liked walking out on the jetty and looking at the boats, and if I got to see some blokes doing some things on a boat, even if they're not unloading some fish, you see them working on something, it's interesting. You stop and watch

– (Community participant, San Remo).

We normally offer; 'do you want to take a photo of the fish?' Or if kids come by and we've got occies [octopus], we say 'have a look at this one', because everyone's almost intrigued by occies, and get them to put their fingers on the tentacles ... it's a great experience for them and it's something they'll always remember

– (Fishing industry participant, Warrnambool).

¹⁶ LEFCOL is the Lakes Entrance fisherman's co-operative.

These observations were supported by our survey of the general public and of tourism businesses. More than two-thirds (69%) of Victorian survey respondents agreed that they would be interested in watching commercial fishers at work when on a coastal holiday (see Figure 44). A slightly lower proportion (51%) noted they would be interested in visiting an aquaculture farm. Tourism business operators similarly agreed that (see Figure 45):

- the fishing/aquaculture industry is part of the character/identity of the community they operate in and is an important part of the local tourism offering (88%)
- the history of fishing/aquaculture is an important part of the local tourism offering (86%).

Figure 44. Community survey respondents' interest in fishing and aquaculture as a tourism feature

Note: n = 1,154.

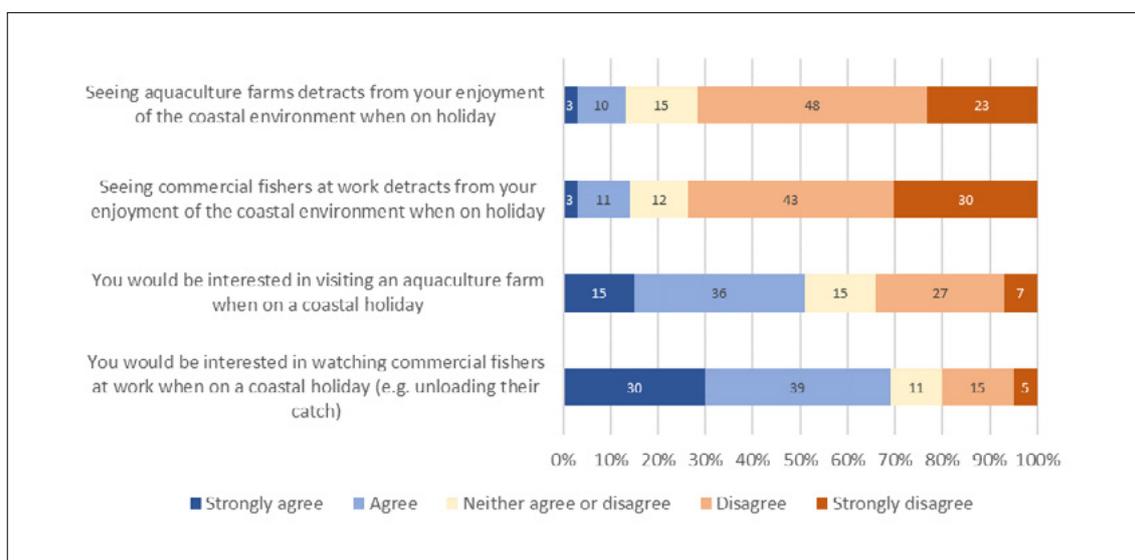
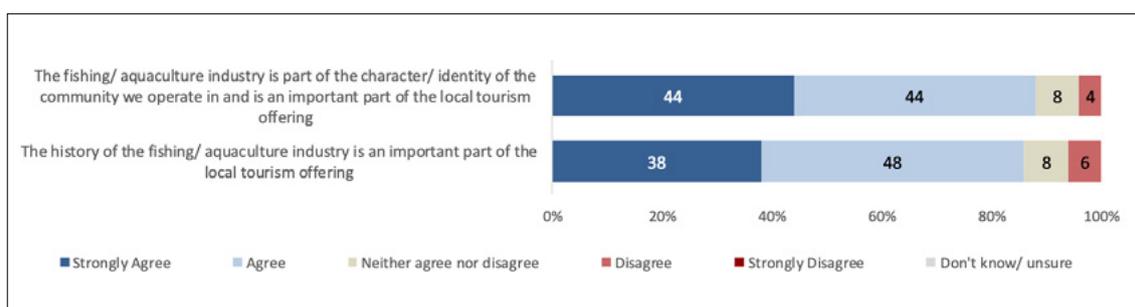


Figure 45. Tourism operators' perceptions of the fishing and aquaculture sector's role in tourism

Note: n = 50.



While professional fisheries and aquaculture contribute to tourism, they are not necessarily solely responsible for it. They are part of the important mix of elements that give many of these regional towns their unique aesthetic and appeal. One of the factors that can strengthen this contribution and linkage is where local seafood experiences can be built into the tourist offering.

Some towns support significant professional fishing and aquaculture sectors that are largely invisible to the casual observer, including the high-value fisheries for abalone or the emerging sea urchin and wrasse fisheries, which use trailer boats and travel along the coastline to launch from small boat ramps. As such, they leave few permanent marks of their operations. Similarly, bay and inlet fisheries such as Gippsland Lakes, Corner Inlet and Port Phillip Bay are also largely set up around highly mobile fishing boats that often operate at night or during the very early morning.

6.4 Interactions with, and benefits to, recreational fishers¹⁷

Compared to the general population, recreational fishers tended to be:

- more interested in professional fishing and aquaculture (82% reporting to be 'very' or 'extremely' interested in the industry as compared to 72% among non-fishers)
- more likely to consider the origin of their seafood to be 'very' or 'extremely' important (82% compared to 72%)
- more likely to consider 'local' seafood to be from their town or region (35% compared to 19%)
- more likely to buy Victorian seafood (56% compared to 44%)
- more confident that the local fishing industry will act in ways that sustain fish production (65% compared to 54% among the general populace) and that the aquaculture sector will act to sustain environmental health (65% compared to 50%).

This interest and generally more positive disposition on the part of recreational fishers is important given that professional fishing and recreational fishers are often portrayed as being two parties competing for a limited resource. The negative interactions and disputes between recreational and professional fishing sectors in Victoria have been documented in-depth elsewhere (e.g., Alexander & Abernethy, 2019; King & O'Meara, 2018; Knuckey et al., 2017).

Instead, we found evidence throughout the state of important ways in which the professional fishing and aquaculture sector contributes to and plays a role in the recreational sector. Both sectors contribute to community wellbeing in Victoria in different ways and are not mutually exclusive. The tourism businesses we surveyed all agreed that, from a tourism perspective, there is a need for the professional and recreational fishing sectors to co-exist. Further reductions in professional fishing would be counter to the interests of the tourism sector.

¹⁷ The general public survey results reported in this section are from people who classified themselves as being recreational fishers. The charter fishing boat sector crosses over the recreational fishing and tourism sectors. The perceptions of charter boat operators about contributions from professional fishing were captured in the interview portion of the study, which included angling shop owners and recreational fishing club members.

Positive contributions of professional fishing and aquaculture production to wellbeing for the recreational fishing sector include:

- bait supply
- advice on where to fish and how to navigate local waterways
- support for inland angling through stocking
- contribution to rescues
- aquaculture infrastructure (such as mussel ropes) that offers good habitat for recreational fishing.

Bait supply is an important and often overlooked linkage between the recreational and professional fishing sectors. Along the Victorian coastline, professional fishers supply a range of bait species to recreational fishers through retail outlets and direct sales. This includes squid, pilchards, prawns, whitebait and a variety of other species, some of which—such as the ever-popular pilchard—can be difficult for recreational fishers to access without the correct gear. Professional fishers do not donate bait; they sell it as a commercial venture. Nevertheless, it is a product recreational fishers would miss if it were to disappear. Victorian-caught bait is highly valued by Victorian fishers (see Figure 46):

- as being better for the marine environment compared to bait from overseas (86%)
- as a preferred source of bait, even if it is more expensive (85%)
- as a more effective bait than bait from elsewhere (62%).

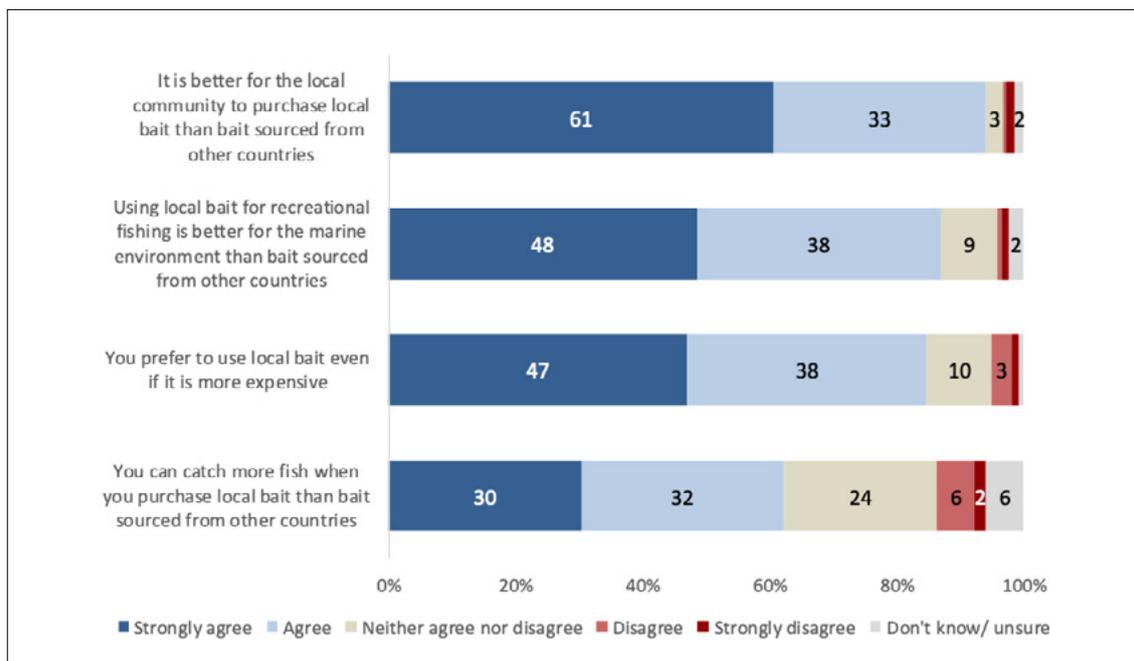
Having access to the bait they want is valued by recreational fishers and businesses supplying recreational fishers benefit from providing the kind of bait recreational fishers want. Describing the importance of access to high-quality bait supplied by professional fishers, and the good service they receive from their suppliers, one charter boat operator noted:

They know what we want. They virtually say ... what do you need? I need squid this big. I need it fresh. I need it white. You know? For the Swords [swordfish]. We're going to spend \$300 in fuel getting out there. We want the best product

(Recreational charter boat operator, Lakes Entrance).

Figure 46. Recreational fishers' perceptions of the value of locally caught bait

Note: n = 281.



Another way in which wild-catch professional fishers contribute to recreational fishing is through advising recreational fishers. This includes the provision of advice regarding fishing grounds and what is currently active/abundant, and how to safely navigate the local waters:

Oh you always get people asking down the boat ramp for advice and stuff like that. A few days we were running over telling people not to go out. It's too rough—all that sort of stuff. [They're about to launch and]. You help them. Try to steer them in the right direction
 – (Fishing industry participant, Mallacoota).

A locally specific example of this is in Port Phillip Bay, where mussel growers sometimes invite recreational fishers to fish around their operations, which act as fish attracting devices:

[I say to recreational fishers] come in, we've got lots of fish there. If you go on the mussel farm and you look at our fish finder there's just masses of fish going through ... We've got tens of thousands of ropes [and] it's all the other stuff that's growing around the mussels, it creates a habitat. It's like a reef
 – (Mussel farmer, Bellarine Peninsula).

In the marine environment, most professional fishers recounted stories of helping vessels that were struggling in adverse weather or with mechanical issues. A 2017 nationwide survey found that 58 per cent of professional fishers in Victoria reported assisting a recreational fisher in distress over a five-year period (King et al. 2018). Across all fishers surveyed, there were 1.6 rescues per fisher for the five-year period. Applying this to the Victorian professional fishing fleet suggests that there may be dozens of instances per year across the state.

It's a fairly regular occurrence, really. I mean, it is a safe harbour for people with trailable boats to launch from, so particularly in holiday periods ... it's busy. That car park is full of hundreds of boats, they all go out from there [into the ocean], and it's just a numbers game. There's always going to be a percentage of idiots who go and take a boat out once a year, or something, and so the fuel's dirty or they forgot to put fuel in the tank, or the bloody battery's flat, or something ... Like last year, even just the tuna comp last year, we went and towed three people in that were in a group that ran out of fuel

– (Fishing industry participant, Apollo Bay).

Inland, the aquaculture sector has significant interactions with the recreational fishing sector, principally through the provision of seed stock of both native and salmonid species to support recreationally important fish stocks in Victoria's freshwater rivers and lakes. The standout example of these is the provision of trout by aquaculture farms in the Goulburn Valley, where 80 per cent of Australia's farmed trout are produced (see Box 5).

Additionally, the Victorian government has in recent years begun to use aquaculture to enhance the wild stocks of native fish, such as Murray cod, Silver perch and Golden perch, with private farms sometimes being drawn on for stock. One recent example of cooperation to provide recreational fishing opportunities from aquaculture was the stocking of Barramundi in the cooling ponds at Hazelwood power station, provided by Mainstream Aquaculture based at Werribee. This was a hugely popular exercise with recreational fishers, with one independent study reported by the Victorian Government stating that the fishery had contributed \$700,000 to the local economy (VFA, 2018c).

Professional eel fishers also facilitated the existence of recreational fisheries that would otherwise not be there, due to the fact that many waterways have been dammed, leading to reductions in the natural recruitment of eels, which need to migrate to the ocean to breed. The release of juvenile eels into designated eel waters supports the businesses of eel fishers, as well as viable recreational fisheries in these waters.

Box 5. Trout farms and recreational fishing in the Goulburn Valley

The history of salmonid aquaculture and trout fishing is closely intertwined in Australia. Trout are an introduced species, and in many rivers require culturing and release of fingerlings to maintain stocks available for recreational fishing. The focus of these operations is in the Goulburn Valley, between the towns of Alexandria and Eildon.:

We've got the mountains here and we've got the Goulburn River—this is the focus of the trout industry. You need access to cold water and you need good volumes of it to be trout farming. So in this area is—there is a significant tie-in to trout. You've got several trout farms and you've got all the recreational fishers that come into this area and fish these lakes. So the principal area of Victoria for trout fishing is also in these rivers

– (Aquaculture farm operator, Goulburn Valley).

The aquaculture in a certain respect is a subset of the history of the recreational fishing industry but it has grown and matured in its own way. It makes the most of the very important environmental assets of this area, and the synergies are there ... They've been there hand-in-hand [from] very early on ... This is where the trout fishery is, and known as a trout area ... It's a real point of difference for this area. This area does have a 'sense of trout'

– (Community participant, Goulburn Valley).

Salmonids were first introduced into Victoria in 1864, and private and public operations have cultured trout for both consumption and stocking ever since, with the government run hatchery at Snobs Creek established in 1948. Stockings of trout by the government hatchery are regularly supplemented by private farms to meet the demands of recreational fishers throughout Victoria. In particular, private farms support the current government policy of encouraging recreational fishing as a healthy family activity:

One of the fish the government are now stocking, it's called their family friendly fish. So it's about a 200 gram fish, a trout and they put those into closed impoundments. Often on the urban fringe, especially leading into the April school holidays and then the July school holidays ... We do quite a lot of those family fish for them ... this year I think we'll do about 15 tonnes of fish for the government which are for recreation angling

– (Aquaculture farm operator, Goulburn Valley).

In the local Goulburn Valley, these connections also extend to encouraging substantial recreational fishing tourism, which leads to a range of other benefits in the community:

We get a massive influx of people coming up to Eildon for the annual Fishing Festival. Last year we had over 1100 people attended it, on the Father's Day weekend ... the kids get casting clinics. They get taught how to cast ... and they get educated in what's required to actually grow the fish and all that sort of thing

– (Community participant, Eildon).

Some trout farms are specifically oriented to fish out facilities where families can catch and cook their own trout on site. One interesting and little appreciated aspect of this case is that one of the main markets is new migrants, who come as families and use fishing as an opportunity to bond between the generations:

When we get a lot of social groups come here, sure, they come here and they want to eat fish but they're actually coming here primarily for a social occasion as a family to get together ... Thirty years ago, we used to have a lot of Italians and Greeks come up and then it was Asians, in the '90s. Now it's more Muslims, Indians. So, it's always the latest generation of immigrants that still have big social networks and family groups ...[it's about] catching a fish with their uncle or their grandpa or something

– (Community participant, Eildon).

The story of salmonid aquaculture and recreational fishing then is one of a very positive synergy, with private trout farms playing a significant role in supporting the wider existence of the recreational trout fishery, with the various economic and social benefits this brings Victoria.

7 Results—environmental sustainability

Domain of community wellbeing	Dimensions of wellbeing	Contributions of Victorian seafood production	Indicators	Data collection methods (and types)
Environmental sustainability	Material (healthy ecosystem functioning now and into the future)	Complying with regulations for environmentally sustainable fishing/ aquaculture Going beyond regulations with additional activities to promote ecosystem health	Sustainability assessment of the fishing and aquaculture industries Involvement in additional environmental stewardship activities	- Literature review - Interviews (qualitative, values and perceptions)
	Relational (groups within society cooperate to manage environmental impacts)	Seafood producers participate in government and non-government environmental management networks	Involvement in environmental management programs, groups and committees	- Interviews (qualitative, values and perceptions)
	Subjective (perceptions that local ecosystems are healthy and protected)	Seafood producers are known in communities as helping protect the environment	Levels of trust that seafood producers are protecting the environment	- Phone questionnaires (semiquantitative, values and perceptions) - Interviews (qualitative, values and perceptions)

7.1 Overview

The health of the natural environment is foundational to human wellbeing. Seafood producers rely on natural systems for their businesses. There is an element of self-interest in terms of ensuring future prosperity and resource security, although the existence of self-interest does not mean there is no altruism also at play, nor does it negate the community wellbeing outcomes of their activities. Responsible seafood producers in Victoria contribute towards the maintenance of healthy ecosystem function in various ways and the beneficiaries include the Victorian public and communities of practice with interests in Victorian aquatic ecosystems, including fisheries managers, researchers and recreational users of aquatic systems and resources.

In outlining the contribution of the professional fishing and aquaculture sector to environmental health and sustainability, the key aspects that we discuss in the following sections are:

- Participation in and support for fishery monitoring and research (see **Section 7.2**).
- Improvement of practices regarding the sustainability of operations (see **Section 7.3**).
- Support for broader research and functional ecosystems outside of production operations (see **Section 7.4**).

Key findings

Important information for understanding and managing Victorian fish stocks and the broader aquatic environment comes from professional fishing and aquaculture operations. Fishers and aquaculturists are required to do this as part of the regulatory oversight of their industry, although in many cases the data provide the only indicators of aquatic ecosystem health. This is also important for recreational species for which recreational fishing data are limited. Additional non-regulatory data is often collected voluntarily by the fishing industry and informal monitoring also occurs by fishers and aquaculturists.

A range of professional fisheries and aquaculture businesses and sectors have voluntarily implemented industry-led initiatives to improve the environmental sustainability of their operations and sector, beyond what is required under government regulations.

Professional fishers and fish farmers participate in projects that seek to improve aquatic ecosystems, including support for research on marine or freshwater environments and non-target species, the provision logistics, local knowledge and in-kind support for research projects, sitting on environmental and research advisory groups and committees, and sharing local ecological knowledge. It also includes participation in projects to restore and rehabilitate habitats, rubbish clean-ups and pest management.

The survey of the Victorian public indicated that they generally believed that the seafood industry is ecologically sustainable. However, findings also revealed that there is poor knowledge and substantial misunderstanding of how the industry operates, is managed and its level of impact. A minority of surveyed Victorians believed the seafood industry is unsustainable with the aquaculture industry viewed as being less sustainable than wild-catch fishing. A significant proportion of Victorians surveyed were 'unsure' about the sustainability of the Victorian seafood industry, despite strong management of fisheries and aquaculture in Australia, the sustainability status of Victorian stocks and that many operators go above and beyond regulations to implement best harvesting practices and participate in conservation projects. Key groups who hold more favourable attitudes towards Victorian fisheries and aquaculture sustainability were people who live in regional Victoria, recreational anglers and those that purchase seafood more regularly. Poor knowledge and misunderstanding could be due to a lack of engagement by the Victorian seafood industry with communities.

7.2 Supporting fishery monitoring and research

Important information for understanding and managing Victorian fish stocks and the broader aquatic environment comes from professional fishing operations through fishery dependent and independent data collection. This includes data such as catch, effort and length-frequency of catch. These data are recorded and reported through logbooks, catch sampling by researchers and automatic logging machines, such as industry-designed shell measurers in the abalone sector.

Data collection principally occurs as part of the regulatory oversight and management of the fishery. It is directly linked to supporting the sustainability of those fisheries, which enables contributions to the economic domain of wellbeing (see **Section 4**). The broader contribution discussed here is the enhanced understanding of fish stocks and ecosystems afforded by these datasets and the decades of contributions to the underpinning research, including supporting additional data collection, such as tagging studies, larval surveys and age sampling:

Industry people have always been willing to be part of trials of escape devices, or trials of different mesh sizes. That's been really important to me. I've tagged hundreds of rock lobsters from commercial fishing boats. Commercial fishermen were very much instrumental in some of the major studies that were done on school shark and gummy sharks in the 1970s and 1980s

– (Researcher, Geelong).

We've done a lot of work with MAFRI [Marine and Freshwater Resources Institute, now the Victorian Fisheries Authority]—the marine science laboratories originally at Queenscliff. We did a lot of otolith¹⁸ work, measuring, sexing, getting outputs. They came over originally in the early days, then as they trimmed up their staff over there ... we started doing the collecting of the data ourselves and doing the otoliths ourselves and then they'd just come and collect all the data off us

– (Fishing industry participant, Bellarine).

This is particularly important for stocks of species that are harvested by both recreational and professional fishers, with much of the information about stock status coming from monitoring associated with and paid for by the professional fishery. While monitoring of recreational catch is receiving increased attention (VFA, 2018a), it is typically poorly understood and patchy, despite recreational catches being substantially more than the commercial catch for some species. For example, Table 27 displays the estimated Victorian (non-Commonwealth) catch for a range of key species and the assessments of their stock sustainability (SAFS, 2018). For the majority of species, the recreational catch is unknown or outdated, even in cases for which it is likely to exceed the commercial catch.

In some cases, industry associations have run formal training sessions for fishers to improve their understanding of the stock assessment process and the importance of the data they collect. For example, the South-East Trawl Fishing Industry Association (SETFIA) ran a voluntary, half-day training session on how stock assessments work with around 80 participants, which was the majority of the local fleet.

In addition to formal monitoring processes, a range of more informal monitoring also occurs within the sector. This is particularly when fishers, aquaculturists or other industry members have a relationship with a researcher or manager and communicate their observations of target species or the general environment.

Because all our King George whiting, every one that's landed in Victoria virtually is a juvenile. From time to time they'll [fishers] come across one that's in spawning condition. It might be somebody at a processor and they'll ring up ... 'I've got a female whiting here that's in running ripe condition'. It's that's sort of level of interest and collaboration

– (Researcher, Geelong).

¹⁸ Otoliths are fish 'ear bones'. Counts of growth checks or bands in otoliths are used to define the age structure of fish populations, providing a metric to assess the species' population sustainability status.

Table 27. Status of key Victorian fish species, 2017 professional catch (not including Commonwealth fisheries) and recreational catch

Source: Data and status as compiled under the Status of Australian Fish Stocks Reports available at fish.gov.au/Jurisdiction/Victoria.

Notes: Includes fish species that are targeted and for which the catch has not been defined as 'negligible'. While the catch data does not include Commonwealth fisheries, the stock status assessments do consider this catch.

Common name	Scientific name	Status ¹⁹	Professional catch (t)	Recreational catch (t)	Notes
Crustaceans					
Balmain bugs	Ibacus spp.	Undefined	8	unknown	
Eastern School prawn	Metapenaeus macleaya	Undefined	27	unknown	
Giant crab	Pseudocarcinus gigas	Sustainable	11	unknown	
Southern Rock lobster	Jasus edwardsii	Sustainable	280	unknown	
Finfish					
Australian herring	Arripis georgianus	Sustainable	190	unknown	In Corner Inlet.
Australian salmon	Arripis trutta & Arripis truttaceus	Sustainable	20	unknown	
Australian sardine	Sardinops sagax	Sustainable	2	unknown	
Black bream	Acanthopagrus butcheri	Sustainable (Eastern and Western Estuaries); Depleting (Gippsland Lakes)	15	unknown	In the Gippsland Lakes: 'the stock is unlikely to be depleted, and that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired in the short-term. However, the continuing decline in mesh net catch rates, continuing low recreational catch rates and lack of evidence of recent strong recruitment events means a short-term recovery of the fishery remains unlikely.'
Bluethroat wrasse	Notolabrus tetricus	Sustainable	26	unknown	
Dusky flathead	Platycephalus fuscus	Sustainable	16	unknown	
Eastern School whiting	Sillago flindersi	Sustainable	6	unknown	
John Dory	Zeus faber	Sustainable	97	unknown	Note that catch is for all Australian fisheries.
King George whiting	Sillaginodes punctatus	Sustainable	62	unknown	215 t estimated rec catch in 1999–2000 (Henry & Lyle, 2003).
Luderick	Girella tricuspidata	Sustainable	2	unknown	

Common name	Scientific name	Status ¹⁹	Professional catch (t)	Recreational catch (t)	Notes
Ocean jacket	Nelusetta ayraudi	Undefined	14	unknown	Note that the total commercial catch includes a mix of leatherjacket species.
Silver trevallies	Pseudocaranx spp.	Sustainable	54	37	Estimated recreational catch from 2003–04 (Status of Australian Fish Stocks Reports, 2017).
Snapper	Chrysophrys auratus	Undefined (Eastern stock); Sustainable (Western Stock)	53	~600	Estimated recreational catch from 2006–07 (Status of Australian Fish Stocks Reports, 2017).
Southern garfish	Hyporhamphus melanochir	Sustainable	77	21	Estimated recreational catch from 2006–07 (Status of Australian Fish Stocks Reports, 2017).
Southern Sand flathead	Platycephalus bassensis	Sustainable (Corner Inlet and Other Victoria stocks); Recovering (Port Phillip Bay)	5–7 t	~110	Estimated recreational catch from mid-2000s (Status of Australian Fish Stocks Reports, 2017). With respect to Port Phillip Bay: 'While stock biomass is still considered depleted relative to levels observed in the early 2000s, the level of fishing mortality should allow the stock to recover from its recruitment impaired state'.
Tailor	Pomatomus saltatrix	Sustainable	70	unknown	
Tiger flathead	Platycephalus richardsoni	Sustainable	3	unknown	
Yelloweye mullet	Aldrichetta forsteri	Recovering	33	unknown	
Molluscs					
Blacklip abalone	Haliotis rubra	Sustainable (Western Zone); Depleting (Central and Eastern Zones)	735	unknown	With respect to the Central Zone, the stock appears to be stable after a decline and is 'unlikely to be depleted and that recruitment is unlikely to be impaired'. In the Eastern Zone, 'the prospect of ongoing decline is exacerbated by habitat loss, indicating reasonable risk of the fishery becoming recruitment impaired'.
Commercial scallop	Pecten fumatus	Sustainable (Port Phillip Bay Dive Fishery); Depleted (Ocean scallop fishery)	135 t TAC for ocean fishery; 60 t TAC for dive	unknown	For the ocean scallop fishery: 'the biomass of this stock is likely to be depleted and that recruitment is likely to be impaired ... current fishing mortality is constrained by management to a level that should allow the stock to recover from its recruitment impaired state'. Note that while there is a TAC for each of these fisheries, the catch for both has been well under this (but is unable to be reported for confidentiality reasons).

Common name	Scientific name	Status ¹⁹	Professional catch (t)	Recreational catch (t)	Notes
Greenlip abalone	<i>Haliotis laevis</i>	Undefined	5	unknown	
Pale octopus	<i>Octopus pallidus</i>	Undefined	>20	unknown	Catch includes a mix of species and does not include the catch from a new fishery for which there is incomplete data available.
Pipi	<i>Donax deltoides</i>	Undefined	34	unknown	
Southern calamari	<i>Sepioteuthis australis</i>	Sustainable	28	unknown	
Sharks					
Gummy shark	<i>Mustelus antarcticus</i>	Sustainable	15	unknown	

7.3 Improving practices and driving innovation

In addition to monitoring stocks through day-to-day data collection, a range of professional fisheries and aquaculture businesses have implemented initiatives to improve the general environmental sustainability of their operations. These initiatives go beyond what is required under state or federal management regulations. The initiatives make business sense through increasing catch per unit of effort and securing long-term sustainability of fisheries. Examples of key activities include:

- **Codes of practice among bay and inlet fishers.** These signed agreements exist, or existed, among most of the bay and inlet fisheries. They outline a range of practices for fishers to reduce impacts of the fishery, improve its economic performance and reduce interactions with other people. For example, the Corner Inlet Code of Practice has been in place since 1992 and, together with the Victorian Bay and Inlets Fisheries Association environmental management system, includes items regarding:
 - reducing bycatch species (through the type of net and approach to how they are set)
 - improving the survival of bycatch and undersized fish through in-water sorting and returning fish deep into the water to avoid predation by birds
 - limiting fishers to two seine net shots per day to limit and spread effort
 - fishing only during the week and avoiding particular areas to reduce interactions with other water users.

¹⁹ As per the Status of Australian Fish Stocks Reporting, where Sustainable = fish stock size is above a minimum level for the stock and fishing pressure is adequately controlled; Depleted = fish stock size is too low and fishing pressure too high, or fishing pressure has been reduced but recovery not yet detected; Recovering stock = fish stock size is too low but fishing pressure is adequately controlled and stock is recovering; Depleting stock = biomass is above a reference limit/reference point but fishing pressure too high; Undefined stock = not enough information to make a reliable assessment.

You make observations and stuff, especially this time of year you get movement of small fish ... and if you know people are working with smaller mesh trying to catch tailor and stuff like that, you just give them a call and say, 'listen there's a few fish moving in your direction, might want to go a bit deeper' [to avoid them]. So, it's just, basically communication ... you don't want people catching small fish if they don't have to

– (Fishing industry participant, Gippsland Lakes).

- **Work to improve the bycatch performance of gear in a variety of fisheries.** In recent years, this has included devices for avoiding seabird interactions in trawl fisheries and net size adjustments to avoid undersized flathead.

We've developed something called a seabird baffler, which reduced seabird interactions with trawlers by 96%... and there are other trawl fisheries in Australia and the world that I think will now adopt what we've done

– (Fishing industry participant, Lakes Entrance).

- **Voluntary fine-scale management of stocks.** The Victorian abalone industry has been working for more than a decade to improve management of the fishery, including implementing voluntary size and catch limits over and above those specified in regulations (see Box 6).
- **Sustainability in onshore operations.** Like many other modern businesses, participants highlighted that onshore elements of the fishing and aquaculture sector are reducing their environmental impacts. The San Remo Fisherman's co-op, for example:
 - has developed a comprehensive waste recycling system
 - sends its used fryer oil for reprocessing into biodiesel
 - has installed photovoltaic solar panels
 - has removed straws and plastic cutlery from the fish and chip shop
 - raising awareness about plastic pollution through its pelican feeding demonstrations.
- **Land-based aquaculturists taking care to avoid causing pollution through wastewater discharge.**
 - Barramundi aquaculture uses closed circulation systems, and is creating fish feed from waste products, which enables a net zero waste discharge.
 - Community participants in the Goulburn Valley noted that local farms had made consistent efforts over time to reduce nutrient outflow into the Goulburn River and surrounding streams, which has built the reputation of the industry as responsible citizens.

Box 6. Rebuilding stocks through industry-led co-management of the abalone fishery

The biology of abalone means that they are vulnerable to depletion if fisheries are not well-managed. Abalone stocks are typically comprised of several smaller populations that have their own growth rates. These populations can be spread at scales of just hundreds of metres, meaning that size limits in one area might not be appropriate just a short distance away (Prince et al., 2008).

The Victorian abalone industry has been working for more than a decade to better match fishery controls—such as size and catch limits—to the differences in abalone populations. This fine-scale management requires a cooperative and voluntary approach to management, with size limits often substantially above that specified in regulations. There are three abalone fisheries in Victoria, and the Western Zone fishery is considered to be leading the way nationally in terms of science, sustainability and management:

A significant thing that the Western Zone did is it identified each reef and came to the realisation through Jeremy Prince [fishery scientist] ... that one size didn't fit all. A bit like the land, you get a gumtree will grow 10 metres high and another one will grow five metres high depending on the locale ... that was a major significant step forward. [We] found that a lot of animals at 120 [mm in length minimum size limit] had never reproduced ever ... Now at 130 [mm length minimum size limit] we're giving every reef a chance to reproduce

– (Quota owner, Port Fairy).

Part of the success of the work in the Western Zone Abalone Fishery has been their proactive approach, use of industry-led data collection and collaboration with scientists and fishery managers:

With the data loggers now, so every abalone I catch goes [into] the logger. It's GPS marked and logs the size, time, the date. I wear a depth logger on me as well ... [and that's all] uploaded to an independent scientist that day

– (Diver, Port Fairy).

As noted by an ex-fishery officer from the region, trust and the relationships within industry and between industry and fishery managers and researchers has been critical to the success of fine-scale management:

We have had trust in the Western Zone abalone divers to self-manage at the reef code level ... because we would all be involved in the decision-making—with the fishers, scientists and managers—it worked better. And the relationships were better because we were working together; we were part of the same community

– (Ex-fishery officer, Warrnambool).

The approach has been used so successfully in the Western Zone that the industry has been able to slowly rebuild the fishery after it was decimated by AVG during 2006. Prior to the virus, the total allowable catch for Western Zone blacklip abalone in 2005 was 221 t, and post virus it was set at 16 t during 2007–2011. Using a precautionary approach and collaboration between scientists, managers and industry, the fishery has since been recovering and in 2019–20 the total allowable catch was set at 73 t. Since 2016, the Western Zone blacklip abalone fishery has been determined to be sustainably harvested (SAFS, 2018) and in 2020 has moved to co-management.

The experience and expertise of the zone is now being copied elsewhere, with other abalone fisheries hoping to learn from the Western Zone's success:

Everyone's looking at what we do here with our data loggers ... we're going to Perth next month to do a demonstration on how the loggers work and how we collect our information. Other zones now are wanting Western Zone's data information or how we do it because they can see that what we're doing here's working
– (Diver, Port Fairy).

7.4 Supporting broader research and functional ecosystems

Outside of the environmental initiatives that directly relate to fishery and aquaculture operations, some fishers and farmers participate in projects that seek to improve aquatic ecosystems more broadly. This includes supporting general research on marine or freshwater environments, including:

- **Research on non-harvested species**, in which fishers either collect samples for researchers, or help them locate the best places for sampling.

If they had a particular project we'd catch eagle rays and certain stingrays and all odd-bods fish for them

– (Fishing industry participant, Bellarine).

If they ever want to come down for one-off things where they need to know where to catch a certain fish at a certain time ... we'd help them out

– (Fishing industry participant, Lakes Entrance).

- **Providing logistics, local knowledge and in-kind support** for monitoring and research (i.e., a boat for sampling water quality and local knowledge to identify appropriate reef monitoring sites).

- **Sitting on advisory groups or committees.** This includes fishery management committees and estuary or catchment management committees, as well as broader groups that feed into natural resource management decision-making more generally, such as the Gippsland Lakes Ministerial Advisory Committee. This provides a mechanism for conveying industry interests in preserving environmental quality, as well as sharing local knowledge and expertise.

There's a vast number of fishers that sit on different environment boards and community groups where they will be looking at [things like] run-off projects, 'how do we improve the water quality'? Obviously in the upcoming election we're pushing for a habitat improvement and water quality improvement fund to be created and we're doing that alongside the Nature Conservancy, the Green Group and the rec. fishing industry where we've all recognised there's a need to do more to create more fish for everyone

- (Fishing industry representative, Victoria).

- **Building and sharing local ecological knowledge.** Because of the extensive amount of time fishers and aquaculturists spend in and observing their environment, they build up a wealth of knowledge about the species with which they work and the environment. This local ecological knowledge is an important contribution to research projects. For example, it can be an input into research, such as the historical knowledge of seagrass distribution that has informed mapping work in Corner Inlet to identify changes and threats to seagrasses (Ford, 2013). Additionally, it can be an idea that gets tested with science, such as in the case of a fisher making observations over time that, rather than just having a single breeding season.

Snapper sometimes breed twice a year in Port Phillip Bay. Because the water temperature is 17 to 18 or whatever it is, and it goes up, that's when they'll breed and then, as it goes down, they do it again in March. So [a Port Phillip Bay fisher] was the one that sort of made them aware of that, to look at that

- (Fishing industry participant, Port Phillip Bay).

In addition to contributions to broader research, professional fishers and aquaculturists undertake important and sometimes innovative on-ground work to improve environmental conditions and the function of ecosystems:

- **Habitat restoration and rehabilitation.** There are a range of projects that professional fishers and aquaculturists are currently involved in that seek to improve critical aquatic habitat, including:
 - trials replanting seagrass beds in Corner Inlet
 - rebuilding oyster beds in Port Phillip Bay, whereby the mussel hatchery is providing oyster seed and the broader industry is providing mussel shells for substrate
 - clearing reefs of urchins in Far East Victoria to restore algal cover—and the associated ecological communities—on rocky reefs that have been denuded by these overabundant native species

- **Rubbish removal.** Several fishers and aquaculture facilities noted that they collect and remove rubbish from the aquatic environment as part of their daily operations.
- **Pest management.** This includes the culling of overabundant urchins by the abalone industry and the work of eel fishers, who regularly take as much as several hundred tonnes of European carp from freshwater systems.²⁰
- **The filtration benefits provided by mussel production:**

Mussels take nutrients out of the water. So the risk for somewhere like Port Phillip Bay would be that the nutrient levels get too high ... by having big volumes of shellfish out there it's already helping to reduce those nutrients and make the place better

- (Mussel farmer, Bellarine Peninsula).

7.5 Lack of awareness and misperceptions about the environmental sustainability of seafood production in Victoria

Community perceptions about the professional fishing and aquaculture sector's impacts on the environment tend to be favourable. However, there appears to be a substantial level of misunderstanding of how the sector operates, how it is managed and its impacts.

General community survey respondents were mostly confident that the professional fishing and aquaculture industries act sustainably. Similarly, most survey respondents disagreed that the professional fishing, recreational fishing and aquaculture sectors' environmental impacts outweigh their benefits (see Figure 47). Key points included:

- There was a small proportion of respondents who did not have favourable views about the environmental impacts of the fishing and aquaculture sectors. Twelve per cent of respondents disagreed that they were confident that the professional fishing industry acts to sustain fish populations and only 11 per cent disagreed that the aquaculture industry acts in ways that sustains environmental health (see Figure 48). Similar proportions considered the impacts of these sectors to outweigh the benefits (see Figure 47).
- Across both questions, a substantial proportion of respondents (around a quarter to one-third) were neutral, neither agreeing nor disagreeing. This may suggest that many people may feel ill-informed to have a clear view on this topic.
- There appeared to be less support for aquaculture than for professional and recreational fishing (see Figure 47).
- Key groups held consistently more favourable attitudes to professional fisheries and aquaculture (see Table 28), including:
 - respondents living outside the Melbourne metropolitan region
 - recreational fishers
 - those who purchase seafood more regularly (more than once a week) as compared to those who purchase less regularly (less than once a month).

²⁰ Eel fishers catch carp as bycatch and by law they are not allowed to be returned to the water. Carp competes with eel so the fishers are happy to reduce carp numbers. They sell a small amount to cray fishers and to fertiliser producers, but the price of carp is very low, so in most cases selling it is uneconomic and fishers bury most of the carp they catch.

Figure 47. General community survey respondents' perceptions of whether the aquaculture, professional fishing and recreational fishing sectors' environmental costs outweigh their benefits
 Note: n = 1,154.

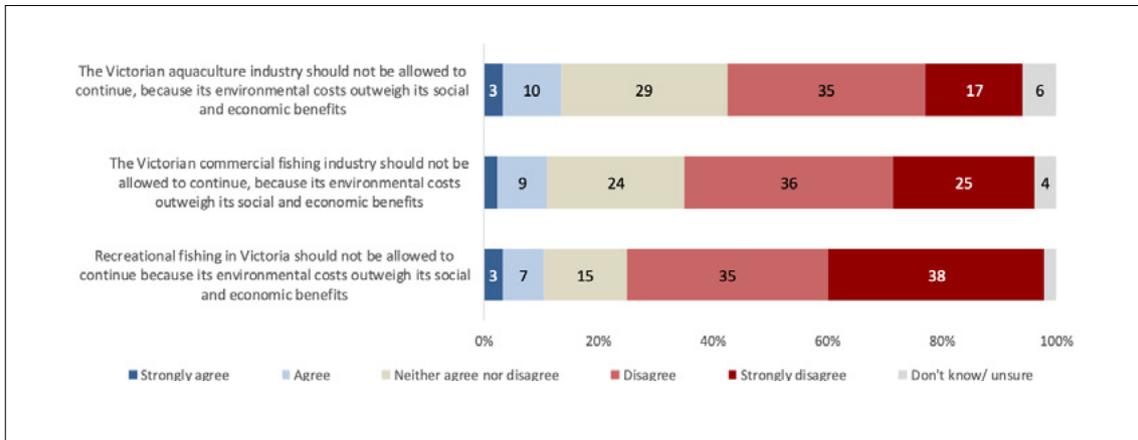


Figure 48. General community survey respondents' confidence that the professional fishing and aquaculture industry will act in a sustainable way
 Note: n = 1,154.

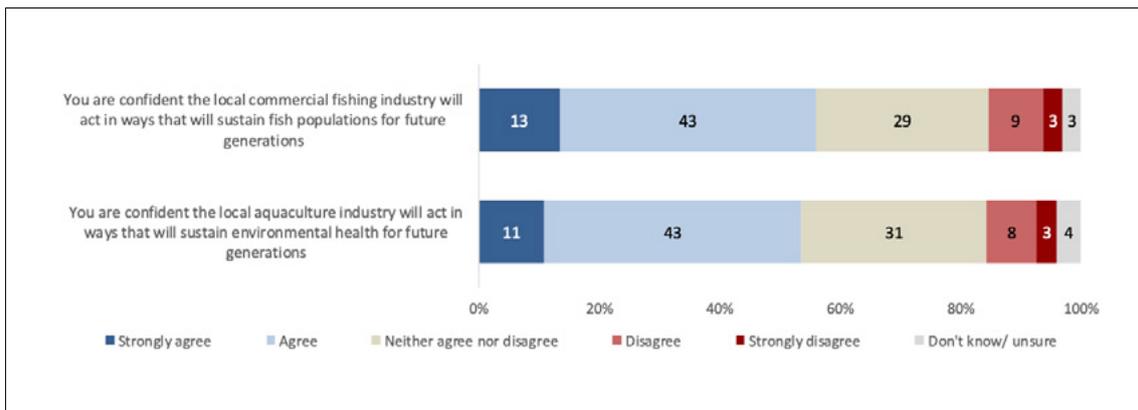


Table 28. General community survey respondents' perceptions of the professional fishing and aquaculture sector's environmental impacts

Note: Higher numbers (proportions of survey respondents) reflect more positive attitudes to the sector. Colouring within the table shows groups that are significantly different to each other.

Demographic variable	Confident the commercial fishing industry will act to sustain fish	Confident the aquaculture industry will act sustainably	Disagree commercial fishing's environmental costs outweigh the social and economic benefits	Disagree aquaculture's environmental costs outweigh the social and economic benefits
Location				
Melbourne	52	51	60	49
Rest of Victoria	67	61	63	59
Fisher/non-fisher				
Recreational fisher	65	65	65	63
Non-fisher	54	50	60	48
Seafood purchasing				
More than once a week	59	58	68	60
Less than once a month	44	40	45	32

Supporting the questionnaire results, a range of interviews and open-ended responses in the phone surveys highlighted that understanding of the fishing and aquaculture sectors among the general public was quite poor. This was evident from interviews with fishing sector stakeholders, who reported their interactions and directly from community members not involved in seafood industries. These discussions highlighted gaps in people's understanding regarding:

- The sustainability and oversight of fishing operations, including the various licensing and quota arrangements in place in different fisheries and the ways in which catches are controlled.
- Fishing methods and vessels, with people displaying confusion about what sort of boats operate in what locations and for what species.

The amount of people that ring me up every year and go ‘oh, I found out there was a trawler trawling in the bay last night’ ... [And I say] ‘I don’t think so’ I said ‘look, for starters it’s just too shallow, it’s not big enough, they can’t trawl in the bay really ... they’ll come in the western Entrance and they’ll come through the bay back to port, they’ll drag to wash their nets on their way through and that’s all they’re doing. They’re not dragging for fish, they can’t. Their nets will be on top of the water, there’ll be no weights on them and their nets will just be flapping in the wind just trying to clean them out a bit before they get back’. Because people just don’t understand ... I mean the fines involved now, if you knew what the fines were and the repercussions of trying to trawl in the bay or net in the bay, you just do not do it
– (Community participant, San Remo).

You get people that come here and ask you questions, ‘oh you’re still catching fish out in Bass Strait? We thought they were all gone’
– (Fishing industry participant, Lakes Entrance).

Part of the issue may be a lack of demonstration of the environmental conservation activities by the fishing and aquaculture sectors. Many fishers and aquaculturists are actively involved in conservation or resource management activities, although this is not necessarily widely recognised by the general public.

I haven’t seen a whole lot of evidence of the local fishing industry getting actively involved in environmental programs. I know there are a couple of the offshore fishermen who are heavily involved in the politics of the fishery, and they contribute a lot to their industry. [But] you don’t see them often getting their hands dirty and getting out there and helping to clean up water, or promote education around environmental stewardship, or anything like that
– (Community participant, Lakes Entrance).

Another issue may be a lack of understanding about the fishing and aquaculture industries. Beyond materials on the internet—through organisations such as SETFIA, SIV²¹ or the VFA²²—the general education provided by the sector and government fisheries and aquaculture managers is largely ad-hoc. Some fishers noted that they speak to local schools on occasion but little else. One of the exceptions to the lack of information provided by the industry on their sector was a relatively new installation at the San Remo co-op, which has a dedicated room and display, which provides information about the history and current practices of the local fishing fleet.

²¹ See siv.com.au/our-industry.html. Note that even this website was incomplete at the time of writing.

²² vfa.vic.gov.au/aquaculture and vfa.vic.gov.au/commercial-fishing

8 Results—social fabric of communities

Domain of community wellbeing	Dimensions of wellbeing	Contributions of Victorian seafood production	Indicators	Data collection methods (and types)
Social fabric of communities	Material (there are events and organisations that promote a sense of community, people who are socially marginalised have economic opportunities)	Supporting community events Fishing and aquaculture provide workplaces for entry-level work with no educational qualifications required	Prevalence of contributions to cultural events, sponsorship and donations Community identification with fishing heritage and notion of 'fishing villages' Prevalence of entry-level work provided for vulnerable young men	- Interviews (qualitative, values and perceptions) - Phone questionnaires (semiquantitative, values and perceptions)
	Relational (there is cooperation to support community-building events and organisations, networks exist to link socially marginalised people with economic opportunities)	Seafood producers are part of the cooperative networks that support community-building and economic opportunities for marginalised people	Extent to which seafood producers are part of these cooperative networks to support community-building activities and organisations, and provide work for vulnerable young men	- Interviews (qualitative, values and perceptions)
	Subjective (community members feel a sense of belonging, marginalised people feel they have opportunities)	The fishing and aquaculture sectors are seen by communities as contributing to community events and organisations, and providing opportunities for marginalised people Fishing/aquaculture is a part of cultural and community identity	Perceptions that seafood production industries and their families contribute to: community life; a part of towns' sense of identity; and entry-level work for vulnerable young men	- Phone questionnaires (semiquantitative, values and perceptions) - Interviews (qualitative, values and perceptions)

8.1 Overview

The presence of professional fishing and aquaculture contributes to the sense of identity within communities regarding what makes their place special to them. This domain of community wellbeing is less tangible than other domains described in previous sections, although it was revealed through interviews and surveys as an important and distinct contribution made by Victorian seafood producers to the 'social fabric' of their communities. This is separate to the appeal of seaside towns from a tourism perspective (see **Section 6.3**). It is about the identity of community residents and their sense of connection to the seafood industry and families.

These contributions are often difficult to articulate because they are diffuse and hard to disentangle from other social processes. They also appear to be stronger in some communities than others, and for some groups within communities. While these contributions are not always obvious or uniformly felt, they are an important part of the milieu of factors that strengthen community identity and cohesion.

In outlining the contribution of the professional fishing and aquaculture sector to the social fabric of regional communities, the key aspects that are discussed in the following sections include:

- Community history and identity (see **Section 8.2**).
- Participation in community life (see **Section 8.3**).
- Support for vulnerable young men in the community (see **Section 8.4**).

Key findings

The presence and history of professional fishing and aquaculture contributes to the character and sense of identity within the communities in which they live and operate. This is partly because many of these communities were founded on fishing activity and for small communities, much of the community infrastructure was built by fishing families. Eighty-three per cent of surveyed community respondents agreed that fishing and aquaculture was important to the cultural heritage and identity of their community.

Seafood festivals, supported by the local industry, help to foster social connections and reinforce community identities.

Fishing and aquaculture families are active participants in community civic life.

Fishing and aquaculture businesses support and donate to local events and charities.

The professional fishing sector provides a workplace, mentoring and support network for young and sometimes vulnerable men in the community. This was particularly the case for Commonwealth fisheries operations.

8.2 Community history and identity

While the fishing and aquaculture sector contributes to the aesthetics and appeal of towns from a tourism perspective (see **Section 6.3**), the presence and history of professional fishing and aquaculture contributes to the sense of identity within communities regarding what makes their place special to them.

This is partly because of the ways in which these communities were founded and built—often from a boom in fishing activity or from the whaling industry, which transformed into the fishing industry. For smaller communities—and those that persist as relatively small communities—such as Mallacoota, Port Fairy or Apollo Bay, this means that much of the ‘community infrastructure’ was set up by fishing families:

When the guys came here in the 60s there was only about 100 people living here or thereabouts. Within a few years there was 120 divers, 80 boats ... crew, families, kids. They built the tennis courts; they built the golf club. They formed the soccer club, the sailing club because they were young active people ... What’s left behind as a result of that is there’s a legacy here from those decades that’s continued. So now you’ve got second generation [fishers] and their kids and so on ... it just goes on

– (Fishing industry participant, Mallacoota).

In some cases, this history continues to imbue these towns with a sense of their character and identity. For communities like Lakes Entrance, this centres on the town as a whole being a ‘fishing community’, with fishing boats a centrepiece of the town and a large portion of the population involved somehow in fishing:

There’s a very strong social and community identity thing about being part of a fishing community. The Gippsland Lakes fishery is all but disappeared, but in Lakes Entrance, I can think of just so many people whose identity and their sense of community comes from the fact that they’re part of a fishing family. Or, that they know a fisherman. Or, that they’ve got a fishing story. It’s impossible to measure, but if you took fishing out of Lakes Entrance, it wouldn’t be Lakes Entrance. It’s just engrained into the place’s character
– (Community participant, Lakes Entrance).

In other places, it was as much about a general maritime identity—one associated with ruggedness and a pioneering spirit. For example, recent work by the local council identified that the community in Portland was still attached to and identifies with its rich maritime heritage. This has purposefully been built into a local ‘upwelling’ festival, which is aimed at locals, rather than tourists:

It’s about local identity. It’s about celebrating that link to the sea and making sure that people understand that and getting those kids from an early age celebrating the place they live in. So, it’s very [wholly] located ... So, it’s about that geographical identity. I think that’s important. Now, in a sense we’re losing a lot of other cultural underpinnings of our Western society, that a geographical identity is non-denominational. It covers everybody ... So, it can be very, very inclusive creating that kind of identity
– (Community participant, Portland).

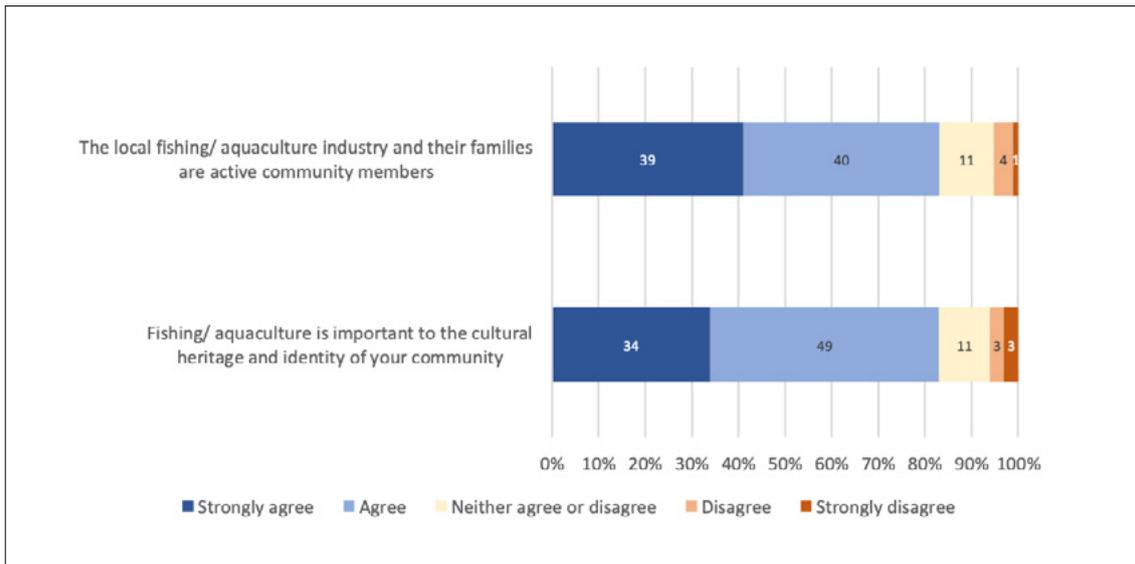
In a related way, it appears to be the work, coordination and volunteerism that goes into organising these festivals that helps to foster social connections and reinforce community identities. For example, the mussel festival on the Bellarine Peninsula raises substantial amounts of funds for local community groups but, equally relies on those community groups to work together:

To me is almost unique. I have not seen that sort of community connectedness in all my years of working in communities. Often times you see the strong connected fabric in a community around an emergency or a disaster or something like that. This is, the community is drawn together for a festival, for one day of the year, basically. It’s become a bit of a celebration
– (Community participant, Bellarine).

Other participants suggested that these identities provide a point of differentiation and a way for community members to develop a sense of shared pride in their town. The majority (83%) of phone survey respondents from fishing/aquaculture towns agreed that fishing/aquaculture is important to the cultural heritage and identity of their community (see Figure 49).

Figure 49. Survey respondents from fishing/aquaculture towns perceptions of the role of the fishing/aquaculture industry in their community

Note: n = 150.



Finally, while participation by Aboriginal people in professional fisheries and aquaculture is currently limited, the case of eel fisheries and aquaculture in Western Victoria is a clear exception. This is an example of how cultural history, economic activity and improved social relations have been drawn together through the culture and harvest of eels (see Box 7).

Box 7. Aboriginal communities and eel fisheries/aquaculture

Eels have played a prominent role in Aboriginal life and culture for communities across Western Victoria for many thousands of years (e.g., Pascoe, 2014). Today, these strong connections remain, with fishing and trapping eels, then cooking and eating them, an important way for Aboriginal community members to maintain community bonds, and connections to their traditional country:

All my life I've been fishing along the river. Fishing for eels is part of our practice for kids to learn how to catch eels, catching elvers at the falls, netting, building nets, fish traps, fishing without hooks with a bob, thrashing. We would then go down to the mouth of the Hopkins just after the full moon in February or March, and there'd be a big feast of eels there and we'd catch eels there ... We share it around, give it around. People from Melbourne, they all come up—they're looking for eels every time they come here. Relatives, other members of our community, yeah. Because they used to live here as kids so that's part of the tradition—'have you brought me an eel down?' Said 'well, get up and [get] it yourself!' But you do give it to them you know
– (Aboriginal community member, Framlingham).

The eel fishery is unique in Victoria in that it is the only fishery in which Aboriginal communities hold a commercial interest. Currently Framlingham Community Trust owns two eel licences:

We've invested our own money [to buy licences]. We thought that's something that is attuned to our cultural practice and something in which we should be allowed to develop. We do lease it occasionally but the stock hasn't been there [in recent years] and we're happy to let the licences lie to take pressure off the system because the system, under drought, these blokes relied on it more so than us commercially for a living ... So we're happy to pull the nets out if you like and not lease our licences to let the fishery recover. That's coming out of culture and tradition. If you had a lake that was full of eels, and this was the case of Bolac—at certain times when we had a corroboree and big gatherings, people would come and they would need permission to take. When it was plentiful you'd let people take it and you do it in a sustainable manner. You didn't mind sharing the resource in order for people to be able to carry out their cultural business and feed their families ... We transported that concept to dealing with the white fishermen - you can't be greedy. That's why we haven't sold them all and done too much with them because in one way we hold them because then that holds a capacity to take a couple of people out of the equation. Because some of these fisheries have got three, four and five licence holders—fishermen—so we see that as a way of ensuring that there's a future catch ... We're regulating it ourselves
– (Aboriginal licence holder, South-Western Victoria).

These cooperative relationships have been formalised in a Memorandum of Understanding (MoU) between Aboriginal and non-Aboriginal fishers in 2005. This relationship involves:

Discussions on eel access, eel utilisation. Basically it's about proactive dialogue. You know, we have an understanding—we shouldn't find out about each other's issues on the front page of the paper. If they had an issue with eel fishing associated with our activity we expected the courtesy of them knocking on the door and sitting down and discussing with it and we would do the same. That's operated since 2005 and there hasn't been any problem
– (non-Aboriginal eel fisher, South-Western Victoria).

Non-Aboriginal fishers related that this MoU represented a substantial change in relations, as during the 1990s the emergence of Native Title rights had been met with some alarm by the fishing industry generally:

It's a bit of a mindset change. Their involvement in the commercial sector is through a licensed entitlement, so I think once they made that investment and you can't deny anyone that if you buy a licence you're equal standings. Then that opened up—you know, when they first bought the licence we started dealing with the guys who were working the licence, so then they became a supplier, and we sort of tried to foster relationships of successful business. Then that transcended into actually operating the licence for them and inevitably doing business with them. So you get a better understanding of what's outside of just the commercial aspect, and the longer times you spend with them the more you understand their interests and your commercial interests
– (non-Aboriginal eel fisher, South-Western Victoria).

Aboriginal communities maintain aspirations for further involvement in eel and abalone fisheries in the south-west of Victoria and for expanding cultural tourism and production of specialty eel products by Gunditjmaara traditional owners in and around the Budj Bim World Heritage Cultural Landscape. The experience of eel licence ownership in Framlingham suggests that even a small involvement in fisheries by Aboriginal communities can lead to community benefits related to economic benefits, but just as importantly maintaining sustainable fisheries, and fostering positive and cooperative relations between Aboriginal and non-Aboriginal fishers.

8.3 Participation in community life

The other key role that the fishing and aquaculture sector plays in some of the communities we researched is through the presence of fishing and aquaculture families and their participation in everyday community life. Again, this is more important in some communities than others, particularly where fishing/aquaculture is a relatively substantial source of employment, such as Mallacoota, Lakes Entrance and Apollo Bay.

Their role includes participation in sporting clubs, schools and other aspects of community life. This can be especially important for small, regional schools or sporting leagues, which might otherwise struggle to be viable.

This community, in Lakes particularly, the fishermen are involved in everything that's happening, from the schools right through to the cemetery, they're there ... Basically fishing's the heart of the town. Take the heart out and the town dies. Simple as that really

– (Fishing industry participant, Lakes Entrance).

Most classes in the school would have a child with a diver, a deck hand or someone very closely involved

– (Fishing industry participant, Mallacoota).

Some fishermen work their schedules around making sure they're home, to make sure that the deckhands are there to play footy

– (Fishing industry participant, Lakes Entrance).

There is also a role that fishers and aquaculture businesses play in terms of donating to and supporting local events and charities. Participants across the state identified donations to various local charities as a normal part of living in regional communities. There was good support for these contributions among the general community in fishing/aquaculture towns as well (see Figure 49), with 79 per cent of survey respondents agreeing that local fishing and aquaculture families are active community members.

However, there were also a range of participants who were sceptical of the sector's contributions. In Lakes Entrance, there was some disparity between the views within industry of their donations and related contributions and the perceptions of some from outside of the industry. As one non-industry community member noted:

As far as I know they are very much like the silent land owners ... LEFCOL²³ will do a \$500 or \$1000 donation [to a local fundraiser] and that's it. It's not from actual fishing families, which, really, they could be a bit more self-promoting ... because they are seen as extremely wealthy in this town

– (Community participant, Lakes Entrance).

²³ LEFCOL is the professional fisheries co-operative in Lakes Entrance.

Several factors appeared to contribute to these less positive views, including:

- Aggregation of fisheries quota ownership by non-local investors. This reduces the economic ties between the fishery and local communities but, as suggested by several participants, places more pressure on operators who are fishing to tighter profit margins. This happens through the operation of market forces—investors wanting returns on their investment will seek out operators to catch their quota at the lowest rate. This is the underpinning rationale of most ITQ systems—economic efficiency rather than community functionality (e.g., Phillips et al., 2002).
- The gradual reduction of active fishing operators and their presence in communities, particularly in places such as the Bellarine. This stems from a change in practices and equipment, a reduction in licence numbers and from an increasing reluctance in industry to engage with the public amidst negative publicity.

It's different to before where all the net boats would moor up at St Leonards ... the newcomers down here wouldn't know anything about commercial fishing ... they don't see them cleaning the nets or carting the fish up the wharf or anything like years ago ... and as the slower boats phased out, then come the trailer boats, and then the night work ... so, you become ghosts, nobody sees you

– (Fishing industry participant, Bellarine).

8.4 Support for vulnerable young men

Another aspect of the contributions that the professional fishing sector makes to the social fabric of communities is through the provision of a workplace and support network for young and sometimes vulnerable members of the community. This was most often identified by participants in the context of larger multi-day boats headed by experienced skippers managing deckhands. In some of these cases, the skippers were noted to be important role models and support for these deckhands:

[It is about] giving them a little bit of a role or a direction ... incorporating them into the family of the boat. The skippers become like fathers and it's a mutual relationship ... there's boys that get into trouble and it's their skipper that bails them out. It's not their mum, it's their skipper. Particularly if they're in a different port. [Or they give them] financial support when their car rego's due, that kind of thing ... [I've seen] a lot of these young boys who were really quite socially isolated in a lot of ways and pretty fragile, who if they were picked up by a skipper, a good skipper, really found a place

– (Community participant, Bellarine Peninsula).

Several industry members supported these observations, agreeing that they themselves had been troubled in their earlier days. Similarly, current skippers also pointed to their current crew, noting from their perspective the support they provide:

We've just had a couple of young people coming through lately. They've got really nothing else to do and they've newly come out of jail and come on board ... they're good kids ... They're actually a breath of fresh air ... you get two good ones who are keen and—so then you put the effort into them and you send them to school and you ... Quite often you send them to school, train them up and then they go somewhere else

– (Fishing industry participant, Portland).

9 Results—the importance of contributions

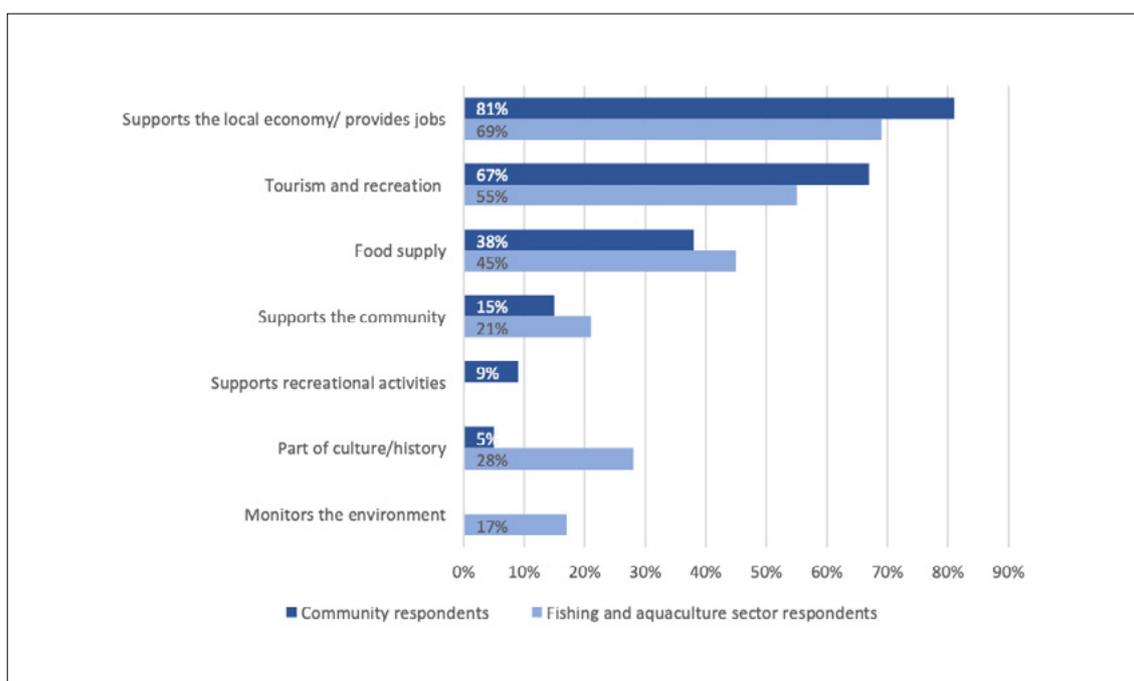
In addition to the explorations of contributions to community wellbeing presented in the previous results sections, the research team employed a short survey tool to gain a sense of how important people felt the various contributions were. Respondents were recruited from two groups: members of communities with seafood-producing industries and members of professional fishing and aquaculture industries. Community members were a subset in the large Victorian public phone survey—if they identified to the enumerator that they were from a selection of 10 key fishing and aquaculture towns, they were asked an extra set of questions about their perceptions of contributions (n = 150). Industry members (n = 53) were recruited during stakeholder workshops that were held by the researchers in regional Victoria and Melbourne to validate preliminary project findings.

9.1 Comparing the community and seafood industry’s perceptions of contributions

Figure 50 presents responses to the open-ended question: ‘In what ways do you think the fishing/aquaculture industry makes the most important contribution to your community?’

Figure 50. Community survey respondents and workshop participant respondents perceptions of the most important contributions of the fishing and aquaculture sector to their communities

Note: Community survey (n=150), Workshop participants (n=39)



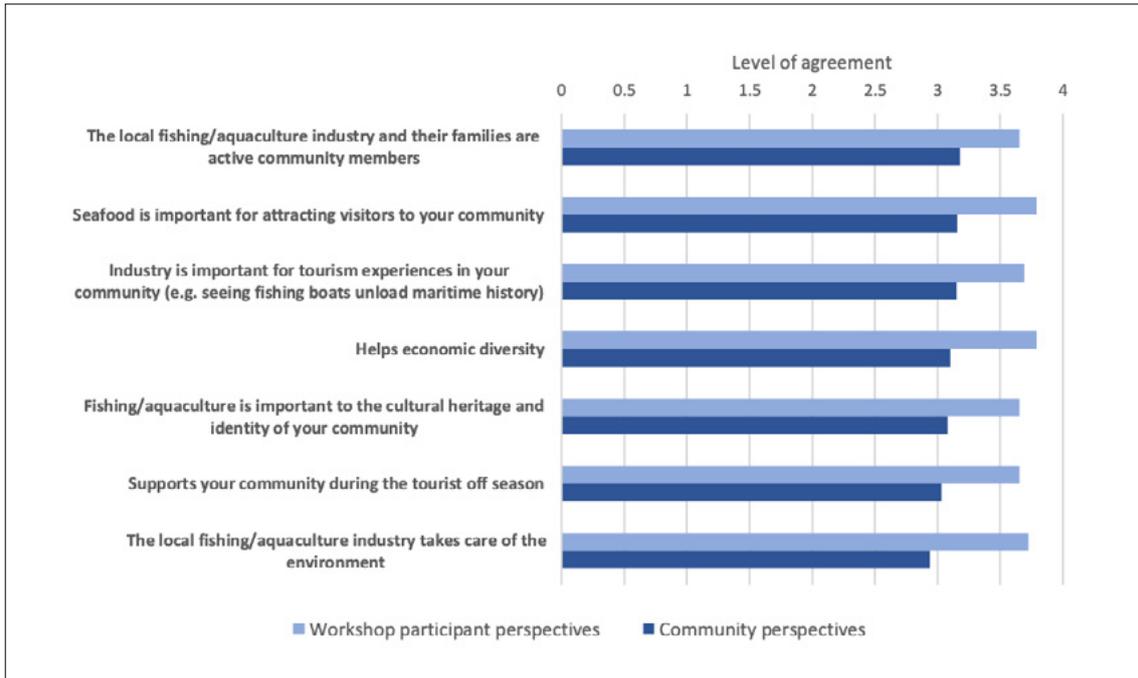
Responses were coded into seven categories, which related to the domains of wellbeing presented in this report. Comparing what community members and the industry perceived to be important contributors revealed that there is some consensus in terms of the most important contributors, including supporting the local economy and providing jobs, contributing to food supply and supporting the tourism and recreation sectors. However, there was a disparity in the strength of belief in the importance of these contributions. A greater proportion of the community felt that the economic and tourism/recreation domains were more important contributors than the industry did. Conversely, a greater proportion of the industry felt that food supply was important, compared to community members. There was no recognition by the industry of the importance of their contribution to recreational activities, and there was no recognition by communities of the importance of industry's contribution to monitoring the environment.

Over a quarter of the industry felt that they made an important contribution to the culture and history of regional communities, although only 5 per cent of community respondents felt the seafood production industry's contribution to their history and culture was the most important contribution. There are several possible reasons for this disparity. It could be that non-industry people were not aware of the contribution seafood production has made to the history and culture of their town or they did not think it to be important. Fishing and aquaculture industries in many towns are not particularly visible or communicative about their contributions to their communities.

Figure 51 displays the comparison of community members and industry (i.e., workshop participants) level of agreement with several statements relating to the seafood industry's contributions to communities. In all statements, industry agreed more strongly than the community, answering they agreed or strongly agreed to every statement. With 'agree' being a score of 3, the community responses indicated that, on average, the community recognises the different contributions made by the industry, although perhaps did not value them as strongly as the industry did.

Figure 51. Average level of agreement by community members and workshop participants with statements about the fishing and aquaculture sector

Note: Community survey (n=150), Workshop participants (n=39)



Fishing boats tied up at Lakes Entrance
Credit: Kirsten Abernethy



10 Discussion

This discussion section considers the extent to which each of the four project objectives were met.

Objective 1: Evaluate the economic contribution of commercial wild-catch fisheries and aquaculture for seven regions of Victoria, including the regional economic impacts such as multiplier effects and employment and contributions to related sectors within regions, building on previous Australian studies.

The economic contributions were evaluated as planned, with findings discussed in-depth in Section Results—economic resilience and diversity. The original objective was for seven areas, although as the project progressed, we settled on five areas for wild-catch fishing and two for aquaculture. See **Section 3.4** for further explanation of the study areas. Further details of the economic analysis are available in **Appendices 1** and **2**.

Previous Australian studies were used to build context for this project (see **Section 3**). A concurrent study on national contributions from seafood production was also relevant, and differences between this project and the national contributions study were outlined (see **Box 1**).

Objective 2: Evaluate the social contributions of commercial wild-catch fisheries and aquaculture for the same regions, including the social aspects of economic contributions, food provision, health and nutrition, services and infrastructure, interactions with tourism, consumers and recreational fishers, contributions to community identity and heritage, and knowledge networks, building on previous Australian studies.

The social contributions of professional wild-catch fishing and aquaculture were thoroughly evaluated, with findings presented throughout Sections 5–9. The evaluation utilised mixed methods, including qualitative and semiquantitative data analyses, with the approach described in **Sections 3.6** and **3.7**.

The domains of wellbeing to which seafood production contributes were derived in part from the existing literature—from which the potential domains listed in the objective were generated—then refined in light of the qualitative interview portion of the study. Further, the domains were refined in response to conversations with Dr Emily Ogier from the FRDC Human Dimensions Research Sub-Program, who recommended working with a smaller number of domains to which seafood production made strong contributions. The domains settled on for evaluating social contributions from seafood-producing industries were economic diversity and resilience, food supply, tourism and recreation, environmental sustainability and social fabric of communities.

The social contributions were evaluated across Victoria, including the regions covered by the economic evaluation, although not exactly the same regions as for the economic evaluation. The economic evaluation used ABS statistical areas to enable an input–output analysis. Those same boundaries were not used for the interview or phone survey social data collection because statistical area boundaries were not workable or useful for those methods. Instead, the state of Victoria, and key fishing/aquaculture towns were used for the social evaluation. For further discussion of the social evaluation study areas see **Section 3.4**. For discussion of the limitations posed by not having the social evaluation areas align with the economic evaluation areas, see **Section 3.9**.

Previous Australian studies on social contributions were used to build context for this project (see **Section 3**). Previous studies are also referred to as relevant throughout Sections 5–9.

Objective 3: Build on and refine a methodology to be used for ongoing social and economic evaluations of industry as part of a FRDC national framework.

The project built on previous FRDC studies that evaluated the contributions of professional wild-catch fishing (FRDC 2014–301) and aquaculture (FRDC 2015–302) in NSW, and the national contributions study (FRDC 2017–210). The project refined methods used in NSW in several ways, but did not significantly reduce the amount of required research, because it was necessary to establish baseline data for Victoria, where no similar study had been conducted.

One way the methods were refined in the economic analysis was through experimenting with more palatable (to industry) methods of collecting financial data. In FRDC 2014–301, fishers were sent an economic survey in the mail and asked to post the completed survey back to the researchers. The response rate was very low. In FRDC 2015–302, we attempted a more targeted approach, with respondents phoned first to ask their willingness to participate and surveys only sent to those who said yes, following up with several more phone calls to ensure surveys were completed and returned, although the response rate remained low. In the current study, we tried an approach based on that used by ABARES to gain economic data on Commonwealth fishing, with groups of respondents giving ranges of high, medium and low averages for their fishery type. Respondents were unwilling to discuss economic data in groups, even hypothetical industry averages, so we fell back to having researchers manually conduct the economic survey with individual respondents in person during fieldwork or over the phone, or having them send their taxation paperwork to researchers to complete the survey on their behalf. With this resource-intensive method, the response rate for wild-catch fisheries was estimated to be 18–23 per cent, although it was lower for aquaculture businesses who were unwilling to divulge financial information. We conclude that if industry and government agree that having economic valuation of seafood production is useful, for example in terms of understanding how government policy changes might affect industry, economic data should be collected as part of the fishery management process. The main fisheries in Australia that have ongoing economic monitoring—in South Australian and Commonwealth fisheries—fishers are required to provide economic data as one of the conditions of their participation in the fishery. Researchers on individual projects cannot elicit widespread cooperation from industry to provide economic data.

Some further considerations for improving the economic data in future iterations of the project include gaining additional certainty regarding the value of Commonwealth-managed catches in Victoria. Moreover, it could be useful to go beyond the input-output method to include a full value chain study. It appears that significant value is generated along some supply chains, but without prices data of Victorian-produced seafood at the various points along the chain to consumption, it is not possible to generate reliable figures for this value. In Victoria, the wild-catch fishing industry does not provide prices data of finfish to government at even the first point of sale, so GVP has to be estimated. Nowhere in Australia are prices data collected further along the chain. The research team attempted to collect data on prices for particular value chains for the purposes of this study, but most participants were unwilling to allow their prices data to be used in publications, even in an aggregated form, for commercial reasons.

Methods used in the NSW studies were also refined in this iteration. We reviewed the NSW phone surveys to determine which areas gained useful data, and which were less conclusive, to consider more precisely what we could achieve with the phone surveys. The questions were more targeted and we put more effort into ensuring a reasonable number of responses from industry groups (e.g., post-harvest, hospitality and tourism sectors).

The other main area in which the social researchers refined the approaches used in previous studies was in reworking the domains of wellbeing. In the NSW studies, the domains raised by participants and the literature were explored, although arguably for some of these domains the contribution was relatively small and having large numbers of domains made the reporting process unwieldy. For the Victorian study, we reduced the number of domains to which seafood production makes more clear contributions. Most importantly, food supply became its own domain in Victoria, whereas in NSW, food supply was covered in multiple domains from health and nutrition, to culture and heritage, tourism and recreation. We had much discussion among the research team regarding whether to keep the domain 'social fabric of communities', and if so, how it would be best framed. In many cases, the contribution of seafood producers to this area of community wellbeing was potentially small, and it was not easy to draw direct causal lines between the activities of seafood producers and benefits to communities. However, interviews revealed that contributions to community identity and sense of place kept emerging in the qualitative interviews, and this set of benefits did not fit in any of the other domains, so we decided to retain this domain.

We also refined the method used in NSW to ascertain various stakeholders' perceptions of the importance of these contributions. In the first NSW study, we used the high-level domains to keep the survey short, but there are so many different attributes under each high-level domain, such as employment, profitability, GVP in the economic domain, that it was difficult for participants to pick a level of importance. For example, they may have thought jobs were important but profitability less important. In the second study, we included the attributions for each domain, although this made for a long survey. For the Victorian study, we found a middle ground, selecting a range of key attributes from domains of wellbeing, making for a short, precise survey.

The current study constituted a useful baseline for understanding the contributions of seafood producers to Victoria and its regional communities. This understanding could be kept up to date and be used to generate time series data that will reveal trends, and be useful for developing social and economic impact assessments for policy changes. We suggest that a large study like this, using mixed methods, might be useful every 10 years, to check whether the relevant domains have changed and to capture any structural changes that might have occurred in the industries and regional economies. In between large studies it should be possible to do smaller studies tracking key sets of data:

- To update the economic analysis, make a selection of some of the key economic data, index the prices and confirm the indexed figures via a workshop of industry people.
- To update the phone survey data, some of the key questions could be drawn out and asked to a smaller sample size.
- To update parts of the study covered by qualitative interview data, focus group discussions could be organised in key seafood regions.
- To track contributions in specific regional areas rather than to the whole of Victoria.

In addition, there are several areas that future contributions studies or studies building on this research may explore.

- Economic resilience is not only about the amount of money contributed, but the quality of those economic contributions, including the distribution of income from the industry within communities and the seasonality of the industry, providing year-round activity as opposed to seasonal tourism. The current project included qualitative data describing these features, although future projects may integrate issues of quality of contributions more thoroughly in the analysis.
- Possibly more semiquantitative or even quantitative data could be collected on the material/relational/subjective dimensions and indicators of the domains of wellbeing other than economic resilience and diversity.
- It may be possible to further ascertain the effects of contributions on the domains of wellbeing. The current study identified contributions, measured the importance of some of the contributions via the phone surveys, and analysed the economic contributions. This could involve comparing wellbeing in fishing/aquaculture towns to towns without those industries, or comparing changes over time.
- At some point in the future, if enough data about the social and economic values of fishing and aquaculture are generated, it may be possible to conduct a bio-economic analysis of what the best use of natural resources would be. This would require comparing different uses of resources and conservation measures. The current study worked towards such kinds of analysis by providing some data about values that would be needed for a policy study of the best use of resources for 'triple bottom line' outcomes.

Objective 4: Disseminate findings, identify the social and economic contributions of seafood production for each study region, highlight threats to sustainability and viability as well as opportunities, in a form suitable for engaging local and state government agencies and the general public, to raise awareness of the role of professional wild-catch fisheries and aquaculture in Victorian communities.

During 2020, the project findings will be disseminated in fishing and aquaculture regions throughout Victoria. The project outputs and dissemination plan were devised in collaboration with the project industry Steering Committee. The main outputs include this report for government and industry representative audiences and a series of factsheets on the headline contributions of professional fishing to regions, and of the main aquaculture sectors. The professional fishing factsheets will be formatted into one page of key 'facts' with an infographic, for the use of industry advocates when they engage with decision-makers and stakeholders. For aquaculture, the factsheets will be further drafted into a template for industry sectors to use to monitor key quantitative contributions and to add further information on desired indicators not covered in this study, such as environmental impacts.

In addition, the project team will work with regional industry 'champions', supplying them with factsheets and supporting them to advocate for the industry and to build critical key relationships across sectors to promote opportunities.

Finally, video material will be produced and released on social media to raise awareness about locally produced seafood in Victoria.

11 Implications

This section draws on findings to highlight key opportunities for how the contributions of the professional fishing and aquaculture sector can be strengthened into the future. We discuss emerging opportunities and associated challenges for seafood producers, including:

- Improving awareness and understanding of the seafood industry and its contributions to Victorians (see **Section 11.1**), such as addressing misperceptions that seafood production is unsustainable.
- Providing the public with more access to Victorian seafood (see **Section 11.2**).
- Strengthening links between the seafood industry and tourism (see **Section 11.3**).
- Attracting new entrants, especially young people (see **Section 11.4**).
- Improving opportunities for Aboriginal people, communities and enterprises to enter fisheries and aquaculture (see **Section 11.5**).

11.1 Improving awareness and understanding of the Victorian fishing and aquaculture sector

One of the key issues with the fishing and aquaculture sectors that was apparent in interviews across the state was the poor understanding of the industry by the general public in metropolitan areas but even in the fishing and aquaculture communities. This is a substantial area of opportunity in that, through improving people's understanding of the sector, there is potential to build support for the industry through:

- Strengthening the appeal, value and pride the community has in Victorian seafood producers.
- Reducing tension and conflict within communities generated through misperceptions of the sector.

There are already a diverse range of efforts in place to help the general public better understand Victorian fisheries and aquaculture and their contributions to the community. This ranges from websites run by conservation NGOs (e.g., sustainableseafood.org.au), to advocacy by chefs and food writers (e.g., sbs.com.au/programs/whats-the-catch), to industry-led promotion through seafood festivals.

These are all important pieces of the puzzle in terms of gradually changing awareness and understanding of fishing and aquaculture. The key opportunity is to build on these diverse sources of information with balanced, transparent and credible communications, which are Victoria-specific and address the awareness gaps identified in this research, including:

- **The contributions of the sector to food supply.** This is important to 'fill the gaps' in people's understanding of how—if they want Australian, Victorian or local seafood rather than imports—they need to support these sectors.
- **The environmental credentials of the sector.** Beyond fishing within the limits of the stocks being targeted, this includes a need for the sector to be more visible in its other contributions to the environment, including potentially strengthening these contributions in a similar way to Landcare, which involves both land managers (i.e., farmers) and community members in activities that help the environment and sustainable production.

They need to be seen to be caring about the environment. Some people don't see fishermen as primary producers. They're taking a public asset and selling it. So, they need to be seen to be giving back
– (Community participant, Lakes Entrance).

This could take the form of marine or river system clean-ups, involvement in Coastcare or Dunecare groups or wildlife assistance, such as the work done by the San Remo Fisherman's co-op to help injured pelicans.

Suggested mechanisms for improving awareness of these activities include engagement activities such as:

- Design interactive displays that provide information about the fishing and aquaculture sectors, how they operate, how they are managed and what they produce. This could potentially be part of broader tourist attractions associated with co-ops or seafood experiences, such as is being done in San Remo.
- Provide information in the form of flyers at the point of sale of seafood, such as in fish and chip shops throughout the state.
- Promote understanding of the sector through seafood festivals and similar forums, including broader events that have relevant links to the history of communities, the maritime sector or the marine environment.

[The] Winter Weekends festival included an event that's called Old Men and the Sea. We're talking to local fishermen and bringing those stories to life. The response so far has been really positive ... we know there's an audience, we know there's an appetite for this story
– (Community participant, Port Fairy).

- Talking at schools and other community venues about professional wild-catch fishing and aquaculture, to build awareness of the situation for Victorian producers. Aquaculture facilities may host visits by community groups for this purpose.

Related to the above points, it is worth mentioning the power of fishers presenting in this context. A range of participants highlighted the popularity and interest people have in hearing the stories of fishing and the work that fishers do. As noted by one fisher who presented at forums in Melbourne:

I had one girl come up to me afterwards and she said I've only ever had goose bumps twice in my life ... She said 'when you were talking about fishing', she said 'I was sitting there and ... I just broke out in goose bumps, all the hair on the back of my neck stood up' ...She said 'I could just feel your passion'. So that made me feel pretty good I suppose
– (Fishing industry participant, Warrnambool).

The ability to realise some of the ideas in relation to tourism depends on the seafood-producing sector strengthening its relationships. This includes relationships within professional fishing and aquaculture groups, and between seafood groups and other organisations or groupings such as local councils, and primary production networks. Through such relationships, seafood producers can spread awareness of their industries, could gain allies in protecting professional fisheries access to resources, and build synergies with other groups interested in local food production.

There are resources and tools available to the seafood industry that provide guidance on how best to engage and improve the level of support from communities and stakeholders, such as local councils, recreational fishers, and environmental organisations (e.g., Alexander & Abernethy, 2019; Mazur & Brooks, 2018; Ogier & Brooks, 2016).

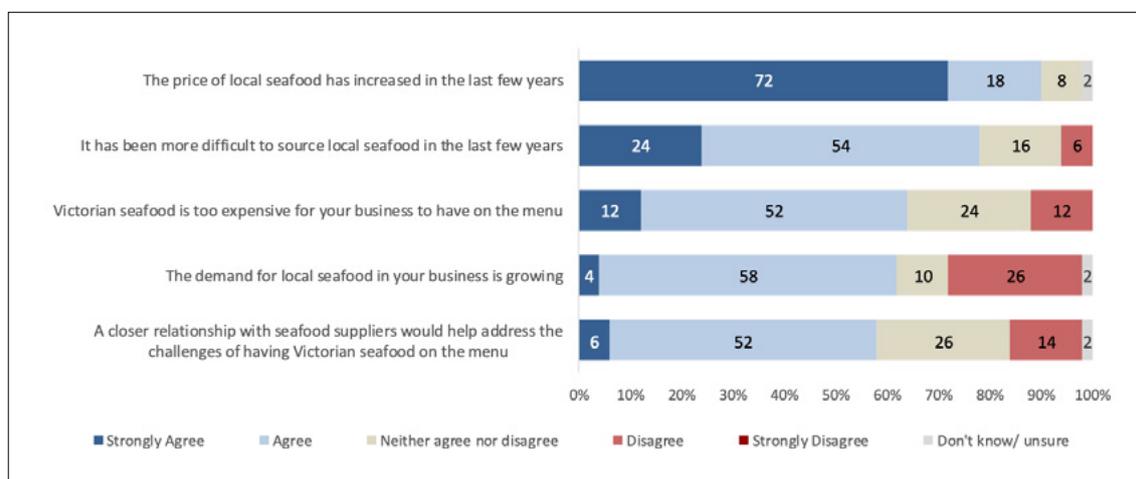
11.2 Providing more access to Victorian seafood

11.2.1 An overall interest in accessing more Victorian seafood

One of the clear opportunities raised by participants and survey respondents across the state was an interest in and support for greater access to more local seafood. This stems from a range of factors and, in turn, has a range of opportunities and challenges associated with it. At a state-wide level, there is good acknowledgement of the growing demand for ‘local’ seafood (see **Section 5.3.4**). For example, almost two-thirds of hospitality businesses surveyed considered there was an increasing demand for local seafood in their business (see Figure 52).

Figure 52. Hospitality businesses’ perceptions of the changes in local seafood availability and demand in recent years

Note: n = 50.



Further, the simple statistics for the volume of imported seafood relative to local production highlights the clear opportunity for addressing local demand with local product. However, important elements of Victoria’s seafood supply are shrinking. Hospitality businesses noted that local seafood has become more difficult to source and more expensive. In around two-thirds of cases, Victorian seafood has become too expensive for them to have on their menus (see Figure 52). Australia has comparatively high production costs, which is one reason for high prices, but in Victoria price rises for fresh finfish have also been driven by the closures of seven bay and inlet fisheries since 2000.

We used to get a lot more really good quality King George whiting, snapper, and garfish, rock flathead, other varieties, pike and that sort of stuff in Port Phillip Bay. The main thing that we have really noticed is the whiting and the rock flathead—these are the two that are really affected and to a slightly less extent the snapper and calamari, so we don't have enough to meet demand. Most of calamari now comes from South Australia, so that bumps up our prices, and means people are buying less fish ... To a limited extent we can get this fish from other states, but other times we just have to get customers buy something else. We used to have a lot of elderly customers come in and buy King George whiting and now they can't because there's either not enough or it's too expensive

– (Fish retailer, Melbourne).

Beyond the generic opportunity of providing the public and tourists with more access to Victorian seafood, there are a range of more specific opportunities and challenges in this area, including:

- making seafood more accessible in regional towns near to fishing and aquaculture operations
- expanding the use of local seafood in restaurants
- increasing access to underutilised species and growing the aquaculture sector to serve the demand for seafood throughout the state.

11.2.2 Making seafood more accessible in seafood-producing regions

A frequently mentioned issue—and opportunity—in some areas with a fishing or aquaculture presence was the paradoxical challenge of accessing fresh, local seafood. This was a key problem in San Remo and Phillip Island five years ago, prior to the San Remo Fisherman's co-op and Bass Strait Direct (see **Box 2**), which made concerted efforts to serve and make local produce available. It remains an issue in places such as Apollo Bay, Portland, Port Fairy and towns in East Gippsland, where accessing seafood from local producers appears to be difficult.

One of the criticisms is, and this applies more to the [Gippsland] Lakes fishery than the offshore one, is that you actually can't buy the fish locally. It all goes to Melbourne. As far as I know, almost all of the catch from the Gippsland Lakes, which is only 40 to 50 tonnes a year at the moment, it all goes straight [there]

– (Community participant, East Gippsland).

Supplying seafood to the local region can have a range of benefits including a visible industry in the community, which is important for the identity of communities and their sense of pride and support for their local industry:

I think the opportunity is for the commercial fishing sector to make sure its product is available locally and not just send it off to Melbourne or Sydney to the highest bidder. There's some social value for them in having their product available locally

– (Tourism manager, Bairnsdale).

There was a common misperception in communities that all fish goes to Melbourne, although a significant proportion does get sold through the wholesale market in Melbourne. The drivers for these dynamics are complex but appear to relate, in part, to the value and logistical ease for fishers to send it to a centralised market in Melbourne. While there is local demand, it is not enough for the entire catch and so most of it has to be sent to Melbourne to be sold elsewhere in Australia or overseas. This applies to both high-value products, such as abalone and rock lobster, but also finfish and other seafood. Because there is a system of sending seafood to Melbourne in place, it is easier for fishers to send off their entire catch to one location, rather than dealing with multiple local buyers:

The system's in place at the moment where the lorry goes to Melbourne ... it actually supplies a wonderful service, and it's not expensive. That can continue and it will continue, because there's been big numbers

– (Fishing industry participant, Apollo Bay).

As a result, sometimes it is often only 'bits and pieces' that get left for local consumption:

I used to sell them a bit cheaper just to give the local, so local people can have a feed ... I'm actually selling it to them cheaper and I'm cooking them. So, it's all this extra work for less money

– (Fishing industry participant, Warrnambool).

I don't sell a lot of fish locally. I probably sell—I don't know—10 kilo a week locally, and the rest goes to top-end restaurants in Melbourne

– (Fishing industry participant, Gippsland Lakes).

Another challenge in having accessible local seafood is continuity of supply. This is particularly the case with small fishing fleets, which can have variable, weather-dependent catch. Diversity in fishing operations can help here—such as in Lakes Entrance, where the Gippsland Lakes fishery (to be closed between April 2020–2021), which is generally more weather-friendly than the ocean fishery, has helped to provide a more stable supply of seafood to the local co-op. Aquaculture, with its capacity for year-round production, can help retailers to maintain local supply through weather-based and seasonal fluctuations in the wild-catch fisheries, although much aquaculture product is sold outside local markets.

There are some examples throughout Victoria, in which the local retail and restaurant seafood supply chain works well. However, this appears to be dependent on the direct relationships formed between retailers and chefs and the fishers. The three co-ops have retail arms, and given their remit, naturally have access to multiple fishers using different gear types catching different species. However, the number of fishermen's co-

ops in Victoria has significantly reduced from when there was a co-op in every coastal fishing town, such as Port Fairy and Lorne. There are other retailers that operated as a vertically integrated business, with the owners also owning a fishing boat and can attract other fishers to sell direct, such as in Drysdale, Portarlinton and San Remo. Alternatively, the retailer has a wholesale business with a retail arm, which means access to fish transport networks and dealing with larger volumes of fish. However, as with the co-ops, these types of retail businesses, although highly successful, are rare in regional Victoria. During fieldwork, we came across a small number of highly successful restaurant businesses specialising in locally caught seafood. The chefs were passionate about seafood, were flexible with what species they would cook, and had the skills to prepare a range of seafood. They had spent considerable effort in building relationships with local fishers to gain direct access to fresh fish.

In summary, the opportunities here relate to:

- Improving collaboration among operators (such as through functional co-ops) so that local wholesale or retail networks have a greater diversity and more likelihood of stable supply, while the transaction costs for producers (i.e., multiple small transactions) are reduced.
- Developing opportunities for more relationships to be established between fishers/aquaculturists and local businesses that may want to sell their product. One of the key issues is to make it viable financially and timewise for producers to supply numerous small local buyers as opposed to shipping their whole catch off to one market.
- Potentially fostering links between aquaculture and wild-catch suppliers to support diversity and continuity of local supply.
- Increasing the diversity and volume of seafood available to the local market by exploring new opportunities with underutilised species and bycatch (see **Section 11.2.4**).

11.2.3 Increasing the use of local seafood in restaurants

Building on the opportunity for making seafood more available in regional areas with professional fishing and aquaculture, there are also specific opportunities to build better relationships between the industry and local restaurants and other hospitality settings. This relates to the interest among domestic and international tourists in experiencing local seafood when they are travelling to seafood-producing regions (see **Section 6.2**), but also the general interest in local Victorian produce being recognised by the hospitality sector (see **Section 5.3.3**). Chefs and tourism managers noted that one of the unique selling points about Victorian seafood in Victorian restaurants was the very short timeframes between capture and the plate:

It's such a unique product in the fact that we can know that it's out there and three hours later it's in our restaurant and on the table ... It's a real point of difference for us. So we've got to work out a way to be able to make that work, from our point of view, it's too good of an opportunity to not do so
– (Chef, Port Fairy).

The challenges that hospitality participants and survey respondents identified to using more Victorian-produced seafood in restaurants and other venues included:

- Continuity of supply and the challenges of fluctuating product availability and higher prices for local product for establishing stable menus and prices.

It's much easier to buy imported fish, for me as a restaurant owner. It's a pain in the bum getting local stuff ... I've got to ring everyone up, 'go hi, have you got this?' ... I spend ages on the phone or texting. Whereas, if I get it frozen imported, I can just put an order in with wholesaler. Don't have to clean it, don't have to do anything ... It's easy, so you can see why a lot of places do it

- (Restaurateur, Lakes Entrance).

- The lack of skills among some newer chefs in working with and preparing a diverse range of seafood—such as filleting skills—can compound the above supply challenges.
- The lack of regulation for labelling in restaurants. This leaves an ambiguity about provenance, which can devalue the local 'brand'. Customers may assume a product is local when it may be imported. A key example here is Barramundi, which is an Australian species that can be farmed in Victoria but also might be imported aquaculture product from interstate or overseas without customers realising.

Seventy per cent of the Barramundi we eat is imported but there are activities that are illegal here that are practiced overseas. For example, medicated diets, gas flushing with carbon monoxide ... As a consumer, your expectation is that it's an iconic, Australian fish ... but currently there is no way that you might know, as a consumer, that the Barramundi you are eating is from Taiwan or Vietnam, not from Australia

- (Aquaculture manager, Victoria).

A related issue is increasing the level of value added processing in Victoria to improve economic contributions. Preparing seafood to sell in restaurants and cafes is one form of value adding, but beyond that there is not much value adding of seafood in Victoria.

Australia is primarily a commodity trader. So we grow things and we pack them in the most convenient form and we get them out of the country. We do very little value adding. Now, when you don't value add, there is a massive hole in the dollars and cents potential

- (Processor, Melbourne).

Opportunities in this area relate to:

- **Strengthening the hospitality sector's ability to work with seafood**, potentially including training and awareness-raising for new chefs about seasonality, how to access and use the diversity of Victoria's seafood produce. This could build on work by the MSC with chefs, or the relationships and support provided by fishmongers like Ocean Made Seafood:

We go to their restaurants and see what they do and we need them to understand us, too ... Relationships in this industry are key. With fish becoming harder to access at times and it can be expensive, you need a strong relationship with your supplier because your supplier can not only educate you and your staff but help your business make money through providing a consistent, quality product

– (George Lucas, co-owner of Ocean Made Seafood, quoted in William Angliss Institute, n.d.).

- Given that Victorian seafood cannot necessarily compete with imported product on price (Ruello & Associates, 2011), it is important to recognise Victorian seafood's unique selling points and the opportunity to build brands from the quality of the environment from which it comes, the management systems in place and sustainability of the produce and the potential for fish to reach retailers and restaurants on the day it was caught.

Yeah, there's always going to be the bulk market, and that's fine. In Australia over 80 per cent of the seafood that we eat now is imported. That's not going to change overnight ... Let's keep our 20 per cent and grow it a bit and get the most we can out of it, because we don't want to compete in that bulk quantity marketplace, we want something special

– (Fishing industry participant, Apollo Bay).

- **Improved country of origin labelling in restaurants and mandating standard names for seafood.** Lack of clarity about where seafood is from and a lack of regulator attention to making sure seafood retailers are selling what they say they are selling, potentially disadvantages more expensive domestic seafood in comparison to cheaper imports, in the context where many consumers do want to buy domestic product but are not clear about where their seafood is from. Unfortunately, it may be some time until government regulators revisit this issue, with the Commonwealth Government and Victoria among most other states having rejected a push for labelling regarding country of origin for the hospitality sector and fish names in recent years (Commonwealth of Australia, 2014a, 2014b).

11.2.4 Increasing access to underutilised species, fostering diversity and growing the aquaculture sector

While the closure of Victorian bay and inlet fisheries such as Port Phillip Bay and Gippsland Lakes had negative implications for seafood supply throughout the state, there are a range of other options for improving the availability of Victorian seafood, including:

- **Emerging fisheries for underutilised species.** In line with its policy relating to new commercial access to wild-catch fisheries resources (VFA, n.d.), over the past ten years, the VFA has granted a range of permits to explore underutilised species, such as periwinkle. It has also created access licences for scallop and urchin dive fisheries and is proposing new licences for octopus, pipi and banded morwong (VFA, 2019b). In 2019 and 2020, permits were issued to existing licence holders and operators to catch limited amounts of finfish for consumption in regional Victoria. These have been

important developments for the sector, but do not replace the volume of seafood lost to bay and inlet closures. There are two key considerations for future development to produce more local Victorian seafood. The first is to ensure permit holders, who have invested in developing new fisheries and markets for these species, have an appropriate consideration and weighting in any future licensing and resource allocation decisions. For example, this appears to have been a key consideration in the banded morwong fishery, with the 2019 Fisheries Regulations proposed to grant transferable access licences to the two permit holders in the fishery ‘to recognise their long-standing commitment to and investment in this fishery’ (VFA, 2019b). Second, it is also important that there are constructive discussions between the industry and decision-makers about developing an ecological sustainable fishery, in which new opportunities consider the economic and business viability, meet demand for local seafood in Victoria and continuity of supply to ensure the supply chain is feasible.

- **Supporting use of underutilised species.** Preferences for different fish species can change substantially through time (see **Section 5.3**). A key opportunity is to improve the marketing, awareness and ultimately the demand for some currently unpopular species caught in fisheries, such as the southeast trawl (van Putten et al., 2019):

We catch a whole bunch of protein and there’s nothing wrong with it and we throw it away because people don’t want it; ocean jackets, ribbon fish. Nothing wrong with it, people just don’t want it. We throw away a lot of Blue grenadier because people don’t want it ... [but it is] a great fish. It’s crazy. That’ll change ... [with] the global food challenge, we can’t afford to keep doing that

– (Fishing industry representative, Lakes Entrance).

- **Exploring by-product regulations** to reduce wastage and support diversity. While fishers acknowledged the importance of the regulations regarding by-product to ensure species are not inappropriately targeted, they also identified a range of areas in which the regulations do not effectively function. This includes the wrasse fishery, for which no by-product is currently permitted, despite fishers using non-species-specific gear such as hook and line, which invariably catches other fish, such as Snapper or Gummy shark. A small amount of permitted by-product was noted to be beneficial in not wasting fish that were already dead or were likely to die on release, as well as supporting a more diverse local fish supply.
- **Increasing aquaculture production.** This is a clear opportunity, provided it can be supported with sustainable feed supplies and is appropriately managed so that it does not damage wild-catch fisheries. Importantly, the potential can be substantial, such as new investment in the main Barramundi farm in Victoria increasing its production from ~200 t to 1000 t in 2018–19.

These are opportunities that can help to increase the quantity and diversity of seafood available in Victoria. Diversity is important in that it can address different consumer preferences and ‘spread the load’ of demand among species:

[They want] Gummy of course, it's a given, but ... there's always the next ones, the supporting fish underneath and we're always struggling [to supply those], so we're getting things from here and there and everywhere. If we could get this stuff [small amounts of bycatch or underutilised species] off these guys [local fishers] it would almost be all I need and we don't have to worry about all of the other crap that comes through from everywhere else

– (Retailer, San Remo).

11.3 Strengthening links with tourism

As canvassed in **Section 6**, tourism operators report that local seafood production is important to their businesses. Industry and regional community members believed that the contribution the professional fishing and aquaculture sectors makes to the tourism sector was important, second only to its own direct economic impacts. As such, further strengthening the links with this sector was a key opportunity.

This can be done, most obviously, through food supply. This includes (as discussed above) strengthening the 'brand' of local produce and making it more accessible in regional areas. In particular, participants highlighted the opportunities around seafood restaurants and appealing to the growing international tourist market:

So, if Apollo Bay has this seaside restaurant, what better thing for the 6.4 m tourists who come through? Not all of them but a nice number of those go and have a nice Australian fresh seafood experience and spend some money, stay a night, and on they go

– (Local government participant, Apollo Bay).

Beyond food supply, the other key opportunity to improve the contribution of the sector to tourism and regional economies is through developing fishing and aquaculture-related experiences. Participants and workshop participants highlighted a range of these experiences that are already available, as well as potential options for the future. Examples of existing experiences include pelican feeding in San Remo, tours of the Mallacoota abalone processing facility and trout fishing throughout the Goulburn Valley region (see **Section 6.2**).

These types of experiences could be implemented elsewhere, with participants suggesting new ways in which tourists could interact with and experience the professional fishing and aquaculture sector, including:

- short trips on professional fishing boats followed by a seafood meal
- aquariums and/or other displays of the variety of catch and unusual species
- tours of working harbours and co-ops
- tours of aquaculture facilities
- a tourist-accessible fish market experience—with recent work valuing the economic contribution of tourism generated by the Sydney Fish Market at \$72.5 m per annum (Deloitte, 2016).

It's that bit of visitor experience ... a bit of a tour, even going out on one of the trawlers get them out there and let them pull in a bucket of rock lobsters or whatever

– (Fishing industry participant, Apollo Bay).

You'll see in lots of plans they talk about agritourism. But here's a whole other tourism experience that needs that focus ... they talk about making farmers visitor-friendly and this is the same ... [It's] self-promotion. From a tourism perspective anyway, it would help towns like this immensely if the commercial fishing industry was behind the tourism promotion too

– (Tourism manager, San Remo).

Part of the ways in which the sector can pursue mutual benefits is forming closer relationships with tour operators, tourism boards and local governments. These stakeholders have the public-oriented skills, insights and networks that the fishing and aquaculture sector may lack or not have time in which to invest. These relationships are being forged in parts of the state (e.g., San Remo), but there is potential for more concerted collaboration across the sector. This is particularly the case at the regional level, at which these partnerships can focus on regionally-relevant strengths and tourism markets.

11.4 Attracting new entrants

Across the Victorian professional fishing industry, in all regions and in all types of fisheries, participants spoke of the concern of an ageing workforce and the difficulty in attracting new entrants, particularly younger people. The barriers to new and young people entering the professional fishing industry are complex. It was identified that young people may not be attracted to the job of fishing unless they are from a fishing family:

We have trouble getting the deckhands—young people—coming into the industry. It's hard, unless they're born into it or have got a special aptitude ... you know?

– (Fishing industry participant, Portland).

It is evident that the nature of the job and the opportunities available in the fishing industry have changed in the last couple of decades, which has made it a less attractive industry to enter. During interviews, several fishers spoke of how they had discouraged their own children from entering the industry:

The industry was in a really bad shape when my son was coming out of school and that, so I just pushed him away basically. I didn't know how long I had to go and all the restructuring and everything that was going on ... So now it's just too late. He's not coming back. He's doing too good over in the west there ... He was in the Navy. He was in submarines and did all his trades in there and got out and he's on a good wicket where he is and no need for him to come back to fishing. I don't blame him. I, none of us would encourage our children ... When you don't see a future for anyone in it, you just sort of, or at least go and get some other skills and then if you want to go fishing, well, you're quite welcome to

– (Fishing industry participant, Portland).

The barriers to new entrants that have emerged over the past 20 years appear to be as a result of contraction and restructuring in the Victorian professional fishing industry. While interviews revealed there may still be opportunities for young people (e.g., as deckhands), the job may not be full-time work nor well-paid, and thus requires a second and flexible job to participate. The pathway to progressing through to owning an independent fishing business is also difficult, detracting from it as a career choice. The cost of entering the industry is now extremely high (e.g., licences and quotas) and the financial risks are high, with a pervasive sense of resource access insecurity currently in the Victorian industry due to government closures and restrictions. This is further compounded by the poor availability of financing to enter the fishing industry.

These barriers to attracting new entrants are not unique to Victoria, but have been identified as a growing problem for the social resilience of fisheries in Europe and North America for several years (e.g., Cramer et al., 2018; Donkersloot & Carothers, 2016; White, 2015). In the South Australian Marine Scalefish fishery, 65 per cent of fishers said in 2005 they would not encourage young people to enter the industry because of a lack of certainty and future security in the fishing industry and the prohibitively high start-up costs (Schirmer & Pickworth, 2005). Profitability was one concern in the South Australian case that is relevant for Victoria, because those who had worked for only one generation in fishing reported significantly lower business activity, including gross sales, than those with intergenerational histories of fishing. It is possible that new entrants had fewer avenues for learning fishing skills and were less productive and efficient.

In summary, while it remains challenging for the industry to address current resource access insecurity, there may be opportunities to address the significant issue of a lack of new entrants into the professional fishing sector. There were some encouraging signs in Victoria of new and younger entrants into the industry, particularly the Western Zone Rock lobster fishery. Opportunities include:

- Developing opportunities for financing young and new entrants. For example, potential discussions with the Commonwealth Government to extend their 'Agristarter' Concessional loans program to the fishing industry. As part of the 2019 Election Commitment, the government will support young farmers with concessional loans to buy their first farm (Australian Liberal Party, n.d; Regional Investment Corporation, n.d).

- Improving earnings of crew and other employees and improving workplace conditions.
- Using learnings from international fisheries programs to look for locally relevant solutions to break down entry barriers. For example, an Alaskan project identified a range of options, including the creation of non-market based access and fishery trusts, which hold and lease access rights to fishers and provide opportunities for new entrants to gain experience and skills without financial risk, the establishment of apprenticeship programs and providing support for regional supply chain infrastructure to provide year-round employment (Cullenburg, 2017).
- Establishing support networks for new and younger entrants to the fishery, to ensure that knowledge and skills are disseminated more effectively through the fishery.

11.5 Increasing the involvement of Aboriginal communities and enterprises in professional fishing and aquaculture

The benefits of professional fishing and aquaculture in Aboriginal communities could be much greater with larger involvement. In 2012–13, the national employment rate within Aboriginal and Torres Strait Islander communities was 47.5 per cent, which was much lower than the overall employment rate for Australians generally of 72.1 per cent. Unemployment rates are significantly higher for men with a Year 10 or below level of education—an education rate attained by nearly half of all Aboriginal men of workforce age (Commonwealth of Australia, 2016).

Aboriginal people have identified that their mental and physical health is connected to the health of the coastal environment, their active involvement in the management of coastal resources and their economies being based in those natural resources (Umwelt Environmental Consultants, 2005). Life expectancy for Aboriginal and Torres Strait Islander Australians remains low at 69.1 years for males and 73.7 years for females, which is a gap of 10.6 years for males and 9.5 years for females between Aboriginal and Torres Strait Islander and non-Indigenous citizens (Commonwealth of Australia, 2016).

The importance of secure, intergenerational work opportunities involving coastal resources in the places where Aboriginal people have traditional ownership (often termed Country) or strong historical ties is hugely important for wellbeing in Aboriginal communities, particularly in regional communities where employment options are more limited.

However, in many southern states such as NSW, Tasmania and Victoria, one of the legacies of colonialism is that some members of the Aboriginal community do not have knowledge and ties to their traditional country or communities. In these cases, work in the seafood industry may provide opportunities to pursue livelihoods that provide substantial wellbeing benefits, and where possible, supporting these people to re-connect with Country will be beneficial.

The Victorian Government has in principle accepted Aboriginal fishing rights and has an Aboriginal Fishing Strategy (VFA, 2019c), which includes: recognition of Aboriginal customary fishing rights for Recognised Traditional Owner Groups; better economic opportunities for all Aboriginal people in fishing and related industries; and sustainable fisheries management in collaboration with Traditional Owner Groups. However, the only substantial Aboriginal involvement we found in professional fishing or aquaculture in this study was that of the eel fishery/aquaculture in Western Victoria.

There are currently few Aboriginal people working commercially in seafood production in Victoria—a small number of participants either indicated they had links to Aboriginal heritage or had known of Aboriginal operators in the past. In terms of future opportunities, there appears to be an interest and desire to see more opportunities for Aboriginal people within the sector—whether that is through owning fishing or aquaculture businesses or being employed in fishing, aquaculture, processing or retail operations.

Even if there was only a 100 kilos of gummy that we can go and catch, at least I'm working ... Even if it goes through the quota system, that makes no difference, as long as you've got the opportunity to be there

– (Fisher with Aboriginal heritage, Lakes Entrance).

A representative of an Aboriginal organisation in the Lakes Entrance area noted that this would also be an opportunity for people to work outdoors but cautioned that there would need to be appropriate cultural awareness training within workplaces:

Obviously, fishing's a primary activity for a lot of Aboriginal people. It's a food source but it's also part of that recreation as well. Being out in your natural environment's it's a part of that healthy type of living and lifestyle ... It's that continuation of those cultural practices

– (Community participant, Lakes Entrance).

People have to feel safe. I wouldn't want to put a young Aboriginal person on a situation where they're isolated physically for say two days—they are offshore, if they don't feel safe. We need the industry to submit to some cultural awareness training

– (Community participant, Lakes Entrance).

As part of this, they highlighted that there might be opportunities for partnerships and co-investment between local Aboriginal groups and the professional fishing or aquaculture sectors, like the Kuti Co venture in South Australia. One study explored partnership options between existing seafood companies and Aboriginal communities for cultural fishing in Tasmania (Lee, 2019). Such partnerships could serve to enhance tourist offerings or attractions or support the employment of Aboriginal people. For example, talking about the Lakes Entrance Fisherman's co-op:

It's good, it's clean and it's a good place to go down and you like to buy fish when it looks like that. It would be good to see some black faces behind the counter there filleting fish or selling. If you were going down there and you expected to see someone from the Aboriginal community more [Aboriginal] people would go down there I reckon ... If the fishing industry wanted to partner ... for example we can put some resources and people. If it meant there was a live tank ... I don't know, we might own the tanks or something and we sell them together and people come and choose fish. We would actively negotiate on that sort of space for a meaningful thing for Aboriginal people. We're not afraid to invest in stuff

– (Community participant, Lakes Entrance).

One study found that for Aboriginal and Torres Strait Islander people, aquaculture has the potential to increase employment, economic independence of communities, arrest population drift, improve self-sufficiency in food and food security, and supplement food and income from capture fisheries (Lee & Net, 2001). In 1993, the National Coastal Zone Inquiry included an Indigenous Coastal Reference Group, which identified the need for Aboriginal and Torres Strait Islander involvement in all kinds of fisheries and aquaculture (Smyth, 1993). Following this, Commonwealth funding was made available to develop Indigenous fisheries strategies, including aquaculture, at the state and territory level. Opportunities arose during the late 1990s and early 2000s for Aboriginal and Torres Strait Islander people nationwide to start their own aquaculture businesses through national and state coastal zone resource management policies. There was some Commonwealth support for initiatives around the country from the Indigenous Aquaculture Unit in Canberra, as part of the National Aquaculture Strategy (DAFF, 2002; Faulkner, n.d.; Fisheries and Aquaculture Department FAO, 2016; Lee & Net, 2001).

However, few Aboriginal or Islander-owned aquaculture operations emerged from these efforts. Barriers identified to achieving sustainable businesses included:

- Lack of financial capital.
- Lack of human capital in terms of education and relevant experience for aquaculture business development and management.
- The projects that attempted to establish aquaculture businesses with Aboriginal people were externally driven.
- The issues affecting the success of Aboriginal aquaculture enterprises are complex, so they require a whole-of-government approach.
- Conflict within and between Aboriginal groups.
- Effective consultation requires talking extensively with communities to understand their interests and to build relationships.
- Community-based projects have often not been financially viable (Lee & Net, 2001).

A recent report on capabilities and performance in Australian Aboriginal and Torres Strait Islander involvement in cultural fishing, commercial wild-catch fishing, aquaculture and fishery tourism, found six attributes that worked, and six attributes that did not work to facilitate capabilities and performance (Colquhoun, 2018). The attributes that worked included:

1. formal community kinship and cultural governance
2. corporate governance in balance and aligned with cultural governance
3. access to multiple sources of learning across Aboriginal and Torres Strait Islander and non-Indigenous knowledge types
4. microbusinesses as a good source of learning regarding commercial viability and community governance mechanisms
5. business cases and business plans used for the first 3–5 years
6. a formally declared and endorsed management team being responsible for making sure business plans were implemented and reporting progress to stakeholders.

Attributes that caused problems for some ventures included:

1. socially focused models for cultural governance not in balance with commercial objectives
2. representational rights to veto initiatives under community governance
3. balancing clan representation rights in decision-making over ventures when some clans have no fresh or saltwater rights
4. incompatibilities between business and community objectives impeding economic returns
5. over-stretched community leaders
6. a community choice to use the welfare system to fund community needs instead of fisheries/aquaculture activities.

Aboriginal groups in Victoria also assert their rights under Native Title and other legal instruments to gain greater control over resources that could be used for professional fishing and aquaculture. For example, the Eastern Maar traditional owner group lodged a native title claim in 2012 and was given permission in November 2017 to negotiate a recognition and settlement agreement covering land from east of Lorne to west of Port Fairy and to north of Stawell (Victoria State Government, 2019). The agreement could include the rights to resources like eel, abalone and crayfish (Thomson, 2019). It is possible that non-Aboriginal fishers may feel threatened by the potential of Aboriginal groups to claim rights over fisheries resources. It is likely to be detrimental for all concerned if the process becomes adversarial. Dialogue about hopes, expectations, opportunities and collaborations could alleviate potential conflict. Wellbeing benefits can be promoted and protected through professional fishers and aquaculturists by building relationships and connections to other groups within communities, in this case Aboriginal groups.

12 Recommendations

The principal recommendation (Recommendation 1) for this project is that greater consideration of community wellbeing should be made in government reporting and socio-economic impact assessment processes regarding professional fisheries and aquaculture. Subsequent recommendations are grouped under thematic areas (see Table 29).

Table 29. Project recommendations

	Recommendation	Responsibility
1	<p>Integrate social and economic indicators from the wellbeing framework into government monitoring, reporting, evaluation and policy development processes:</p> <p>(a) Formalise monitoring of industry contributions to community wellbeing in regulatory and socio-economic impact assessment processes.</p> <p>(b) Improve the quality of data for indicators. For example, improve GVP data by re-establishing provision of price data from the MSC and producers to VFA.</p>	Victorian Government, seafood industry
Further research		
2	Conduct value chain, marketing and logistics research to better understand the economic contributions made by Victorian seafood production in the food industry through to the point of consumption and the possibilities for increasing these contributions. This should investigate the possibilities for value adding, for better supply of local seafood in regional areas, especially to support tourism and hospitality sectors, and the challenges to achieving better supply.	FRDC/ABARES, Seafood and food industry
3	Conduct social and economic impact assessments of planned fishery closures, evaluating whether restrictions will significantly negatively impact fishers and their communities' wellbeing and on Victorian consumers' access to fresh local seafood.	Victorian Government
4	Conduct retrospective social and economic impact assessment case studies of past fishery closures, evaluating whether restrictions have significantly negatively impacted fishers and their communities' wellbeing, and on Victorian consumers' access to fresh local seafood.	Victorian Government
Strategy development		
5	<p>Develop programs for social capital to build industry resilience and cohesion:</p> <p>1) within the seafood industry</p> <p>2) between seafood producers and other sectors and community groups in their regions (e.g., environmental groups and recreational fishing clubs)</p> <p>3) between seafood producers and government agencies (for regional development and tourism as well as fisheries management).</p> <p>These could build on existing activities that facilitate relationship building. Examples for connections between industry and other groups in their regions include: seafood festivals; industry association meetings; habitat protection/restoration activities; water quality improvement initiatives; and efforts to remove impediments to fish passage. Where relations between fishers and VFA are constructive and collaborative, examples could be drawn on to improve government relations in other fisheries where relations are less collaborative.</p>	SIV, other seafood industry bodies and individuals, FRDC, recreational fishing groups

	Recommendation	Responsibility
6	Explore ideas, experiment and develop programs to overcome the challenges to increasing the supply of fresh local seafood across Victoria, without increasing the risk of overfishing. One strategy is to educate chefs on the efficient and effective use of seasonally available seafood species, and to educate wholesalers to better cater for chefs wanting to use local seafood. Another strategy is encouraging greater use of underutilised species, which involves educating chefs and wholesalers on how to best cook and market these species. It also involves removing regulatory disincentives to investment in new fisheries.	SIV, other seafood industry organisations, regional development bodies, tourism organisations, hospitality organisations, VFA
7	Foster relations with tourism organisations to jointly pursue mutual interests around fresh local seafood, cultivating the tourism industry as an ally for the seafood industry, both locally and at the state scale. This could include jointly developing new tourism offerings for aquatic experiences, such as professional fishing and aquaculture tours, building on existing examples and promoting new joint business models.	SIV, other seafood industry organisations, tour operators, tourism boards, local government
8	Develop opportunities for new entrants to enter the industry, and to learn from established operators who may soon retire. These opportunities should aim at industry renewal by upskilling and succession planning.. Possible examples include trainee licences, loans schemes or discounted licensing period to encourage new entrants to take up licences as they become available, and ongoing training and mentoring of new entrants, including opportunities for informal learning with established fishers/aquaculturists.	VFA, SIV
9	Increase Aboriginal participation in professional fishing and aquaculture through development of a strategic policy to promote positive change for Aboriginal communities. For example, consider the role that working on Country and communal sharing of food from Country plays in cultural, social and economic activities of those communities.	Victorian Government, Aboriginal community representatives, seafood industry
Communication		
10	Develop a communication and engagement plan to address concerns around social licence, including targeted information to recreational fishers highlighting areas of mutual interest with professional fishing. This could include the availability of fresh local seafood and bait to buy, environmental knowledge and assistance when having boating trouble. In addition, develop general information about inshore fishing methods, statistics on environmental performance (including levels of bycatch), the value of the industry to local communities and the stories of local fishing/aquaculture for regional residents, especially those residing in areas where there are significant seafood production industries.	SIV, VFA, Aquaculture sector
11	Develop and promote materials from trusted, independent bodies that clearly explain the environmental sustainability credentials of Victorian professional fisheries and aquaculture, including the scale of the threats they pose in context with other environmental threats.	SIV, VFA, FRDC
12	Develop local branding strategies and traceability protocols and procedures to improve consumer awareness of seafood and aquaculture provenance, especially in wholesale, supermarket and hospitality (restaurant/takeaway) sectors.	Post-harvest sector, SIV, aquaculture business groups, VFA, individual producers
13	Pursue country of origin labelling regulations and mandatory use of standardised fish names to improve consumer knowledge of where their seafood comes from and reduce the likelihood of product substitution.	SIV, post-harvest sector, Victorian Government
14	Develop a promotional campaign for Victorian seafood targeted at residents and visitors, including from non-English-speaking backgrounds, promoting culturally important or popular species such as whiting, flathead, calamari, gummy shark.	SIV, post-harvest sector
Support services		
15	Deliver targeted counselling and mental and physical health support services, tailored to the needs of the professional fishing community (e.g., King et al., 2019) to address the impacts of industry marginalisation and regulatory uncertainty.	Victorian Government, SIV

13 Extension and adoption

On submission of this project proposal, the FRDC Victorian Research Advisory Committee asked the project team to collaboratively approach extension of this research with industry and determine the adoption strategy once the findings were clear.

As such, the final extension and adoption plan was determined after the project team conducted several meetings with the project Steering Committee to discuss extension options, face-to-face and telephone meetings with specific stakeholder groups to refine options, and considered community and industry ideas generated through the results feedback workshops with project participants.

There are three main audiences for the project. The first is seafood producers and their representative organisations. They need to know the information exists, to access it and take ownership of it, for use in promotion and negotiation with government and other industry bodies and stakeholders (e.g., tourism and hospitality sectors), as well as for communication within their communities, regions and with the general public. The second audience is government agencies, particularly state and local, who affect the operations of professional fishing and aquaculture, and whose relationship with the industry is critical for building future opportunities. The third audience is the general public, whose perceptions about the social responsibility of the seafood industry is important. Building societal support within Victoria for the seafood industry was one of the principle drivers of this project for wild-catch fisheries and aquaculture.

13.1 Project outputs

13.1.1 Project report

The first project output is this report, which has been written in plain language to be accessible for producers, the public and government audiences. The report will be circulated to the Victorian seafood industry via SIV networks, the VFA and to project participants. The report will be produced as a PDF and made available on the SIV and UTS websites.

13.1.2 Factsheets and infographics

The second project output is a series of factsheets and infographics. Given the extensive nature of the project, the volume of collected data and the number of findings, the project findings were summarised into more easily digestible factsheets, which are at a scale relevant to industry sectors. Upon advice, the factsheets (see **Section 14**) are separated into professional fisheries and aquaculture. The professional fisheries factsheets are focused on regional level findings, so we have produced four factsheets, one for each coastal region excluding Melbourne (Far West, Near West, Near East and Far East). The aquaculture industry felt that separating factsheets into species farmed was more appropriate, so factsheets have been written for abalone, trout, eels, mussels and Barramundi. A factsheet has also been produced for the overall project.

These ten factsheets are quite dense (e.g., up to eight pages) in terms of information and were considered to be useful for industry members and potentially government to provide a clear but detailed understanding of the contributions of the industry.

Given the amount of information on the factsheets, the industry stakeholders felt that in addition, short summaries with infographics of key findings would be useful, so these were developed and designed (see **Section 14**). These infographics were considered to be useful for industry to hand out during their communications and negotiations with government and stakeholders, and potentially at public events.

The factsheets and infographics have been developed in collaboration with industry stakeholders.

These factsheets and infographics will be sent to industry stakeholders, project participants, Victorian State Government MPs, local government councillors, regional economic development officers, tourism promotion officers and other stakeholder organisations.

13.1.3 Regional champions—professional fisheries

During the extension discussions with the professional fishing industry (i.e., Steering Group, industry sectors and project participants), a clear concern was that the findings from this project would not be effectively communicated in the regions once the project concluded. It was deemed important that the industry took ownership of their contributions and of the extension materials. Therefore, it was decided that it would be important to identify regional champions and work with them to understand how the findings could be useful and what materials would be important for them. For example, one fishing town is interested to pursue greater collaboration with the tourism industry and encourage greater support from local council. The project team has identified champions from each region and is consulting with them regarding their needs. Where deemed necessary, members of the project team will visit the regional champions to present the factsheets and infographics, prepare short presentation and discuss plans for how they might want to use the findings for their purposes.

13.1.4 Draft report card templates for monitoring contributions—aquaculture

The aquaculture industry was interested to take this research and turn it into something useful to track their contributions, and where appropriate report their contributions to improve their level of societal support. While outside the scope of this project to collect further data or provide ongoing support, the industry wanted to take ownership of the approach used in the project. The abalone farms were particularly interested in this approach, and therefore in collaboration with the VFA and the abalone farms, we have worked to draft a contributions report card template. This is focused on collecting quantitative data for indicators under each contribution domain. The plan is for the abalone farming industry to work collectively and upload these data to a trusted source that industry would organise and produce a report card on a regular basis. Some of the data may be kept for internal purposes and some reported to the public. This report card approach will be presented to the wider Victorian aquaculture industry in 2020.

13.1.5 Video material

Video material that highlights the contributions of the Victorian seafood industry will be made during 2020, focused on one of the key findings of the project that the Steering Committee felt was important to highlight to the public. The audience will be the general Victorian public, especially those who have little knowledge of the Victorian seafood industry. The purpose of the video material will be to provide better public understanding of the Victorian seafood industry (See Section 14).

13.1.6 Media releases

After FRDC peer review and outputs are completed and ready to share, the UTS MCU will work with the project team to release key project findings to regional and national/capital city radio and print media outlets. Several regional contacts have been made throughout the project and will be used. It was felt by participants of the project that it is particularly important to reach the regional fishing and aquaculture communities.

13.1.7 Webpages

A UTS webpage will be created with an overview of project and links to all outputs (uts.edu.au/about/faculty-arts-and-social-sciences/research/fass-research-projects/victorias-fisheries-and-aquaculture). The project team will also provide the text and images for the SIV webpage (siv.com.au).

The link to the UTS webpage will be sent to industry stakeholders, project participants, Victorian state government MPs, local government councillors, regional economic development officers, tourism promotion officers and other stakeholder organisations.

13.1.8 Articles

Pieces will be written for SIV PROFISH, FRDC Fish Magazine on the project results as requested.

Journal publications will be submitted within one year of project completion.

13.1.9 Conferences and meeting presentations

Conference papers have been or will be delivered at:

- Seafood Directions 2019.
- World Fisheries Congress 2020.
- Victorian Aquaculture Forum 2017, 2020.
- International Institute for Fisheries Economics and Trade (IIFET) 2022.

13.2 Project coverage

At the time of writing, there have been no publications arising from the findings of the project. These are planned for when the report is ready to be released (see **Section 13.1.6**).

14 Project materials developed

The project materials developed:

- Project report
- Professional fisheries and aquaculture factsheets
- Professional fisheries summaries with infographics
- Video material

These materials are available from the UTS website and FRDC website:

uts.edu.au/about/faculty-arts-and-social-sciences/research/fass-research-projects/victorias-fisheries-and-aquaculture

frdc.com.au/project/2017-092

References

- Australian Bureau of Agricultural and Resource Economics and Science (2017). 2017: *Financial and economic performance of the Southern and Eastern Scalefish and Shark Fishery*. Retrieved from data.daff.gov.au/data/warehouse/9aam/9aame/2018/FinEconPerfSESSF/FinEconPerfSESSF20180410_v1.0.0.pdf
- Australian Bureau of Agricultural and Resource Economics and Science (2018). *Australian fisheries and aquaculture statistics 2017*. Retrieved from agriculture.gov.au/sites/default/files/sitecollectiondocuments/abares/publications/AustFishAquacStats_2017_v1.2.0.pdf
- Australian Bureau of Agricultural and Resource Economics and Science (2019). *Fishery status reports 2019*. Retrieved from agriculture.gov.au/sites/default/files/documents/00_fishstatus2019_6.0.0_lr.pdf
- Australian Bureau of Statistics (2018a). *5220.0—Australian national accounts: State accounts, 2017–18*. Retrieved from abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/5220.02017-18?OpenDocument
- Australian Bureau of Statistics (2018b). *3101.0—Australian demographic statistics*. Retrieved from abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3101.0Jun%202018?OpenDocument
- Australian Bureau of Statistics (2019). *81550D0003_201718 Australian industry, 2017–18*. Retrieved from abs.gov.au/ausstats/abs@.nsf/mf/8155.0
- Australian Fisheries Management Authority. (n.d.). *Fisheries*. Retrieved from afma.gov.au/fisheries
- Alexander, K. A. & Abernethy, K. E. (2019). *Determinants of socially-supported wild-catch fisheries and aquaculture in Australia*. Canberra: Fisheries Research and Development Corporation (2017-158). Retrieved from frdc.com.au/Archived-Reports/FRDC%20Projects/2017-158-DLD-final.pdf
- Australian Institute of Health And Welfare (2015). *Aboriginal and Torres Strait Islander health performance framework 2014 report: NSW*. Canberra, Australia.
- Australian Government (2017). *Australian Government federal register biosecurity (suspended goods—uncooked prawns) determination 2017*. Retrieved from legislation.gov.au/Details/F2017C00384/Controls/
- Australian Liberal Party (2016). *Our plan for a stronger agriculture fisheries and forestry sector*. Retrieved from liberal.org.au/our-plan-stronger-agriculture-fisheries-and-forestry-sector
- Barclay, K., McIlgorm, A., Mazur, N., Voyer, M., Schnierer, S. & Payne, A. M. (2016). *Social and economic evaluation of NSW coastal aquaculture*. Sydney: Fisheries Research and Development Corporation (FRDC 2015/302) and University of Technology Sydney.
- Bennett, B. (2002) *The fish markets of Melbourne*. Hawthorn, Australia.
- Breslow, S. J., Sojka, B., Barnea, R., Basurto, X., Carothers, C., Charnley, S. & Levin, P. S. (2016). Conceptualizing and operationalizing human wellbeing for ecosystem assessment and management. *Environmental Science and Policy*, 66, 250–259.
- Britton, E. & Coulthard, S. (2013). Assessing the social wellbeing of Northern Ireland's fishing society using a three-dimensional approach. *Marine Policy*, 37(0), 28–36.
- Chaigneau, T., Brown, K., Coulthard, S., Daw, T. M. & Szaboova, L. (2019). Money, use and experience: Identifying the mechanisms through which ecosystem services contribute to wellbeing in coastal Kenya and Mozambique. *Ecosystem Services*, 38, 100957.
- Chaigneau, T., Coulthard, S., Brown, K., Daw, T. M. & Schulte-Herbrüggen, B. (2019). Incorporating basic needs to reconcile poverty and ecosystem services. *Conservation Biology*, 33(3), 655–664.
- Colquhoun, E. (2018). *Building the capacity and performance of Indigenous fisheries*. Canberra: Fisheries Research and Development Corporation (FRDC 2013/218).
- Commonwealth of Australia. (2014a). *A clearer message for consumers. Report on the inquiry into country of origin labelling for food*. Canberra, Australia: The Parliament of the Commonwealth of Australia.
- Commonwealth of Australia. (2014b). *Current requirements for labelling of seafood and seafood products*. Canberra, Australia: Department of the Senate.
- Commonwealth of Australia. (2016). *Closing the Gap Prime Minister's report 2016*. Canberra, Australia: Department of the Prime Minister and Cabinet.

- Coulthard, S. (2012). What does the debate around social wellbeing have to offer sustainable fisheries? *Current Opinion in Environmental Sustainability*, 4(3), 358–363.
- Coulthard, S., Johnson, D. & McGregor, J. A. (2011). Poverty, sustainability and human wellbeing: A social wellbeing approach to the global fisheries crisis. *Global Environmental Change*, 21, 453–463.
- Cramer, L.A., Flathers, C., Caracciolo, D., Russell, S.M. & Conway, F. (2018). Graying of the fleet: Perceived impacts on coastal resilience and local policy. *Marine Policy*, 96, 27–35.
- Cross Border Management. (2016). *Golden dragons: The spending habits of Chinese tourists in Australia*. Retrieved from crossbordermanagement.com/deep-thoughts/2016/2/14/golden-dragons-the-spending-habits-of-chinese-tourists-in-australia-1
- Cullenberg, C, Donkersloot, R., Carothers, C., Coleman, J. & Ringer, D. (2017). *Turning the Tide: A review of programs and policies to address access challenges in Alaska fisheries*. Retrieved from fishermen.alaska.edu/turning-the-tide
- DEDJTR. (2016). *Victorian aquaculture strategy 2016–2021* (Draft). Melbourne: Department of Economic Development, Job, Transport and Resources (DEDJTR), Victorian Government.
- Deloitte Access Economics. (2016). *A redeveloped Sydney Fish Market: enhancing its wider economic and social impacts*. Retrieved from sydneyfishmarket.com.au/Portals/0/adam/Content/qRgV19k0PUqBaxqyS9ExLg/ButtonLink/Deloitte%20Report%202.pdf
- Department of Agriculture, Fisheries and Forestry (2002). *Aquaculture action agenda taskforce 2002. Aquaculture Industry Action Agenda: National Aquaculture Development Committee's Report to Government and Industry*. Canberra, Australia.
- Department of Primary Industries. (2015). *Fisheries Victoria commercial fish production information bulletin 2015*. Fisheries Victoria, Queenscliff, Victoria, Australia.
- Donkersloot, R., and Courtney C. (2016). The graying of the Alaskan fishing fleet. *Environment: Science and Policy for Sustainable Development*, 58(3), 30–42. doi:10.1080/00139157.2016.1162011
- Dopico, D. (2002). An analysis of brand equity supplied by appellations of origin: An empirical application for beef. *Journal of International Food & Agribusiness Marketing*. 14(3), 21–34. doi:10.1300/J047v14n03_03
- Econsearch. (2010). *Economic analysis of the Victorian Rock lobster fishery 2008/09*. Department of Primary Industries Victoria. 7 December 2010.
- Econsearch. (2011a). *Economic analysis of the Victorian Scallop fishery 2008/09*. Department of Primary Industries Victoria. 24 January 2011.
- Econsearch. (2011b). *Economic analysis of the Victorian Bays and Inlet Fisheries 2008/09*. Department of Primary Industries Victoria. 14 February 2011.
- Econsearch. (2011c). *Sensitivity analysis of Victorian fisheries and aquaculture sectors*. Department of Primary Industries Victoria. 14 February 2011.
- Econsearch. (2011d). *Economic analysis of the Victorian abalone fishery 2008/09*. Department of Primary Industries Victoria. 23 June 2011.
- Econsearch. (2014). *Economic indicators for the professional fisheries of South Australia: Summary report 2012/13*. PIRSA Fisheries and Aquaculture.
- Econsearch. (2018). *Economic indicators for the professional Fisheries of South Australia: Summary Report 2017–18*. PIRSA Fisheries and Aquaculture.
- Econsearch & Roberts Evaluation. (2014). *Economic value of commercial fishing operating out of Lakes Entrance (Port of Gippsland Lakes)*. Gippsland Ports Authority. 4 February 2014.
- Faulkner, A. (n.d.). *Submission to the National Aquaculture Development Strategy for Indigenous Communities in Australia*. Indigenous Environmental Research Centre, Southern Cross University.
- Fisheries and Aquaculture Department FAO. (2016). *National aquaculture sector overview: Australia*. Food and Agriculture Organization of the United Nations. Retrieved from fao.org/fishery/countrysector/naso_australia/en

Fisheries Research & Development Corporation. (2019). *Seafood import and export by volume*. Canberra, Australia. Retrieved from frdc.com.au/sitecore/content/frdc/services/seafood-trade-data/seafood-import-and-export-by-volume

Ford, J. (2013). *Using local knowledge to understand linkages between ecosystem processes, seagrass change and fisheries productivity to improve ecosystem-based management*. Canberra, Australia: Fisheries Research and Development Corporation (FRDC).

Ford, J. & Gilmour, P. (2013). *The state of recreational fishing in Victoria: A review of ecological sustainability and management options*. Victorian National Parks Association, Melbourne.

Frankel, D. & Major, J. (2017). *Victorian Aboriginal life and customs: Through early European eyes*. Melbourne: La Trobe University. Retrieved from library.latrobe.edu.au/ebureau/pdf/Victorian-Aboriginal-Life-and-Customs.pdf

Garnham, N. (1997). Amartya Sen's 'Capabilities' Approach to the Evaluation of Welfare: Its Application to Communications. *Javnost—The Public*, 4(4), 25–34. doi:10.1080/13183222.1997.11008658

Gretton, P. (2013). *On input–output tables: Uses and abuses*, Canberra, Australia: Productivity Commission.

Henry, G. & Lyle, J. (2003). *The national recreational and indigenous fishing survey*. Canberra, Australia: Australian Government Department of Agriculture, Fisheries.

Hicks, C. C. Levine, A. Agrawal, A. Basurto, X. Breslow, S. J. Carothers, C. Charnley, S. Coulthard, S. Dolsak, N. Donatuto, J. Garcia-Quijano, C. Mascia, M. B. Norman, K. Poe, M. R. Satterfield, T. Martin, St, K. & Levin, S. P. (2016). Engage key social concepts for sustainability. *Science*, 352(6281), 38–40. doi:10.1126/science.aad4977

Himes-Cornell, A. Hoelting, K. Maguire, C. Munger-Little, L. Lee, J. Fisk, J. Felthoven, R. Geller, C. & Little, P. (2013). *Community profiles of North Pacific Fisheries—Alaska*. Seattle, United States of America: US Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Jones, D. (2011). The water harvesting landscape of Budj Bim and Lake Condah: Whither world heritage recognition. In Proceedings of the 2011 International Conference of the Association of Architecture Schools of Australasia, 131–142.

Jordan, J. W. (2012). The engineering of Budj Bim and the evolution of a societal structure in Aboriginal Australia. *Australian Journal of Multi-Disciplinary Engineering*, 9(1), 63–68.

Kasperski, S. & Himes-Cornell, A. (2014). *Indicators of fishing engagement and reliance of Alaskan fishing communities*. Retrieved from afsc.noaa.gov/Quarterly/jfm2014/JFM14_Feature.pdf

King, T., Abernethy, K., Brumby, S., Hatherell, T., Kilpatrick, S., Munksgaard, K. & Turner, R. (2018). *Sustainable fishing families: Developing industry human capital through health, wellbeing, safety and resilience*. Retrieved from frdc.com.au/Archived-Reports/FRDC%20Projects/2016-400-DLD.pdf

King, T. J. and O'Meara, D. (2018). 'The people have spoken': How cultural narratives politically trumped the best available science (BAS) in managing the Port Phillip Bay fishery in Australia. *Maritime Studies*, 18(1), 17–29.

Kingsley, J., Townsend, M., Henderson-Wilson, C. & Bolam, B. (2013). Developing an exploratory framework linking Australian Aboriginal peoples' connection to country and concepts of wellbeing. *International Journal of Environmental Research and Public Health*, 10, 678.

Knuckey, I., Morison, A. & Ryan, D. (2002). *The effects of haul seining in Victoria bays and inlets*. Retrieved from siv.com.au/uploads/9/8/7/7/98771034/knuckey_et_al__2002__survivability_of_haul_seine_fish_victoria.pdf

Knuckey, I., Brooks, K., Koopman, M. & Jenkins, G. (2017). *The social drivers and implications of an ecological risk assessment of both recreational and commercial fishing—a case study from Port Phillip Bay*. Canberra: Fisheries Research and Development Corporation (2014–207).

Landos, M. & Future Fisheries Veterinary Services Pty Ltd. (2017). *Assessing compliance and efficacy of import conditions for uncooked prawn in relation to White Spot Syndrome Virus (WSSV) through testing retail commodities and comparison of stringency of import measures with other imported commodities into Australia*. Retrieved from frdc.com.au/Archived-Reports/FRDC%20Projects/2016-066-DLD.pdf

Lawley, M. (2015). *A final seafood omnibus: evaluating changes in consumer attitudes and behaviours*. Retrieved from frdc.com.au/Archived-Reports/FRDC%20Projects/2015-702-DLD.pdf

- Lee, C. L. & Net, S. (2001). *A national aquaculture development strategy for Indigenous communities in Australia*. Canberra, Australia: Department of Agriculture Fisheries and Forestry Australia, Fisheries Western Australia.
- Lee, E. (2019). *'Wave to plate': Establishing a market for cultural fisheries in Tasmania*. Canberra: Fisheries Research and Development Corporation (FRDC 2016/204).
- Lim, Vivien K. G. (1996). *Job insecurity and its outcomes: Moderating effects of work-based and nonwork-based social support*. *Human Relations*, 49(2), 171–194.
- Mazur, N. A. & Brooks, K. A. (2018). *The right conversations: Building industry engagement capacity for socially-supported*. Canberra, Australia: Fisheries Research & Development Corporation.
- McGregor, A. Coulthard, S. & Camfield, L. (2015). *Measuring what matters: The role of well-being methods in development policy and practice*. Retrieved from odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9688.pdf
- McManus, A. Howieson, J. & Nicholson, J. (2009). *Review of literature and resources relating to the health benefit of regular consumption of seafood as part of a health diet*. Retrieved from cessh.curtin.edu.au/local/docs/literature%20review.pdf
- McNiven, I. J. & Bell, D. (2010). Fishers and farmers: historicising the Gunditjmara freshwater fishery, Western Victoria. *The La Trobe Journal*, 85, 83–91.
- Mobsby, D. & Koduah, A. (2017). *Australian fisheries and aquaculture statistics 2016*. Canberra, Australia: Australian Bureau of Agriculture and Resource Economics and Sciences
- McMichael, A. Scholes, R. Hefny, M. Pereira, E. Palm, C. & Foale, S. (2005). Linking ecosystem services and human well-being. In D. Capistrano, K. C. Samper, M. J. Lee & C. Raudsepp-Hearne (Eds.), *Ecosystems and human well-being: Multi-scale Assessments. Millennium Ecosystem Assessment Series*, 4. I (pp. 43–60). Washington DC: Island Press.
- Mobsby, D (2018), *Australian fisheries and aquaculture statistics 2017*. Canberra, Australia: Australian Bureau of Agricultural and Resource Economics and Sciences
- Murphy, S. (2016). *Recreational fishing sector pushes for ban on commercial net fishing near major centres*. Retrieved from abc.net.au/news/2016-11-18/recreational-fishing-sector-pushes-net-fishing-ban-major-centres/8033432
- National Oceans Office. (2002). *Sea country: An Indigenous perspective. The South-East regional marine plan. Assessment reports*. Hobart: National Oceans Office. Retrieved from environment.gov.au/system/files/resources/271c0bfc-34a2-4c6c-9b02-01204ebc0f43/files/indigenous.pdf
- New Zealand Quality of Life Project. (2007). *Quality of life 07 in twelve of New Zealand's cities*. Retrieved from qualityoflifeproject.govt.nz/pdfs/2007/Quality_of_Life_2007.pdf
- Nussbaum, M. C., Sen, A. & World Institute for Development Economics Research. (1993). *The quality of life*. Retrieved from econpapers.repec.org/bookchap/oxpobooks/9780198287971.htm
- OECD. (2013). *How's life? 2013: Measuring well-being*. Retrieved from dx.doi.org/10.1787/9789264201392-en
- Ogier, E. (2019). *National fisheries and aquaculture industry social and economic contributions study. Phase 1 (FRDC 2017-210)*. Canberra, Australia: Fisheries Research & Development Corporation.
- Ogier, E. & Brooks, K. (2016). *License to engage: Gaining and retaining your social license in the seafood industry. A handbook of available knowledge and tools for effective seafood industry engagement with communities*. Hobart, Tasmania: Fisheries Research and Development Corporation, Institute for Marine & Antarctic Studies and KalAnalysis.
- Parker, R. Blanchard, J. Gardner, C. Green, B. Hartmann, K. Tyedmers, P. & Watson, R. (2018). Fuel use and greenhouse gas emissions of world fisheries. *Nature Climate Change*, 8, 333–337.
- Partridge, E., Chong, J., Herriman, J., Daly, J. & Lederwasch, A. (2011). *City of Sydney indicator framework*. (Institute for Sustainable Futures, Ed.). University of Technology, Sydney: City of Sydney.
- Pascoe, B. (2014). *Dark emu black seeds: Agriculture or accident?* Broome, Australia: Magabala Books.
- Phillips, G. Kriwoken, L. & Hay, P. (2002). Private property and public interest in fisheries management: The Tasmanian rock lobster fishery. *Marine Policy*, 26, 459–469.
- Pierce, J. & Robinson, G. (2013). Oysters thrive in the right environment: The social sustainability of oyster farming in the Eyre Peninsula, South Australia. *Marine Policy*, 37, 77–85.

- Primesafe. (2018). *Annual report 2017–18*. Retrieved from primesafe.vic.gov.au/uploads/Annual%20Reports/PrimeSafe%20Annual%20Report%202017_18.pdf
- Prince, J. (2007). *A review of the outbreak of a herpes-like virus in the abalone stocks of Western Zone Victoria and the lessons to be learnt*. South Fremantle, Australia; Biospherics Pty Ltd.
- Prince, J., Peeters, H., Gorfine, H. & Day, R. (2008) The novel use of harvest policies and rapid visual assessment to manage spatially complex abalone resources (Genus *Haliotis*). *Fisheries Research*, 94, 330–338.
- Pulford, J. (2019). *Media release: Hook, line and sinker on fishing in the bay*. Retrieved from jaalapulford.com.au/media-releases/hook-line-and-sinker-on-fishing-in-the-bay/
- Regional Investment Corporation. (n.d.). *Loans for farmers*. Retrieved from ric.gov.au/farmers
- Ruello & Associates. (2004). *The retail sale and consumption of seafood in Melbourne*. Canberra, Australia: Fisheries Research and Development Corporation.
- Ruello & Associates. (2011). *A study of the value, composition and utilisation of imported seafood in Australia*. Canberra, Australia: Fisheries Research and Development Corporation.
- Status of Australian Fish Stock Reports. (2018). *Victorian species*. Fisheries Research and Development Corporation. Retrieved from fish.gov.au/jurisdiction/victoria
- Schirmer, J & Pickworth, J. (2005). *Social impacts of the South Australian marine scalefish fishery*. Canberra, Australia: Bureau of Rural Sciences.
- Sen, A. Muellbauer, J. & Hawthorn, G. (1987). *The standard of living*. Cambridge: Cambridge University Press.
- Skirtun, M & Green, R. (2015). *Australian fisheries economic indicators report 2014: Financial and economic performance of the Southern and Eastern Scalefish and shark fishery*. Canberra, Australia: Australian Bureau of Agricultural and Resource Economics and Sciences.
- Smith, C. L. & Clay, P. M. (2010). Measuring Subjective and Objective Well-being: Analyses from Five Marine Commercial Fisheries. *Human Organization*, 69(2), 158–168.
- Smyth, D. C. (1993). *A voice in all places: Aboriginal and Torres Strait Islander interests in Australia's coastal zone—consultancy report*. Canberra, Australia: Coastal Zone Inquiry.
- Stiglitz, J. E. Sen, A. & Fitoussi, J-P. (2009). *Mismeasuring our lives: why GDP doesn't add up*. Retrieved from thenewpress.com/books/mismeasuring-our-lives
- Thomson, A. (2019). *Eastern Marr board member says everything on the table to help first owners out of poverty trap*. Retrieved from standard.net.au/story/6264239/aboriginal-group-to-claim-gas-and-key-infrastructure-in-negotiations/
- Tourism Research Australia. (2019). *Victoria's tourism, events and visitor economy research overview—to March 2019*. business.vic.gov.au/tourism-industry-resources/research/teve-research
- Umwelt Environmental Consultants. (2005). *NSW commercial abalone draft fishery management strategy: Assessment of impacts on heritage and Indigenous issues*. Australia: NSW Department of Primary Industries.
- Van Putten, I., Koopman, M. Fleming, A. Hobday, A. Knuckey I. & Zhou, S. (2019). Fresh eyes on an old issue: Demand-side barriers to a discard problem. *Fisheries Research*, 209, 14–23.
- VFA. (2017). *Policy for new commercial access to wild-catch fisheries resources in Victoria*. Retrieved from vfa.vic.gov.au/commercial-fishing/policy-for-new-commercial-access-to-wild-catch-fisheries-resources-in-victorian-waters.
- VFA. (2018a). *Victorian Fisheries Authority annual report 2017–2018*. Queenscliff, Australia: Victorian Fisheries Authority.
- VFA. (2018b). *Victorian Fisheries Authority commercial fish production: Information bulletin, July 2016 – June 2017*. Queenscliff, Australia: Victorian Fisheries Authority.
- VFA. (2018c). *Hazelwood Pondage barramundi fishery*. Victorian Fisheries Authority. Retrieved from vfa.vic.gov.au/recreational-fishing/targetonemillion2/target-one-million/towards-victorias-first-ever-barramundi-recreational-fishery
- VFA. (2019a). *Victorian Fisheries Authority commercial fish production: Information bulletin, July 2017 – June 2018*. Victorian Fisheries Authority. Retrieved from vfa.vic.gov.au/___data/assets/pdf_file/0004/432625/Fishery-Production-2017-2018.pdf

- VFA. (2019b). *Public call for feedback on proposed fisheries regulations 2019*. Victorian Fisheries Authority. Retrieved from getinvolved.transport.vic.gov.au/fishreg2019
- VFA. (2019c). *Aboriginal fishing*. Victorian Fisheries Authority. Retrieved from vfa.vic.gov.au/aboriginal-fishing
- VFA. (2020). *Commercial fisheries*. Victorian Fisheries Authority. Retrieved from vfa.vic.gov.au/commercial-fishing
- Victorian State Government. (2019). *Proposed Eastern Marr recognition and settlement agreement*. Retrieved from justice.vic.gov.au/your-rights/native-title/proposed-eastern-marr-recognition-and-settlement-agreement
- Victoria State Government. (2015). *Media release: Labor government to end netting in Port Phillip Bay*. Retrieved from premier.vic.gov.au/labor-government-to-end-netting-in-port-phillip-bay/
- Victorian State Government. (2017a). *Victorian aquaculture strategy 2017–2022*. Melbourne, Australia: Department of Economic Development, Jobs, Transport and Resources.
- Victoria State Government. (2017b). *Victoria's diverse population: 2016 Census*. Retrieved from vic.gov.au/sites/default/files/2019-08/Victorias-Diverse-Population-brochure-2016.pdf
- Victoria State Government. (2019). *Economic indicators: Victorian economy at a glance*. Retrieved from invest.vic.gov.au/resources/statistics/economic-indicators.
- Voyer, M., Barclay, K., McIlgorm, A. & Mazur, N. (2016). *Social and economic evaluation of NSW coastal professional wild-catch fisheries (FRDC 2014–301)*. Canberra, Australia: Fisheries Research and Development Corporation.
- Voyer, M., Barclay, K., McIlgorm, A. & Mazur, N. (2017a). Connections or conflict? A social and economic analysis of the interconnections between the professional fishing industry, recreational fishing and marine tourism in coastal communities in NSW, Australia. *Marine Policy*, 76.
- Voyer, M., Barclay, K., McIlgorm, A. & Mazur, N. (2017b). Using a well-being approach to develop a framework for an integrated socio-economic evaluation of professional fishing. *Fish and Fisheries*, 18(6).
- White, C. S. (2015). Getting into fishing: recruitment and social resilience in north Norfolk's 'Cromer crab' fishery, UK. *Sociologia Ruralis*, 55(3), 291–308.
- William Angliss Institute (n.d.). *From seafood, food systems and gastronomy: An interview with George Lucas*. Retrieved from angliss.edu.au/about/news/news--ocean-made-seafood/
- Winstanley, R. (2017). *The future of commercial fishing in Port Phillip Bay*. Retrieved from setfia.org.au/the-future-of-commercial-fishing-in-port-phillip-bay/
- Worley Parsons (2013) *Assessing the value of coastal resources in Victoria*. Retrieved from marineandcoasts.vic.gov.au/___data/assets/pdf_file/0025/405943/VCC_Economic_Study_Report_FINAL.pdf

Appendices

Appendix 1: The Victorian professional fishery economic survey, aquaculture economic assessment, and regional economic results

The main findings of the economic analysis are reported in this document. Some further details some readers may want to explore are contained in this Appendix. To keep this report a manageable length, it is not included in this document but are available as a separate document at:

uts.edu.au/about/faculty-arts-and-social-sciences/research/fass-research-projects/victorias-fisheries-and-aquaculture

frdc.com.au/project/2017-092

Appendix 2: WRI regional input–output analysis

The WRI report Economic impact of Victorian commercial fisheries and aquaculture is available here:

uts.edu.au/about/faculty-arts-and-social-sciences/research/fass-research-projects/victorias-fisheries-and-aquaculture

frdc.com.au/project/2017-092

Appendix 3: Phone survey scripts

General Community Survey Victorian residents aged 18 and over

Introduction

Good afternoon/evening, my name is < > from Lighthouse Data Collection calling on behalf of the University of Technology Sydney.

Today we are conducting a short survey that has been requested by the fishing industry through the Fisheries Research and Development Corporation.

It will involve answering questions on your views regarding commercial fishing, aquaculture and the seafood industry in Victoria.

Could I please speak to the youngest member of the household who is aged 18 or above?

Your answers are very important and will be treated confidentially. The survey results will be used to evaluate the social and economic contributions of fisheries and aquaculture in Victoria. No individual will be able to be identified from the research results. Your answers will only be used for the purposes of the research.

The survey should take around 15 minutes to complete.

IF RESPONDENT ASKS TO REMAIN ANONYMOUS: We will not record your name or other identifying details in your responses to this survey. The information you provide will be de-identified.

IF THE INTERVIEW WILL BE RECORDED: The survey will be recorded for quality control purposes. If you do not wish this to occur, please let me know.

OBTAIN CONSENT BY ASKING: Are you happy to proceed with the survey?

Firstly, I have a few questions about you to make sure that you part of the group of people that we would like to talk to.

Screening questions

Interviewer record gender

- 1 Male
- 2 Female

Which of the following age brackets do you fall into?

- 1 Less than 18 years old [Thank and end]
- 2 18–20 years
- 3 21–24 years
- 4 25–29 years
- 5 30–34 years
- 6 35–39 years
- 7 40–44 years
- 8 45–49 years
- 9 50–54 years
- 10 55–59 years
- 11 60–64 years
- 12 65–69 years
- 13 70–74 years
- 14 75 years or more
- 99 Prefer not to answer [Do not read out] [Thank and end]

What is the postcode of your home address?

-----[record verbatim]

[Postcode must be Victorian, else thank and end]

[If postcode is 3714, 3233, 3909, 3892, 3711, 3779, 3971, 3965, 3965, 3223, 3284, 3305 or 3925, prompt to confirm suburb for additional fishing/aquaculture community questions]

['Thank and end' script:

Thank you for answering these initial questions. Unfortunately, you are not part of the target audience for this survey. Thanks again for your interest in participating.]

[Script for continuation with the survey:

Thank you for answering these initial questions. We are pleased to confirm that you are part of the target audience for the survey. We will now move on to the main questions in the survey.]

Purchase behaviour module

[Ask all]

In the last six months, have you purchased or ordered any fish or seafood (including freshwater species) either to be served or cooked at home, or as a meal from a restaurant or takeaway? This includes fresh, frozen, tinned or other packaged seafood.

- 1 Yes
- 2 No [GO TO Q0]
- 99 Don't know [GO TO Q0]

[IF Q0=2 OR 99, GO TO Q0]

What types of seafood have you purchased or ordered in the past six months?

[Read out] [Multiple response] [Randomise options 1-4]

- 1 Fresh seafood
- 2 Frozen seafood
- 3 Tinned seafood
- 4 Cooked or prepared seafood
- 96 Other [please specify] _____

Which of the following fish or seafood products have you purchased or ordered in the past six months?

[Read out] [Multiple response] [Randomise options 1-5]

- 1 Fish
- 2 Prawns
- 3 Oysters
- 4 Octopus/squid/calamari
- 5 Shellfish (e.g., lobster/crab/mussels/clams/scallops/abalone)
- 96 Other [please specify] _____

How often you usually purchase fish or seafood? **[Do not randomise]**

- 1 More than once a week
- 2 Once a week
- 3 Once a fortnight
- 4 Once a month
- 5 Every 2 or 3 months
- 6 Every 4 or 5 months
- 7 Every 6 to 8 months
- 8 Once a year
- 9 Less than once a year [GO TO Q0]
- 10 Never [GO TO Q0]
- 99 Don't know/unsure [Do not read out]

Where do you usually buy your fish or seafood from? **[Multiple response] [Do not randomise]**

- 1 Supermarkets
- 2 Fish co-ops (e.g., Lakes Entrance, Apollo Bay, San Remo)
- 3 Seafood wholesalers
- 4 Melbourne markets (e.g., Victoria market, South Melbourne market)
- 5 Fresh fish shops (e.g., one outlet but selling fish or seafood)
- 6 Farmer's market or mobile fish shops (e.g., van/truck on the highway)
- 7 Restaurants & cafes
- 8 Takeaway and fish and chip shops
- 9 Direct from the fisher (e.g., off-the-boat)
- 10 Direct from the grower/fish farmer (e.g., mussels, fish)
- 96 Other [please specify] _____

What do you consider to be 'local' fish or seafood? Seafood from...

[Single response][Do not randomise][Read out]

- 1 Your town/city
- 2 Your region (within about 100km of your home)
- 3 Victoria
- 4 Australia
- 96 Other **[please specify]** _____
- 99 Don't know/unsure **[Do not read out]**

Do you have any preference of where your fish or seafood is caught/fished from? If so, where?

[Single response][Do not randomise][Read out if necessary]

- 1 My town/city
- 2 My region (within about 100km)
- 3 Victoria
- 4 Australia
- 5 Overseas
- 6 No, I don't care where my seafood comes from **[GO TO Q0]**
- 99 Don't know/unsure **[GO TO Q0]**

[IF Q0 > 5, GO TO Q0]

Why do you prefer seafood caught/fished from **[Answer to Q0]**?

-----**[record verbatim]**

How important is it to you to know the origin of your fish or seafood? **[Single response]**

- 1 Not at all important
- 2 Somewhat important
- 3 Moderately important
- 4 Very important
- 5 Extremely important
- 99 Don't know/unsure **[Do not read out]**

Do you know whether the fish or seafood you are buying is Australian or not? **[Do not read out]**

- 1 Yes
- 2 No
- 3 Sometimes
- 4 I think/assume so
- 99 Don't know/unsure

Do you buy fish or seafood that is caught or farmed in Victoria? **[Single response][Do not read out]**

- 1 Yes
- 2 No **[GO TO Q0]**
- 3 I think/assume so
- 99 Don't know/unsure **[GO TO Q0]**

How frequently do you buy Victorian-caught or farmed fish or seafood?

- 1 Never
- 2 Rarely
- 3 Sometimes
- 3 Often
- 4 Always
- 99 Don't know/unsure **[Do not read out]**

Please rate the extent to which you agree or disagree with the following statements regarding purchasing fish or seafood using a scale of 1 to 5 where 1 is 'strongly disagree' and 5 is 'strongly agree'.

[Randomise order] You choose fish and seafood...	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't know/ unsure
...based on price	1	2	3	4	5	99
...that is Victorian	1	2	3	4	5	99
...that you think is sustainably caught	1	2	3	4	5	99
...that looks the freshest	1	2	3	4	5	99
...based on nutritional content/ what is better for your health	1	2	3	4	5	99
...based on your cultural background/preference	1	2	3	4	5	99
...that you or your family are familiar with cooking and eating	1	2	3	4	5	99
...that are easy and not too messy to prepare and eat (e.g., dealing with shells and bones)	1	2	3	4	5	99

[Ask Q0a-h if Q0b=4 or 5, 'Agree' or 'Strongly agree' choose seafood that is Victorian]

Please rate the extent to which you agree or disagree with the following statements regarding purchasing Victorian fish or seafood using a scale of 1 to 5 where 1 is 'strongly disagree' and 5 is 'strongly agree'.

[Randomise order] You prefer Victorian fish or seafood...	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't know/ unsure
...even if it costs more	1	2	3	4	5	99
...because you believe the local seafood industry is environmentally sustainable	1	2	3	4	5	99
...because it has lower carbon emissions	1	2	3	4	5	99
...because it is fresher	1	2	3	4	5	99
...because it is higher quality	1	2	3	4	5	99
...because you don't trust seafood from overseas	1	2	3	4	5	99
...because you want to support the local seafood industry	1	2	3	4	5	99
...because your family/ household likes to eat the local species	1	2	3	4	5	99

Which of the following statements best describes how interested you are in the fishing and aquaculture industry in Victoria?

- 1 Not at all interested
- 2 Somewhat interested
- 3 Moderately interested
- 4 Very interested
- 5 Extremely interested
- 99 Don't know/unsure **[Do not read out]**

[Read to all]

Australia's fishing industry includes four sectors:

Commercial or professional fishing (if necessary, read out: this sector catches different species of fish and seafood in marine, estuarine and inland fresh and salt waters. These catches are managed by various levels of government and sold for profit)

Aquaculture which is often referred to as 'fish farming' (If necessary, read out: this includes growing oysters or mussels and farming of aquatic organisms such as crustaceans and plants. It involves practices to boost production, such as regular stocking, feeding, and protection from predators)

Recreational fishing (If necessary, read out: this includes individuals fishing for fun or for their own or their family's food, not resale)

Indigenous cultural fishing (If necessary, read out: this includes fishing activities and practices carried out by Aboriginal and Torres Strait Islander people for the purpose of personal, domestic or community needs, or for educational or ceremonial or other traditional purposes)

I am now going to ask you some questions regarding your view on and attitudes to Victoria's fishing industry.

[Ask all]

Please rate the extent to which you agree or disagree with the following statements regarding commercial fishing and aquaculture using a scale of 1 to 5, where 1 is 'strongly disagree' and 5 is 'strongly agree'.

[Randomise order]	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't know/ unsure
You are confident the local commercial fishing industry will act in ways that will sustain fish populations for future generations	1	2	3	4	5	99
You are confident the local aquaculture industry will act in ways that will sustain environmental health for future generations	1	2	3	4	5	99
The Victorian commercial fishing industry should not be allowed to continue, because its environmental costs outweigh its social and economic benefits	1	2	3	4	5	99
The Victorian aquaculture industry should not be allowed to continue, because its environmental costs outweigh its social and economic benefits	1	2	3	4	5	99
Recreational fishing in Victoria should not be allowed to continue because its environmental costs outweigh its social and economic benefits	1	2	3	4	5	99
It is important we produce our own seafood in Victoria and reduce our reliance on imported seafood	1	2	3	4	5	99

The commercial fishing industry in Victoria has been substantially restricted in recent years. Twenty years ago there were 214 licences operating across 8 Victorian Bay and Inlet fisheries which provided seafood for Victorian consumers, and today there are only 37 licences in 3 Bay and Inlet fisheries.

Using a scale of 1 to 5, where 1 is 'not at all concerned' and 5 is 'extremely concerned', please rate your concern about the following occurring if commercial/professional fisheries are further restricted.

[Randomise order]	Not at all concerned	Somewhat concerned	Moderately concerned	Very concerned	Extremely concerned	Don't know/ unsure
Potential job losses in the commercial fishing industry	1	2	3	4	5	99
Loss of availability of local fish or seafood	1	2	3	4	5	99
Loss of the character or identity of Victorian coastal communities	1	2	3	4	5	99
Loss of commercial fishing as a way of life	1	2	3	4	5	99

Where have you heard or seen information about seafood, commercial fishing and aquaculture?

[Multiple response] [Randomise]

- 1 General news on TV, radio, newspapers
- 2 Scientific publications
- 3 Documentaries
- 4 Fishing and aquaculture industry publications/groups
- 5 Recreational fishing publications/groups
- 6 Environmental conservation publications/groups
- 7 Food and cooking books, magazines and TV shows
- 8 Friends and family
- 9 General conversation with people
- 10 Politicians and government
- 11 Online search
- 12 Social media
- 96 Other **[please specify]** _____
- 98 I have not heard or seen information about seafood, commercial fishing or aquaculture

Thinking about any recent or upcoming holidays in coastal areas, please rate the extent to which you agree or disagree with the following statements using a scale of 1 to 5, where 1 is 'strongly disagree' and 5 is 'strongly agree'.

[Randomise order]	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't know/ unsure
Eating seafood caught or grown in the local region is an important part of your coastal holiday experience	1	2	3	4	5	99
You expect to eat local fish or seafood from the local region when you visit the coast	1	2	3	4	5	99
You would be interested in watching commercial fishers at work when on a coastal holiday (e.g., unloading their catch)	1	2	3	4	5	99
You would be interested in visiting an aquaculture farm when on a coastal holiday	1	2	3	4	5	99
Seeing commercial fishers at work detracts from your enjoyment of the coastal environment when on holiday	1	2	3	4	5	99
Seeing aquaculture farms detracts from your enjoyment of the coastal environment when on holiday	1	2	3	4	5	99

What is your preferred way of getting Victorian seafood? **[Read out]**

Interviewer note: Examples of Victorian species include snapper, flake, King George whiting, calamari and flathead

- 1 Recreational fishing
- 2 Commercial supply chain (e.g., fish market stalls, fish shops, restaurants and takeaway stores)
- 3 Not applicable – don't buy Victorian seafood
- 99 Don't know **[Do not read out]**

Are you a recreational or any other type of fisher?

[Multiple response]

- 1 No, non-fisher **[GO TO NEXT SECTION]**
- 2 Yes, Recreational fisher
- 3 Yes, Commercial fisher **[GO TO NEXT SECTION]**
- 4 Yes, Aquaculturist/fish farmer **[GO TO NEXT SECTION]**
- 5 Yes, Indigenous customary fisher **[GO TO NEXT SECTION]**
- 99 Unsure **[Do not read out] [GO TO NEXT SECTION]**

[Ask Q0 if Q0 = 2]

Please rate the extent to which you agree or disagree with the following statements using a scale of 1 to 5, where 1 is 'strongly disagree' and 5 is 'strongly agree'.

[Randomise order]	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't know/ unsure
Using local bait for recreational fishing is better for the marine environment than bait sourced from other countries	1	2	3	4	5	99
You can catch more fish when you purchase local bait than bait sourced from other countries	1	2	3	4	5	99
It is better for the local community to purchase local bait than bait sourced from other countries	1	2	3	4	5	99
You prefer to use local bait even if it is more expensive	1	2	3	4	5	99

Fishing/aquaculture community questions

ONLY ASK QUESTIONS OF RESPONDENTS LIVING IN THE FOLLOWING POSTCODES:

- 3714 (Alexandra)
- 3233 (Apollo Bay)
- 3909 (Lakes Entrance)
- 3892 (Mallacoota)
- 3711 (Buxton), 3779 (Marysville) if required
- 3971 (Port Albert), 3965 (Port Welshpool), 3964 (Port Franklin)
- 3223 (Portarlinton/Indented Head)
- 3284 (Port Fairy)
- 3305 (Portland)
- 3925 (San Remo)

Quotas of n = 15 for each town/region. Go to Section E 'General comments' if quota has been filled.

The next few questions are about the fishing/aquaculture industry in your community. We are particularly interested in your views as a resident of <town>.

Using a scale of 1 to 5 where 1 is 'strongly disagree' and 5 is 'strongly agree', please rate the extent to which you agree or disagree with the following statements about commercial fishing and/or the aquaculture industry in your community.

[Randomise order]	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't know/ unsure
Fishing/aquaculture helps to create economic diversity in your community	1	2	3	4	5	99
Fishing/aquaculture supports your community during the tourist off-season	1	2	3	4	5	99
Availability of locally caught/ farmed seafood in shops and restaurants is important for attracting visitors to your community	1	2	3	4	5	99
The fishing/aquaculture industry is important for tourism experiences in your community (e.g., seeing fishing boats unload, maritime history)	1	2	3	4	5	99
The local fishing/aquaculture industry takes care of the environment	1	2	3	4	5	99
The local fishing/aquaculture industry and their families are active community members (e.g., involved in local organisations, donate to community events)	1	2	3	4	5	99
Fishing/aquaculture is important to the cultural heritage and identity of your community	1	2	3	4	5	99

Using a scale of 1 to 5 where 1 is 'not at all important' and 5 is 'extremely important', please rate the importance of local seafood produced and available in your community as a source of...

[Randomise order]	Not at all concerned	Somewhat concerned	Moderately concerned	Very concerned	Extremely concerned	Don't know/ unsure
Affordable food	1	2	3	4	5	99
Nutritious food	1	2	3	4	5	99
High-quality and fresh seafood	1	2	3	4	5	99
Sustainable seafood	1	2	3	4	5	99

Using a scale of 1 to 5 where 1 is 'not at all important' and 5 is 'extremely important', please rate the importance of the jobs created by fishing/aquaculture for the following groups in your community...

[Randomise order]	Not at all concerned	Somewhat concerned	Moderately concerned	Very concerned	Extremely concerned	Don't know/unsure
Young people	1	2	3	4	5	99
People who haven't finished high school	1	2	3	4	5	99
Aboriginal people	1	2	3	4	5	99
People from disadvantaged backgrounds	1	2	3	4	5	99
People who might not otherwise find work in your community	1	2	3	4	5	99
People of diverse ethnic background	1	2	3	4	5	99
Women	1	2	3	4	5	99

In what ways do you think the fishing/aquaculture industry makes the most important contribution to your community? Please list up to 3 things/areas. **[Multiple response]** **[Do not read out]**

If required: Examples include contributing to the local economy, local food supply, tourism and recreation, the environment, jobs, cultural heritage, civic life, knowledge and education, and community health/safety

-----[record verbatim]

General comments

[Ask all]

Do you have any other general comments about the commercial fishing and aquaculture industries in Victoria?

-----[record verbatim]

Demographic profile

[Ask All]

Before we finish the survey, we would like to ask you a few more questions about yourself to help us analyse the information we collect from the survey.

How would you classify your existing diet? **[Read out]**

- 1 Omnivore (eats meat and plants)
- 2 Pescatarian (no land animal meat, but eats seafood)
- 3 Vegetarian
- 4 Vegan
- 96 Other **[please specify]** -----
- 98 None of the above
- 99 Don't know/unsure **[Do not read out]**

To ensure our sample is representative of the Victorian population, can you tell me the total annual income before tax for your whole household? Please stop me when I get to the appropriate income bracket.

- 1 Under \$40,000
- 2 \$40,000 – \$59,999
- 3 \$60,000 – \$79,999
- 4 \$80,000 – \$99,999
- 5 \$100,000 – \$119,999
- 6 \$120,000 – \$149,999
- 7 \$150,000 or more
- 8 Prefer not to answer **[Do not read out]**
- 99 Don't know/unsure **[Do not read out]**

Do you speak a language other than English at home? **[Do not read out]**

- 1 Yes **[please specify]** _____
- 2 No – English only
- 99 Prefer not to answer **[Do not read out]**

Are you of Aboriginal or Torres Strait Islander origin?

- 1 Yes – Aboriginal
- 2 Yes – Torres Strait Islander
- 3 Yes – both Aboriginal and Torres Strait Islander
- 4 No
- 99 Prefer not to answer **[Do not read out]**

What is your mother's family country of origin? **[Do not read out]**

- 1 Australia
- 2 England
- 3 India
- 4 China
- 5 New Zealand
- 6 Vietnam
- 7 Italy
- 8 Sri Lanka
- 96 Other **[please specify]** _____
- 99 Prefer not to answer

What is your father's family country of origin? **[Do not read out]**

- 1 Australia
- 2 England
- 3 India
- 4 China
- 5 New Zealand
- 6 Vietnam
- 7 Italy
- 8 Sri Lanka
- 96 Other **[please specify]** _____
- 99 Prefer not to answer

What is the highest level of formal education that you have completed? **[Do not read out]**

- 1 Under Year 10
- 2 Year 10 or equivalent
- 3 Year 11 or equivalent
- 4 Year 12 or equivalent
- 5 TAFE, diploma, associate degree, certificate
- 6 University degree or higher
- 96 Other **[please specify]** _____
- 99 Prefer not to answer **[Do not read out]**

Are you retired?

- 1 Yes
- 2 No

Do you own a holiday home in a Victorian coastal or waterside region?

- 1 Yes
- 2 No

Closing Script

Thank you very much for your time and assistance with this research.

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Our Privacy Policy is available at lighthousedc.com.au/services/quality-matters and contains further details regarding how you can access or correct information we hold about you, how you can make a privacy related complaint and how that complaint will be dealt with.

Until we de-identify our research records, you have the right to access the information that we hold about you as a result of this survey. You may request at any time to have this information de-identified or destroyed.

Tourism Operator Survey

Introduction

Good afternoon/evening, my name is < > from Lighthouse Data Collection calling on behalf of the University of Technology Sydney.

Today we are conducting a short survey that has been requested by the fishing industry through the Fisheries Research and Development Corporation.

It will involve answering questions on your views regarding commercial fishing, aquaculture and the seafood industry in Victoria.

Could I please speak to a main or joint decision maker in the business?

Your answers are very important and will be treated confidentially. The survey results will be used to evaluate the social and economic contributions of fisheries and aquaculture in Victoria. No individual will be able to be identified from the research results. Participation is voluntary and you can terminate the survey at any time. Your answers will only be used for the purposes of the research.

The survey should take around 15 minutes to complete.

[IF LIST PROVIDER USED TO OBTAIN SAMPLE: SPECIFY THE PROVIDER AS SAMPLE SOURCE AND PROVIDE CONTACT DETAILS OF PROVIDER SHOULD THE RESPONDENT WISH TO WITHDRAW CONSENT TO BEING ON THE LIST]

IF RESPONDENT ASKS TO REMAIN ANONYMOUS: We will not record your name or other identifying details in your responses to this survey. The information you provide will be de-identified.

IF THE INTERVIEW WILL BE RECORDED: The survey will be recorded for quality control purposes. If you do not wish this to occur, please let me know.

OBTAIN CONSENT BY ASKING: Are you happy to proceed with the survey?

Firstly, I have a few questions about you to make sure that you part of the group of people that we would like to talk to. Screening questions

Introduction

Which of the following describes the type of business you own/operate? Please select all that apply.

[Multiple response] [Randomise options 1-9]

- 1 Accommodation
- 2 Attraction (e.g., museums, venues, parks, galleries)
- 3 Events organisation (e.g., festivals, shows)
- 4 Tours
- 5 Transport
- 6 Tourism services
- 7 Tourism hospitality
- 8 Tourism promotion organisation
- 9 Tourist information centre
- 96 Other tourism sector business **[please specify]** _____
- 97 Other **[please specify]** _____ **[Thank and end if only response]**

Which of the following regions does your business operate in? Please select all that apply.

[Multiple response] [Do not randomise]

- 1 Melbourne area
- 2 Port Phillip Bay area
- 3 Great Ocean Road area
- 4 South-west coastal Victoria (e.g., from Warrnambool to the SA border)
- 5 Gippsland
- 6 East Gippsland
- 7 Inland Victoria (Goulburn/Yarra Valley)
- 8 Other inland Victoria
- 96 Other Victorian region **[please specify]** _____
- 97 Other **[please specify]** _____ **[Thank and end if only response]**

[IF ONLY ANSWER TO Q1=97 OR ONLY ANSWER TO Q2=97, thank and end]

['Thank and end' script:

Thank you for answering these initial questions. Unfortunately, you are not part of the target audience for this survey. Thanks again for your interest in participating.]

[Script for continuation with the survey:

Thank you for answering these initial questions. We are pleased to confirm that you are part of the target audience for the survey. We will now move on to the main questions in the survey.]

Which of the following market segments does your business cater to?

[Multiple response] [Do not randomise]

- 1 Tourists from the local area and region
- 2 Tourists from Victoria
- 3 Tourists from Melbourne
- 4 Interstate tourists
- 5 International tourists
- 6 All of the above

Which of the following demographic segments does your business typically cater to?

[Multiple response] [Randomise]

- 1 People from the local area or region
- 2 Grey nomads If necessary: Retired people travelling for extended periods
- 3 Backpackers or youth tourists
- 4 Business tourists
- 5 People visiting friends and relatives
- 6 Families
- 7 Education tourists
- 8 Adventure tourists
- 9 Cultural tourists
- 10 Eco-tourists
- 11 Sport and recreation tourists
- 12 Recreational fishers
- 13 Everyone
- 96 Other **[please specify]** _____

Core questionnaire

What do you consider to be 'local' fish or seafood (including freshwater species)? Seafood from...

[Single response] [Do not randomise]

- 1 Your town/city
- 2 Your region (within 100km of your business)
- 3 Victoria
- 4 Australia
- 96 Other **[please specify]** _____
- 99 Don't know/unsure

Does your business have a direct association with the sea or freshwater waterways, fishing or seafood (e.g., fishing charter, marine eco-tours, visiting fishing/aquaculture attractions, seafood restaurant)?

- 1 Yes **[please describe]** _____
- 2 No

Does your business sell or serve seafood?

- 1 Yes
- 2 No **[GO TO Q0]**

[IF Q0 = 2 'No', GO TO Q0]

Where is most of the seafood on your menu caught or farmed?

[Single response][Do not randomise]

- 1 Your local town/city
- 2 Your local region (within 100kms)
- 3 Victoria
- 4 Australia
- 5 Overseas
- 96 Other **[please specify]** _____
- 99 Don't know/unsure

If required: Please think of the term 'local' seafood as referring to Victorian seafood.

Please rate the extent to which you agree or disagree with the following statements using a scale of 1 to 5 where 1 is 'strongly disagree' and 5 is 'strongly agree'.

[Randomise order]	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't know/unsure
It is important to your customers to know where their seafood comes from	1	2	3	4	5	99
It is important to your customers to know that their seafood is sustainably sourced	1	2	3	4	5	99
You experience greater demand for local seafood than you can supply	1	2	3	4	5	99
Commercial fishing/aquaculture plays an important part in regional tourism, through supplying local seafood	1	2	3	4	5	99

[Ask all]

Please rate the extent to which you agree or disagree with the following statements using a scale of 1 to 5 where 1 is 'strongly disagree' and 5 is 'strongly agree'.

[Randomise order]	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't know/ unsure
Eating seafood is an important part of the coastal/waterside holiday experience	1	2	3	4	5	99
Visitors and tourists expect to eat local seafood when visiting the area where your business operates	1	2	3	4	5	99
The tourism industry in this region suffers from tourists/ customers not being able to easily access local seafood	1	2	3	4	5	99
The tourism industry would suffer in this region if local seafood was no longer available	1	2	3	4	5	99
The tourism industry would suffer in this region if locally caught bait was no longer available for recreational fishing	1	2	3	4	5	99
The history of the fishing/ aquaculture industry is an important part of the local tourism offering	1	2	3	4	5	99
The fishing/aquaculture industry is part of the character/identity of the community we operate in and is an important part of the local tourism offering	1	2	3	4	5	99
Professional fishing and/or aquaculture plays an important part in tourism through supplying local seafood	1	2	3	4	5	99
From a tourism perspective, you see a need for both the commercial and recreational fishing industries to exist	1	2	3	4	5	99
Economic activity created by fishing/aquaculture helps to keep communities afloat during the tourist off-season	1	2	3	4	5	99

Please rate the extent to which you agree or disagree with the following statements using a scale of 1 to 5 where 1 is 'strongly disagree' and 5 is 'strongly agree'.

[Randomise order] Tourists you talk to...	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't know/ unsure
Enjoy watching commercial fishers work (e.g., unloading catches)	1	2	3	4	5	99
Enjoy visiting local aquaculture facilities	1	2	3	4	5	99
Ask about the sustainability of local seafood	1	2	3	4	5	99
Have concerns about the environmental impacts of commercial fishing/ aquaculture	1	2	3	4	5	99
Have concerns about the environmental impacts of recreational fishing	1	2	3	4	5	99

When advertising your business or tourism offering, do you use any of the following? Please select all that apply. **[Multiple response] [Randomise]**

- 1 Photos/text descriptions of seafood (e.g., fish and chips, prawns, etc.) on marketing material
 - 2 Photos/text descriptions of commercial fishing vessels (e.g., trawlers) on marketing material
 - 3 Photos/text descriptions related to aquaculture (e.g., local mussels) on marketing material
 - 4 Promotion of events or activities which feature the local seafood industry (e.g., festivals, farmers markets)
 - 5 Any other advertising specifically related to the local seafood or fishing industry
- [please specify]** _____
- 98 None of the above

[IF Q0 = 98, GO TO Q0]

Please tell us a bit more about your promotional events and activities which feature the local seafood industry? For example, what format did they take, who were they targeting and why?

[Record open-ended verbatim response]

[Ask all]

Using a scale of 1 to 5 where 1 is 'never' and 5 is 'always', how often do you provide the following products or services to tourists and visitors?

[Randomise order]	Never	Rarely	Sometimes	Often	Always	Don't know/ unsure
Cross promotion with local seafood outlets or restaurants	1	2	3	4	5	99
Advice on where to access fresh seafood	1	2	3	4	5	99
Bait for recreational fishers	1	2	3	4	5	99
Tours or promotion of tours or museums which detail the history of the region, including the fishing or aquaculture history	1	2	3	4	5	99
Any other products specifically related to the local seafood or fishing industry [please specify]	1	2	3	4	5	99

[IF Q0c > 1, ASK Q0 ELSE GO TO Q0]

Where do you usually source the bait for recreational fishers?

[Single response][Do not randomise]

- 1 Locally or regionally (i.e., within 100km radius)
- 2 Elsewhere in Victoria
- 3 Interstate
- 4 Overseas
- 99 Don't know/unsure

[ASK ALL]

Which groups of tourists do you perceive to be most interested in accessing local seafood?

[Single response][Do not randomise]

- 1 International tourists **[please specify nationalities]** _____
- 2 Interstate tourists
- 3 Tourists from Victoria
- 4 Tourists from Melbourne
- 5 Tourists from the local region
- 6 Recreational fishers
- 99 Don't know/unsure

Are there any particular groups of tourists who are interested in accessing local seafood?

[Record open-ended verbatim response]

Have you noticed a change in interest for local seafood over time?

[Record open-ended verbatim response]

Demographics and general comments

Lastly, a couple of final questions about your business.

How many years has your business been in operation?

[Single response][Do not randomise][Do not read out]

- 1 Less than 1 year
- 2 1–5 years
- 3 6–10 years
- 4 Over 10 years
- 99 Don't know/unsure

How many people are employed within your business? **[Single response][Do not read out]**

- 1 0
- 2 1–4
- 3 5–10
- 4 11–20
- 5 21–50
- 6 51–100
- 7 101–200
- 8 More than 200
- 99 Don't know/unsure

That is all the questions in the survey. Is there anything else you would like to comment on regarding the commercial fishing and aquaculture industries?

[Record open-ended verbatim response][Not compulsory]

Closing script

Thank you very much for your time and assistance with this research. The survey has been conducted by Lighthouse Data Collection, an independent research company, on behalf of the University of Technology Sydney.

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Hospitality Business Survey

Introduction

Good afternoon/evening, my name is < > from Lighthouse Data Collection calling on behalf of the University of Technology Sydney.

Today we are conducting a short survey that has been requested by the fishing industry through the Fisheries Research and Development Corporation.

It will involve answering questions on your views regarding commercial fishing, aquaculture and the seafood industry in Victoria.

Could I please speak to a main or a joint decision maker in the business? If your business sells or serves seafood, we would like to speak to the person primarily involved in making decisions related to seafood.

Your answers are very important and will be treated confidentially. The survey results will be used to evaluate the social and economic contributions of fisheries and aquaculture in Victoria. No individual will be able to be identified from the research results. Participation is voluntary and you can terminate the survey at any time. Your answers will only be used for the purposes of the research.

The survey should take around 15 minutes to complete.

[IF LIST PROVIDER USED TO OBTAIN SAMPLE: SPECIFY THE PROVIDER AS SAMPLE SOURCE AND PROVIDE CONTACT DETAILS OF PROVIDER SHOULD THE RESPONDENT WISH TO WITHDRAW CONSENT TO BEING ON THE LIST]

IF RESPONDENT ASKS TO REMAIN ANONYMOUS: We will not record your name or other identifying details in your responses to this survey. The information you provide will be de-identified.

IF THE INTERVIEW WILL BE RECORDED: The survey will be recorded for quality control purposes. If you do not wish this to occur, please let me know.

OBTAIN CONSENT BY ASKING: Are you happy to proceed with the survey?

Firstly, I have a few questions about you to make sure that you part of the group of people that we would like to talk to.

B. Introduction

1. Which of the following describes the type of business you own/ operate?
[Multiple response] [Randomise options 1-11]
 - 1 Family restaurant
 - 2 Casual dining restaurant
 - 3 Fine dining restaurant
 - 4 Café
 - 5 Take away shop
 - 6 Fast food outlet
 - 7 Pub
 - 8 Bar
 - 9 Club
 - 10 Catering business
 - 11 Hotel/ Motel/ Bed and Breakfast
 - 96 Other hospitality sector business **[please specify]** _____
 - 99 Other **[please specify]** _____ **[Thank and end if only response]**

2. Which of the following regions does your business operate in?
[Multiple response] [Do not randomise]
 - 1 Melbourne area
 - 2 Geelong area
 - 3 Port Phillip Bay coastal area
 - 4 Great Ocean road coastal area
 - 5 South-west coastal Victoria (e.g. from Warrnambool to the SA border)
 - 6 Gippsland coastal area
 - 7 East Gippsland coastal area
 - 8 Inland Victoria (Goulburn/ Yarra Valley)
 - 9 Other inland Victoria
 - 96 Other Victorian region **[please specify]** _____
 - 97 Other non-Victorian region **[please specify]** _____ **[Thank and end if only response]**

[IF ONLY ANSWER TO Q1=97 OR ONLY ANSWER TO Q2=97, THANK AND END]

3. Does your business sell or serve fish or seafood (including freshwater species)?
 - 1 Yes, it's the main focus of our business
 - 2 Yes, we sell/ serve seafood as part of our business
 - 3 No, we don't sell/ serve seafood **[Thank and end]**

['Thank and end' script:

Thank you for answering these initial questions. Unfortunately, you are not part of the target audience for this survey. Thanks again for your interest in participating.]

[Script for continuation with the survey:

Thank you for answering these initial questions. We are pleased to confirm that you are part of the target audience for the survey. We will now move on to the main questions in the survey.]

4. Which of the following markets does your business cater to?
[Multiple response for options 1-6] [Do not randomise]
 - 1 Own city/ town
 - 2 Own region/ state
 - 3 Melbourne
 - 4 Interstate
 - 5 Australia wide
 - 6 International **[please specify main nations]** _____

C. Core questionnaire

5. What do you consider to be 'local' fish or seafood? Seafood from...
[Single response][Do not randomise]

- 1 Your town/ city
- 2 Your region (within 100kms of your main business premises)
- 3 Victoria
- 4 Australia
- 96 Other **[please specify]** -----
- 99 Don't know/ unsure

6. Where is most of the seafood on your menu caught or farmed?

- 1 Your town/ city
- 2 Your region (within 100kms of your main business premises)
- 3 Victoria
- 4 Another State
- 5 Australia
- 6 Overseas
- 96 Other **[please specify]** -----
- 99 Don't know/ unsure

The next set of questions are about local seafood and the local fishing/ aquaculture industries. In these cases, we define 'local' as Victorian caught or farmed.

7. Please rate the extent to which you agree or disagree with the following statements on the importance of professional fishing and aquaculture to the hospitality sector, using a scale of 1 to 5, where 1 is 'strongly disagree' and 5 is 'strongly agree'?

[Randomise order]	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't know/ unsure
a. Eating seafood is an important part of the dining out experience in Victoria	1	2	3	4	5	99
b. Customers expect to eat local seafood when dining out in Victoria	1	2	3	4	5	99
c. The Victorian hospitality industry suffers from a lack of access to local seafood	1	2	3	4	5	99
d. The Victorian hospitality industry would suffer if local seafood was no longer available	1	2	3	4	5	99
e. Mislabelling of seafood is a concern for the Victorian hospitality industry	1	2	3	4	5	99
f. Illegally caught seafood is a concern for the Victorian hospitality sector	1	2	3	4	5	99

8. Please rate the extent to which you agree or disagree with the following statements regarding the importance of professional fishing and aquaculture to your customers, using a scale of 1 to 5, where 1 is 'strongly disagree' and 5 is 'strongly agree'?

[Randomise order]	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't know/ unsure
a. Your customers prefer local seafood when you have it on the menu	1	2	3	4	5	99
b. Your customers ask questions about the sustainability of the seafood you sell	1	2	3	4	5	99
c. Your business labels the source/ origin of the seafood you sell	1	2	3	4	5	99
d. Your customers consider seafood to be a 'healthy option'	1	2	3	4	5	99

9. Please rate the extent to which you agree or disagree with the following statements regarding sourcing local seafood for your business, using a scale of 1 to 5, where 1 is 'strongly disagree' and 5 is 'strongly agree'?

[Randomise order]	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't know/ unsure
a. The demand for local seafood in your business is growing	1	2	3	4	5	99
b. It is easy for your business to source local seafood	1	2	3	4	5	99
c. The variation in availability of local seafood makes it difficult for you to have it on the menu	1	2	3	4	5	99
d. A closer relationship with seafood suppliers would help address the challenges of having Victorian seafood on the menu	1	2	3	4	5	99
e. It is easy for your business to find information about the Victorian fishing/ aquaculture industries	1	2	3	4	5	99
f. Victorian seafood is too expensive for your business to have on the menu	1	2	3	4	5	99
g. You would be more inclined to serve Victorian seafood if your chefs/ cooks had more exposure to Victorian seafood and appropriate preparation methods	1	2	3	4	5	99
h. It is more difficult to source local seafood in the last few years	1	2	3	4	5	99
i. The price of local seafood has increased in the last few years	1	2	3	4	5	99
j. My front of house staff are able to communicate the source of the seafood we serve to our customers	1	2	3	4	5	99

10. Using a scale of 1 to 5, where 1 is 'not at all interested' and 5 is 'extremely interested', please rate how interested you would be in receiving more information about the following?

[Randomise order]	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't know/ unsure
a. Seasonal availability of Victorian seafood	1	2	3	4	5	99
b. Sustainability of Victorian seafood	1	2	3	4	5	99
c. Information and stories about the people who produce Victorian seafood	1	2	3	4	5	99

11. Is there anything else that would make it easier or more appealing for your business to source Victorian seafood?

[Record open-ended verbatim response]

12. Have the recent closures of Victorian commercial fisheries (e.g. in Port Phillip Bay) impacted your business in any way?

- 1 Yes **[please describe]** -----
 2 No
 99 I was not aware of any recent closures

13. When advertising your restaurant, do you use any of the following? Please select all that apply. **[Multiple response][Randomise]**

- 1 Photos/ text descriptions of seafood (e.g. fish and chips, prawns, etc.) on marketing material
 2 Photos/ text descriptions of commercial fishing vessels (e.g. trawlers) on marketing material
 3 Photos/ text descriptions related to aquaculture (e.g. local mussels) on marketing material
 4 Any other advertising specifically related to the local seafood or fishing industry
[please specify] -----
 98 None of the above

D. Demographic and general comments

Lastly, a couple of final questions about your business.

14. How many years has your business been in operation?
[Single response][Do not randomise][Do not read out]

- 1 Less than 1 year
 2 1 – 5 years
 3 6 – 10 years
 4 Over 10 years
 99 Don't know/ unsure

15. How many people are employed within your business?
[Single response][Do not randomise][Do not read out]

- 1 0
 2 1-4
 3 5-10
 4 11-20
 5 21-50
 6 51-100
 7 101-200
 8 More than 200
 99 Don't know/ unsure

16. That is all the questions in the survey. Is there anything else you would like to comment on regarding the commercial fishing and aquaculture industries?
[Record open-ended verbatim response][Not compulsory]

E Closing script

Thank you very much for your time and assistance with this research. The survey has been conducted by Lighthouse Data Collection, an independent research company, on behalf of the University of Technology Sydney.

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Seafood Processors, Wholesalers & Retailers Survey

Introduction

Good afternoon/evening, my name is < > from Lighthouse Data Collection calling on behalf of the University of Technology Sydney. Your business should have received a letter from UTS advising you of this research.

Today we are conducting a short survey that has been requested by the fishing industry through the Fisheries Research and Development Corporation.

It will involve answering questions on your views regarding commercial fishing, aquaculture and the seafood industry in Victoria.

Could I please speak to the main or a joint decision maker in the business?

Your answers are very important and will be treated confidentially. The survey results will be used to evaluate the social and economic contributions of fisheries and aquaculture in Victoria. No individual will be able to be identified from the research results. Participation is voluntary and you can terminate the survey at any time. Your answers will only be used for the purposes of the research.

The survey should take around 15 minutes to complete.

IF RESPONDENT ASKS TO REMAIN ANONYMOUS: We will not record your name or other identifying details in your responses to this survey. The information you provide will be de-identified.

IF THE INTERVIEW WILL BE RECORDED: The survey will be recorded for quality control purposes. If you do not wish this to occur, please let me know.

OBTAIN CONSENT BY ASKING: Are you happy to proceed with the survey?

Firstly, I have a few questions about you to make sure that you part of the group of people that we would like to talk to.

Introduction

Which of the following categories does your business fall into within the seafood industry?

[Multiple response][Do not randomise]

- 1 Fishing Co-op
- 2 Seafood Agent (e.g., MSC)
- 3 Wholesaler (of seafood for human consumption)
- 4 Wholesaler (of bait)
- 5 Processor (of seafood for human consumption)
- 6 Processor (of seafood for bait)
- 7 Retailer (of seafood for human consumption)
- 8 Retailer (of bait)
- 9 Transporter (of seafood)
- 10 Restaurant/takeaway food business
- 11 Exporter (of bait, fish or seafood products)
- 12 Importer (of bait, fish or seafood products)
- 96 Other **[please specify]** _____
- 97 Business is not in seafood industry **[Thank and end]**

Would you describe your business as... **[Single response] [Do not randomise]**

- 1 A local business only operating in the local area
- 2 A regional business operating in a Victorian region
- 3 A business that operates throughout Victoria
- 4 A business that operates in multiple states in Australia
- 5 A business that operates overseas as well as in Australia

What is the postcode of your main business location? **[Record postcode]**

[Postcode must be Victorian, else thank and end]

['Thank and end' script:

Thank you for answering these initial questions. Unfortunately, you are not part of the target audience for this survey. Thanks again for your interest in participating.]

[Script for continuation with the survey:

Thank you for answering these initial questions. We are pleased to confirm that you are part of the target audience for the survey. We will now move on to the main questions in the survey.]

Core questionnaire

Please estimate, as percentages, what proportions of fish or seafood (including freshwater species) you buy is from Victoria, interstate and overseas. A rough estimate will suffice.

[Do not randomise order]

Victoria -----%
Interstate -----%
Overseas -----%

Please estimate, as percentages, what proportions of seafood you sold in the last year was sold in Victoria, interstate and overseas. A rough estimate will suffice.

[Do not randomise order]

Victoria -----%
Interstate -----%
Overseas -----%

Which of the following seafood products do you sell? **[Multiple response] [Randomise order] [Read out]**

- 1 Fish
- 2 Prawns
- 3 Oysters
- 4 Octopus/squid/calamari
- 5 Shellfish (e.g., lobster/crab/mussels/clams/scallops/abalone)
- 6 Recreational fishing bait
- 96 Other **[please specify]** -----

The next set of questions are about both caught and farmed seafood.

Which source of seafood tends to sell the best (greatest sales in dollars/revenue) in your business? Please select one source for each product.

[Only ask for products sold, as identified in Q0]

[Randomise order]	Caught/farmed in Victoria	Caught/farmed interstate	Caught/farmed overseas	Don't know/ unsure/NA
Fish	1	2	3	99
Prawns	1	2	3	99
Oysters	1	2	3	99
Octopus/squid/calamari	1	2	3	99
Shellfish (e.g., lobster/crab/ mussels/clams/scallops/ abalone)	1	2	3	99
Recreational fishing bait	1	2	3	99

Please rate the extent to which you agree or disagree with the following statements regarding commercial fishing, using a scale of 1 to 5, where 1 is 'strongly disagree' and 5 is 'strongly agree'?

[Randomise order]	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't know/ unsure
The professional fishing industry is an important source of employment in some Victorian towns	1	2	3	4	5	99
The aquaculture industry provides important employment opportunities in some Victorian towns	1	2	3	4	5	99
It is important to your customers to know that their seafood is sustainably sourced	1	2	3	4	5	99
The Victorian seafood industry (fishing and aquaculture) is important to the success of your business	1	2	3	4	5	99
Your customers want to know where their seafood comes from	1	2	3	4	5	99
You experience greater demand for Victorian seafood than you can supply	1	2	3	4	5	99
You experience greater demand for Victorian seafood than seafood sourced from other countries	1	2	3	4	5	99
You experience greater demand for Victorian seafood than seafood sourced from interstate (in Australia)	1	2	3	4	5	99
Victorian seafood production plays an important part in regional tourism in Victoria	1	2	3	4	5	99
Local seafood production could play a more important role in Victorian tourism if it was more readily available for tourists to eat	1	2	3	4	5	99
The closure of Victorian commercial fisheries has prevented seafood playing a greater role in Victorian coastal tourism	1	2	3	4	5	99
A lack of direct connections between local producers and local markets affects supply of fresh local seafood	1	2	3	4	5	99
The ethnicity of customers is an important factor in the demand for certain Victorian-caught species	1	2	3	4	5	99
Seafood exported internationally from Victoria is an important contribution to the Victorian economy	1	2	3	4	5	99

Please rate the extent to which you agree or disagree with the following statements regarding impacts from the past closure of Victorian professional fisheries (e.g., Port Phillip Bay), using a scale of 1 to 5, where 1 is 'strongly disagree' and 5 is 'strongly agree'?

[Randomise order]	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Don't know/ unsure
It has caused price increases for Victorian species	1	2	3	4	5	99
It has reduced the availability of some Victorian species	1	2	3	4	5	99
It has reduced the availability of high-quality seafood	1	2	3	4	5	99
It has caused profit losses in post-harvest businesses	1	2	3	4	5	99
It has caused job losses in post-harvest businesses	1	2	3	4	5	99
It has shifted demand, increasing pressure on other fisheries	1	2	3	4	5	99
You have lost customers	1	2	3	4	5	99
It has damaged long-term relationships within the industry	1	2	3	4	5	99

Within the past 12 months, have you undertaken any of the following activities?

[Multiple response] [Rotate options 1–4] [Read out]

- 1 Provided support (in any way) for local fishers or aquaculture producers who you felt were in need of mental health support or counselling
- 2 Provided financial assistance or advice to local fishers or aquaculture producers
- 3 Provided input into environmental or fisheries management issues or decisions
[please specify details] _____
- 4 Provided input into fishing/aquaculture industry-based research or development projects
[please specify details] _____
- 98 None of the above

Within the past 12 months, have you undertaken any of the following?

[Multiple response] [Randomise 1–5] [Read out]

- 1 Provided group tours of your facility
- 2 Held an open day for your facility
- 3 Provided sponsorship or donations (including ice or seafood donations)
- 4 Participated in any seafood festivals or similar events
- 5 Participated in other engagement activities
- 98 None of the above

Demographics and general comments

Lastly, a couple of final questions about your business.

How many years has your business been in operation?

[Single response] [Do not read out]

- 1 Less than 1 year
- 2 1–5 years
- 3 6–10 years
- 4 Over 10 years
- 99 Don't know/unsure

How many people are employed within your business?

[Single response] [Do not randomise] [Do not read out]

- 1 0
- 2 1–4
- 3 5–10
- 4 11–20
- 5 21–50
- 6 51–100
- 7 101–200
- 8 More than 200
- 99 Don't know/unsure

That is all the questions in the survey. Is there anything else you would like to comment on regarding the commercial fishing or aquaculture industries?

[Record open-ended verbatim response] [Not compulsory]

Closing script

Thank you very much for your time and assistance with this research. The survey has been conducted by Lighthouse Data Collection, an independent research company, on behalf of the University of Technology Sydney.

We will not disclose any identifiable research information for a purpose other than conducting our research or to overseas recipients unless we have your express prior consent or are required to do so by an Australian law.

Our Privacy Policy is available at lighthousedc.com.au/services/quality-matters and contains further details regarding how you can access or correct information we hold about you, how you can make a privacy related complaint and how that complaint will be dealt with.

Until we de-identify our research records, you have the right to access the information that we hold about you as a result of this survey. You may request at any time to have this information de-identified or destroyed.

Appendix 4: Thematic coding framework

Coding framework used in NVivo for thematic coding of qualitative interview transcripts.

Parent node	Child nodes	Notes/description for node
Economy	incomes	to individual or family, revenue to local community, region, or state
	jobs	numbers, types, who is getting the jobs and who is not
	inputs	buying goods and services (is an important part of economic contribution to community), synergies with other sectors using the same inputs (e.g., freight, gear, ice, fuel, infrastructure)
	downstream	various value chains generated from the seafood, post-harvest, trading, processing, retail, flowing through to hospitality, tourism (is another important part of economic contribution to community)
	stability, diversity, resilience	economic security for individuals/families, for communities, for the sector, economic diversity in the community, does the industry contribute to economic resilience in some way?
	value chain	for case studies, also for when there are value chain comments made that do not really fit in inputs or downstream, because they are not in the local or Victorian economy
	synergies	when the existence of fishing/aqua supports another economic activity, like rec. boating, tourism, hospitality (similar to downstream, but for when there is not a direct use of seafood in the supply chain), also between different fisheries
Food supply	food culture	having locally produced food is an important part of food culture (similar to cultural identity)
	food ethics	wanting to buy local for ethical reasons, e.g., food miles, supporting local economies, food sovereignty, assuming local = sustainable (well-managed fisheries)
	food quality	
	food supply	to local community, to metro areas
Health & safety	nutrition	food supplies, good food contributing to community health, health characteristics of local product
	search & rescue, reporting	fishing/aquaculture people being 'eyes on the water', seeing things, helping with rescue, reporting things
Education & knowledge	schools, VET, public	contributing to schools and other education institutions, including community groups (e.g., Rotary) by giving talks or hosting information visits, hosting student trainees
	formal training	training required to work in the industry, e.g., boating tickets, food safety handling, aquaculture certificates
	informal	intergenerational knowledge, on the job learning, on fishing/aquaculture/processing/quality
	personal development	leaning 'how to be a man' (or responsible adult), work ethic, resilience ('toughness')
	LEK	local environmental knowledge, including Aboriginal knowledge
	research	doing own research, e.g., gear modifications, participating in research done by others, e.g., water quality monitoring, research on fish, aquaculture feed research
Environment	volunteer work	e.g., beach or waterway clean-ups, collaborating with farmers on water quality improvements

	committee work	e.g., estuary management committees, state govt committees to do with environmental protection
	best practice	modifying and improving practice to reduce ecological footprint of fishing/aquaculture
	well-managed fishery	
	perceptions of damage	perceptions that fishing/aquaculture causes damage to the environment
	sustainability	where participants have used the word sustainable or sustainability
integrated communities	ethnic	includes Aboriginal people/groups, opportunities for jobs/businesses, role in industry, supplies food for different groups, supplies food for cultural celebrations
	social class	opportunities for jobs/businesses, role in industry, upward mobility
	gender	opportunities for jobs/businesses, role in industry
	age	opportunities for young people and older people
	donations	for community groups or events, ice, seafood platters, etc
	volunteer work	by industry people, e.g., football clubs, schools, etc
	status of fishing/aquaculture	status of seafood producers in the community - respected or not- community standing, social licence
	bonding social capital	internal cohesion within fishing/aquaculture communities, or fishers within local community (similar to donations) - how fishers/aquaculturists contribute to this in the community
	bridging social capital	how fishing/aquaculture contributes to connections outside local community, or outside fishing/aqua to other sectors
Cultural heritage & identity	historical role	seafood production in history of community, in formation or growth of community, was Aboriginal contribution important, is it recognised?
	sense of place	is seafood production an important part of the town, in the perception of insiders or outsiders? e.g., fishing village, place branding
	special products	is local seafood produce a part of local people's heritage?
	diverse heritage & identity	is the heritage of a range of different ethnic groups?
Leisure & recreation	tourism & hospitality	fresh local produce, food tourism, food as part of the experience of place, local food as contributing to leisure experiences
	recreational fishing & boating	provision of bait, fishing around aquaculture equipment, knowledge from pros, shared infrastructure for boating
	interactions	positive and negative interactions between seafood producers and recreational boaters or fishers
	festivals	similar to sense of place (builds sense of place), also similar to synergies and downstream, because contributes to tourism, and is often about eating
Unrealised contributions	lost old opportunities	Missed opportunities, where contributions are not as good as they could be because of some obstacle, e.g., lack of local distribution channels, contributions lost through closed access
	new opportunities	



