



**2020 – 2025**  
**Oysters Australia Strategic Plan**



Oysters Australia Ltd, ACN 153 542 833

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Cover photos:

Top: Wagonga Inlet, NSW (photo credit: Montague Oysters)

Bottom: Eat more oysters!

## **SUMMARY**

The primary purpose of this plan is to coordinate oyster industry research, development, and extension (RD&E) across Australia to ensure that usable outputs are provided to oyster businesses. The plan outlines a set of RD&E programs and a list of priority projects for which research proposals will be called.

There are five programs, each of which have desired outcomes and key performance indicators. Extension and adoption activities will be developed as an integral part of establishing the projects within each of the programs.

Non-research activities conducted by Oyster Australia, as the national representative body, are also outlined in the plan. These activities include policy preparation, market development, communication, and advocacy.

The plan forms an integral part of the Industry Partnership Agreement (IPA) between Oysters Australia and the Fisheries Research and Development Corporation (FRDC).

Oysters Australia will work closely with FRDC to manage the portfolio of projects.

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## 1. ABOUT OYSTERS AUSTRALIA

Oysters Australia Limited (OA) is a national body that was formed in 2011 by Australia's community of oyster growers. It is a not-for-profit, unlisted, public company, the Members being the official oyster industry bodies in New south Wales, Tasmania and South Australia:

- NSW Farmers Association,
- Oysters Tasmania (OT), and
- South Australian Oyster Growers Association (SAOGA)

These bodies appoint the Directors, who serve in an honorary capacity. Provision does exist in the company constitution for an observer from the Queensland Oyster Growers Association to attend Directors meetings, but this representative does not have voting rights. Membership by WA, NT and Victorian oyster industries would be welcomed as these sectors grow.

The operations of Oyster Australia are supported by an Executive Officer, President, and Company Secretary, each of whom are employed on a part time basis.

### 1.1. The purpose of Oysters Australia

#### 1.1.1. Research, Development & Extension

The primary purpose of OA is to manage a program of research, development, and extension for the benefit of the Australian oyster industry. This involves defining the needs of industry, identifying suitable entities to conduct the research, monitoring progress, and ensuring the results are implemented in a manner that benefits the end users. A wide range of RD&E projects can be conducted, covering technology, policy, markets, human development, environment, etc. Priority projects are outlined in this plan and are further guided by state-level RD&E strategies

The Fisheries Research & Development Corporation (FRDC) manages funds for each project and enters a contract with the entity conducting the research. Although FRDC has ultimate legal control over the projects, the terms of the IPA give OA very significant influence over which projects are approved, and how they are conducted. Funds to cover OA's management costs are also provided through FRDC. The details of this arrangement are set out in an Industry Partnership Agreement (IPA) between FRDC and OA – see Section 6.2.1.

A fundamental principle governing the manner in which OA manages its RD&E portfolio is that the end-users of the research must be intimately involved in the design of each project and the work is not regarded as complete until the results are implemented by the end users in an economically sustainable manner.

#### 1.1.2. Communication and Advocacy

Oysters Australia has a representative responsibility to address issues affecting the whole oyster industry. This involves interactions with the Australian Government and national bodies. It could simply be a matter of distributing information to stakeholders, or activities could be more involved, including consultation, coordination of stakeholders to act in unison, applying for grants, or lobbying.

The extent of OA's involvement in advocacy will expand or contract depending on the degree of influence that is possible or required. There are limited funds to support advocacy within OA, and such action is always taken in conjunction with the state industry associations.

## 1.2. Stakeholders & Partnerships

The funds that FRDC provides to OA are derived from levies collected from growers<sup>1</sup>, and matching dollars from the Australian Government. Consequently, OA's primary stakeholders are oyster growers and FRDC (representing the Commonwealth). In practice this means that all activities conducted by OA must be beneficial to growers. The state oyster industry associations, being Members of Oysters Australia Limited, are also key stakeholders.

There are many other stakeholders with whom OA may interact. These include:

- Individual researchers and research institutions
- State Governments
- Other seafood industry associations
- Businesses in the supply chain, through to retail.
- Media outlets
- The public.

## 1.3. Operational Activities

In addition to its role as custodian of the RD&E Plan, OA undertakes activities in connection with communication to members, market development policy and liaison with national bodies. These activities are listed below.

Activity	Timing	Desired Outcome
Liaison with SIA on the national marketing campaign	Regularly during 2021	Oyster industry participants gain maximum benefit from involvement in the campaign
National Oyster Market Report	Bimonthly	All sectors of the supply chain have access to timely data on oyster prices and demand
Communications	Quarterly	Regular updates provided to State Advisory Committees Website maintained with up-to-date information, including stakeholder updates following board meetings
Aquatic Emergency Animal Disease Response Agreement (aEADRA)	June 2021	A decision is made on whether OA becomes a signatory of the Agreement
Oyster Conference and Strategic Review	During 2021	Oyster businesses are exposed to recent R&D. Update / review of the strategic plan.
Liaison with FRDC	Quarterly	OA ensures that members are aware of relevant FRDC activities and funding opportunities.
Seek other research & marketing opportunities & partnerships	Ongoing	Increase capacity for RD&E Provides additional leverage to the oyster industry IPA funds

Table 1. Oysters Australia operational activities

<sup>1</sup> R&D levies are initially collected by the States before being transferred to the FRDC

## 1.4. Vision & Strategies

### Vision

A vibrant Australian oyster industry, celebrated by the community, which adopts world-class research to achieve sustainability and prosperity, with a GVP of \$175m by 2025.

Over the course of this plan it is anticipated that the industry will grow from the current GVP of \$106m, to \$175m. Assuming that production issues (largely due to POMS) and market disruptions (due to Covid) can be overcome through ongoing strategic investment, this target accounts for each state returning to its GVP highs of recent years, plus a 35% increase. This plan will contribute to that growth through projects that reduce oyster disease, improve farm efficiency, and increase consumer demand. Growth will also occur through new investment in the industry, and expansion of the industry in Northern & Western Australia. The plan supports those growth areas by bolstering skills development, oyster quality, improved regulations, and environmental sustainability.

STRATEGIES	DESIRED OUTCOMES	INVESTMENT PROGRAM
<ul style="list-style-type: none"> <li>Support innovation which can lead to efficiency or productivity gains on farm or in the supply chain</li> <li>Provide a conduit between industry, innovators and other stakeholders</li> </ul>	Increase the sustainable, efficient production of oysters and their management on farm	Program 1. Production & Innovation (page 27)
<ul style="list-style-type: none"> <li>Grow oysters that are resistant to disease and have traits desired by consumers</li> <li>Breed oysters that are adapted to future climates</li> <li>Maintain &amp; improve monitoring systems</li> <li>Implement sound biosecurity practices</li> <li>Investigate causes of wide-spread mortality</li> <li>Co-invest with climate change initiatives</li> <li>Investigate potential impacts of climate change on the oyster industry and implement adaptation measures</li> <li>Support a move to a carbon neutral industry</li> </ul>	Increase the sustainable, efficient production of oysters and their management on farm	Program 2. Risk Management (page 29)
<ul style="list-style-type: none"> <li>Support oyster farmers &amp; aligned industries to network and share knowledge at various scales</li> <li>Identify training needs and access appropriate training resources</li> <li>Build alliances with scientific institutions</li> <li>Establish a knowledge bank of data that can be shared under secure arrangements to improve R&amp;D outcomes</li> </ul>	Knowledge, skills & networks are developed, increasing the industry's human & data resources	Program 3. People & Knowledge (page 32)
<ul style="list-style-type: none"> <li>Facilitate development of new markets &amp; products</li> <li>Co-invest with national promotion opportunities</li> <li>Support export opportunities</li> <li>Find alternative paths to consumers</li> </ul>	Build consumer demand for oysters and increase profitability through the supply chain	Program 4. Post Harvest & Market Development (page 34)
<ul style="list-style-type: none"> <li>Support changes to Government regulations that are more favourable to the oyster industry</li> <li>Promote community benefits of the oyster industry and foster opportunities to increase their support</li> </ul>	The oyster industry is recognised as a legitimate & responsible user of public resource, and operates under constructive regulation	Program 5. Industry Profile & Regulation (page 36)



## 2. INDUSTRY BACKGROUND

### 2.1. Australian Aquaculture

Aquaculture production is one of the fastest growing primary industries in the world. For the past decade, global aquaculture production has been growing at a rate of almost 8% a year, while in Australia, growth of aquaculture production has been less rapid, averaging 4.3% (FRDC, 2019c).

While the aquaculture sector accounted for 36% of Australia’s total seafood production in 2017-18, this represented 44% of the value, with high value species being the target for production. These include Atlantic Salmon, Prawns, Barramundi, Abalone, Kingfish, Southern Bluefin Tuna, Mussels & Oysters.

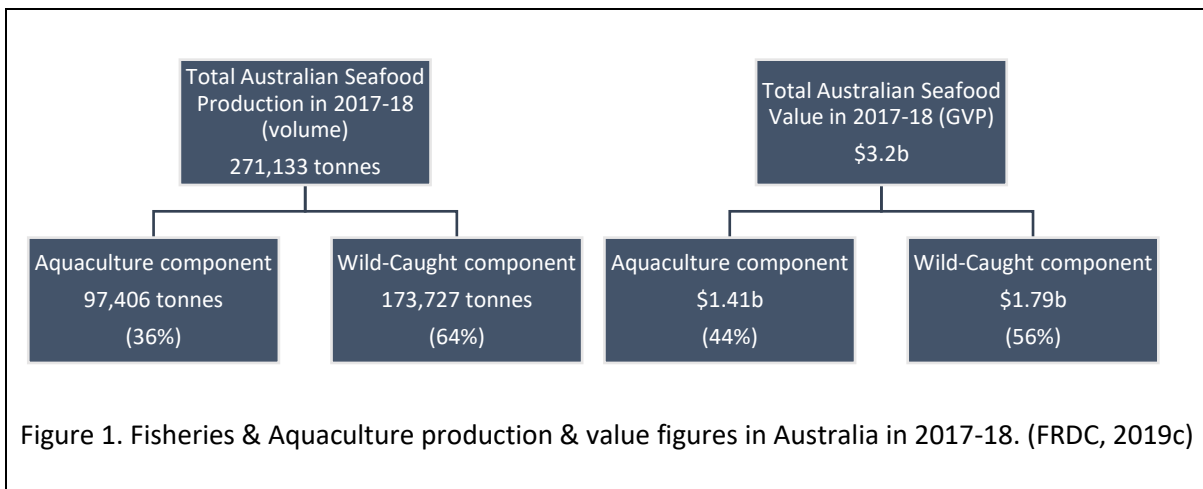


Figure 1. Fisheries & Aquaculture production & value figures in Australia in 2017-18. (FRDC, 2019c)

With the volume of seafood provided through wild-capture fisheries being relatively stable, a growing demand for seafood protein for a swelling population will likely need to be met by aquaculture. ABARES outlook reports predict that aquaculture’s share of production value will continue to rise and account for half of Australia’s fisheries and aquaculture production value by 2024-25 (figure 2).

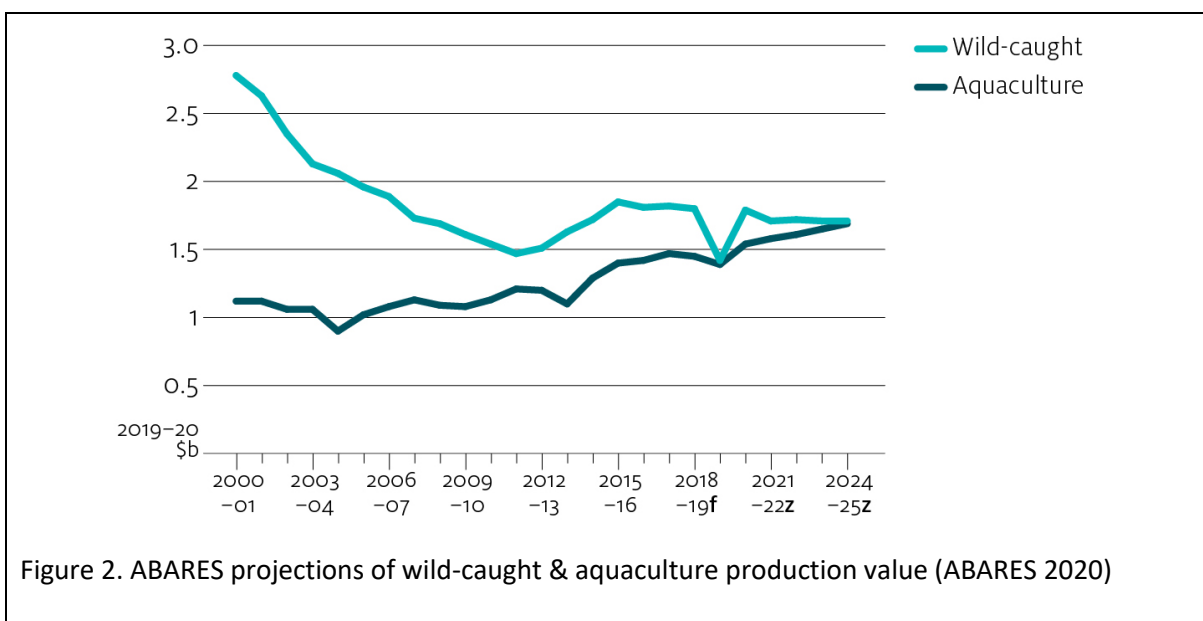


Figure 2. ABARES projections of wild-caught & aquaculture production value (ABARES 2020)

The aquaculture industry is largely based in regional Australia and makes a significant social and economic contribution to regional development.

## 2.2. Unfed Aquaculture

Marine aquaculture can be split into two categories: Fed and Unfed.

Fed aquaculture includes finfish such as Atlantic Salmon & Yellowtail Kingfish. These fish require supplementary feed which often, though not always, contains fish meal and fish oil sourced from wild-caught fish. Significant improvements have been made in ‘aquafeeds’ in recent years with substitutes being increasingly used to reduce this reliance on natural resources (see Hua *et al.* 2019). Considerable time and technology is often invested to optimise feeding regimes, minimising feed wastage and the potential export of nutrients from aquaculture pens.

Unfed aquaculture includes seaweeds and shellfish such as mussels and oysters, which grow and sustain themselves without additional inputs. Seaweed requires only sunlight, and mussels and oysters feed off microscopic plankton that naturally occur in seawater. As such, unfed aquaculture is an important contributor to low environmental impact protein production.

Furthermore, shellfish aquaculture does not only provide a healthy, protein rich product, but the culture of these bivalves provides valuable ecosystem services that benefit both the environment and community. Summaries of the goods and services provided by shellfish aquaculture are provided in Alleway *et. al.* (2019) and van der Schatte Olivier *et. al.* (2020).

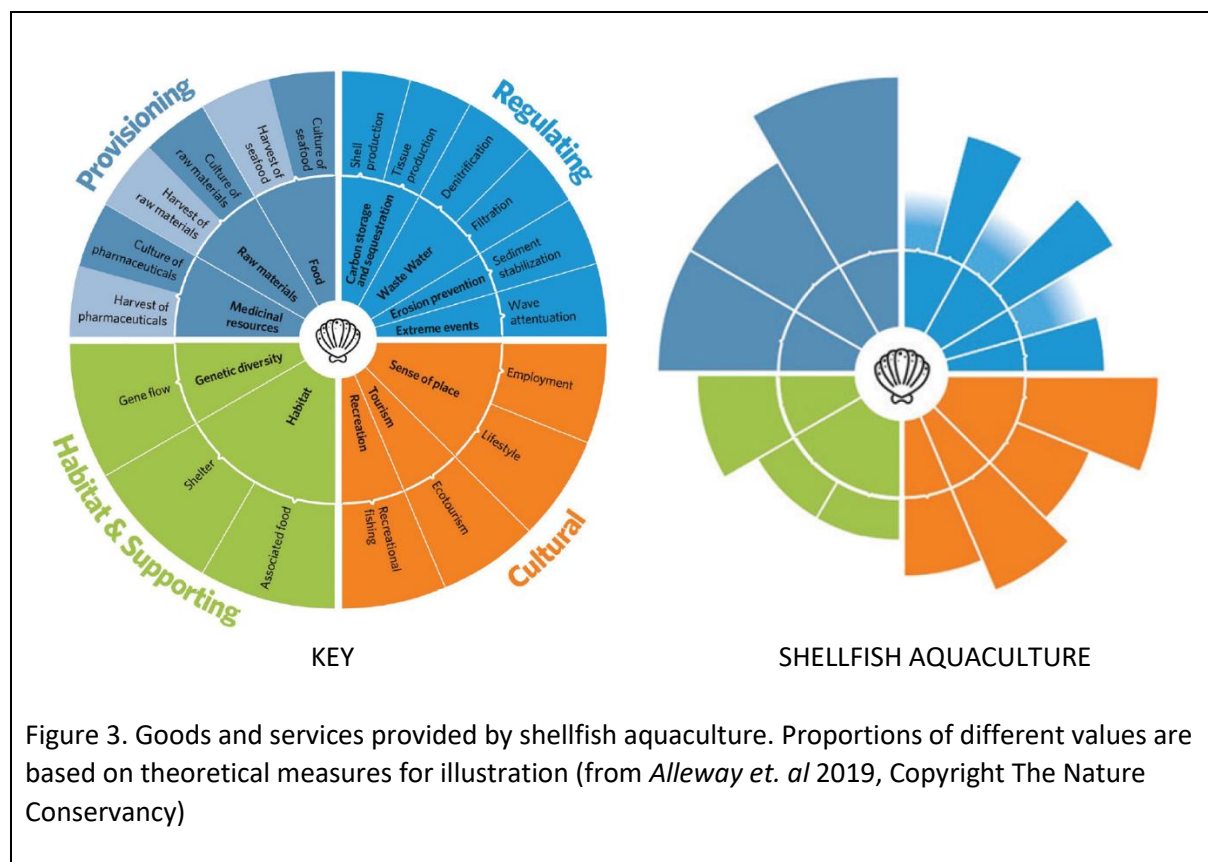


Figure 3. Goods and services provided by shellfish aquaculture. Proportions of different values are based on theoretical measures for illustration (from Alleway *et. al.* 2019, Copyright The Nature Conservancy)

## 2.3. Australian Oyster Industry

### 2.3.1. Oyster Species

Oyster production in Australia is currently dominated by the cultivation of two species, the Sydney Rock Oyster (*Saccostrea glomerata*) and the Pacific Oyster (*Crassostrea gigas*). Small numbers of Native Oysters (*Ostrea angasi*), and tropical Blacklip Rock Oysters (*Saccostrea lineage J*) are also produced in some locations.

**Sydney Rock Oyster (*Saccostrea glomerata*)** - The Sydney Rock Oyster (SRO) is endemic to Australia and is found naturally in bays, inlets and sheltered estuaries from Harvey Bay in Queensland, south to Wingan Inlet in eastern Victoria. Sydney Rocks can tolerate a wide range of salinities and occupy the intertidal zone to 3 m below the low water mark. Within this range they are common on hard rocky substrates but can survive and grow on soft substrates.

Sydney Rock Oysters generally spawn in summer. Peak spawning occurs at water temperatures of 21–23° C, meaning that the time of spawning varies between locations. Growth rates vary with local conditions, but generally Sydney Rock Oysters reach 40–60 g in 3 to 4 years.

To assist the industry, commercial hatcheries breed from selected family lines with a fast growth rate so that quick-growing spat can be derived. These hatchery-reared oysters can grow to market size in half the time of wild-caught spat (i.e. 2 years). These oysters may also be bred to provide some resistance to disease, particularly QX and winter mortality (see Section 4.1).

Since 2004, the selective breeding program for Sydney Rock Oysters has been managed and commercialised by the Select Oyster Company (SOCo), with NSW DPI acting as the operational breeder.



Figures 4. Sydney Rock Oysters  
Photo credit. Australia's Oyster Coast (NSW)



Figure 5. Pacific Oysters  
Photo credit. Tarkine Fresh Oysters (Tas)

**Pacific Oyster (*Crassostrea gigas*)** - Pacific Oysters are the most common oyster species cultivated globally and can grow very rapidly. They are not a native species to Australia but were introduced by the CSIRO into Tasmania in the 1940's for aquaculture purposes. They were later introduced into South Australia in the 1960's, and NSW waters in the 1980's.

Adult Pacific Oysters are sessile and can be found on a variety of hard substrates in the intertidal and shallow subtidal zones, to a depth of ~3 metres. They favour brackish, cool waters in sheltered waterways, although can tolerate a wide range of salinities and can also occur offshore.

With their fast growth rate, in some regions stocks can grow to a marketable size within 12 months. Like Sydney Rocks, commercial hatcheries breed from select families of Pacific Oysters that have desirable traits, such as fast growth, condition, shape and disease resistance.

The Pacific Oyster selective breeding program is managed by Australian Seafood Industries (ASI), who have carried forward an Australia-wide pacific oyster selective breeding program since 1997.

**Native Oyster (*Ostrea angasi*)** - Native Oysters are found naturally along the NSW, VIC, TAS, SA and southern WA coasts. These oysters were first referred to as 'mud oysters' as it was initially thought that the oyster lived under mud. It was later discovered that larvae settle on hard substrates before breaking free later in life to rest on sand or soft mud. Correctly known as the Native Oyster, *Ostrea angasi* are also sometimes referred to as Angasi or Flat oysters. Sharing the same genus, the Native Oyster is a cousin to the famous flat Belon oysters from France.

The species was consumed long before European settlement, being an important food for indigenous Australians. The shell remains a common component of many coastal middens. Compared with Sydney Rocks and Pacifics, Native Oysters are more difficult to cultivate. Juvenile Native Oysters have relatively thin shells, and care must be taken when handling. This is a large, rounded oyster that is relatively flat, and typically develops a bold flavour over their life. The oyster prefers cooler water and is normally grown slightly lower in the water column. It has a more limited post-harvest shelf-life compared to Sydney Rocks and Pacifics.



Figures 6. Native Oysters  
Photo credit. Merimubla Gourmet Oysters (NSW)



Figure 7. Blacklip Rock Oysters.  
Photo credit. Bowen Fresh Oysters (QLD)

**Blacklip Rock Oysters (*Saccostrea lineage J*)** – Blacklip Rock Oysters are a more tropical species, and while they have been recorded as far south as Sydney, they are more common in the warmer waters of Northern Australia. Blacklip Rock Oysters are often difficult to distinguish from Sydney Rock Oysters, however under cultivation, the oyster forms a distinctive black frilly ring or “lip”. A recent study (McDougal, 2020) identified 14 distinct lineages of rock oysters in Queensland, and it is likely that each lineage represents a distinct species.

Blacklip Rock Oysters grow an appealing cup-shape and can reach market size in approximately 2 years. They are sweet tasting and does not appear to be susceptible to the QX parasite which has decimated some Sydney Rock growing regions in northern NSW.

### 2.3.2. Farming Locations

Ninety-nine per cent of Australia’s oyster production occurs across NSW, South Australia, and Tasmania, with cultivation focusing on cooler water species – Sydney Rocks and Pacifics. There is a growing industry in Queensland, Western Australia and Northern Territory, and a lot of attention is being given to development of a tropical oyster industry in Northern Australia (see <https://crcna.com.au/research/projects/northern-australian-tropical-rock-oyster-research-and-development>)

**South Australia** – The South Australian oyster industry is focused on the cultivation of Pacific Oysters. Spat are obtained from commercial hatcheries and grown out in numerous ocean embayments throughout the state. In the past, the South Australian industry was reliant on the importation of spat from Tasmanian oyster hatcheries, however in recent years a number of hatchery facilities have been built, increasing the capacity and resilience of the sector within the state. There is also a small production of Native Oysters.



Figure 8. Location of major oyster farming embayments in SA (South Australian Oyster Growers Association, 2020)

**NSW** - In NSW, oyster farming occurs in approximately 30 coastal estuaries, from Wonboyn Lake in the south, to the Tweed River – Terranora Lake in the north. The primary species under cultivation is the Sydney Rock Oyster, with some estuaries also permitted to grow Pacific Oysters. Given the importance of the Sydney Rock Oyster industry in NSW, and the perception that Pacific Oysters could outcompete and smooth this native species, only reproductively sterile, triploid Pacific Oysters are permitted to be grown in a handful of estuaries. The exception to this is Port Stephens, where wild Pacific Oysters are so prevalent, that the collection of Pacific Oyster spat, and their on-growing is permitted. The state also has a very small production of Native Oysters.

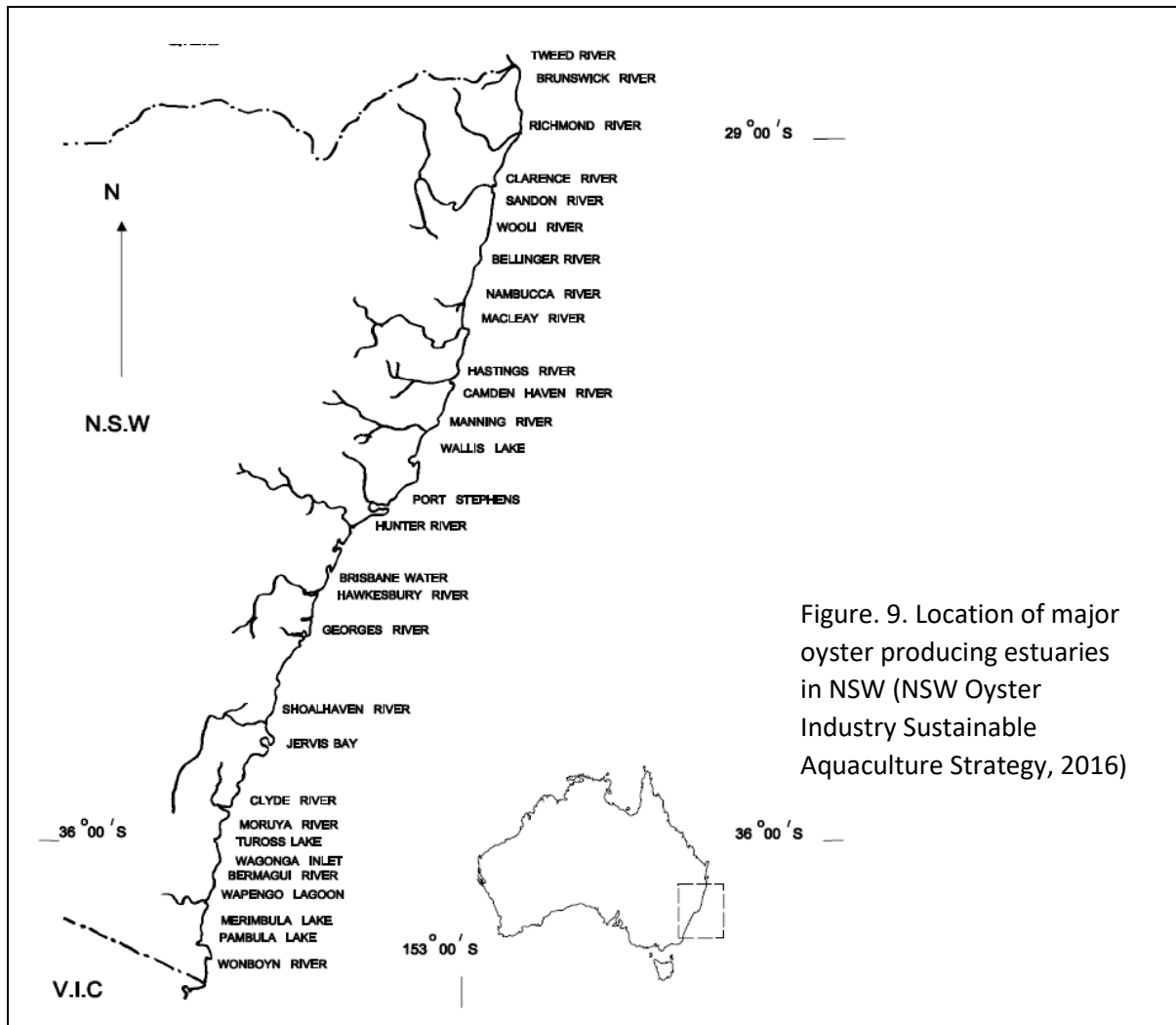


Figure. 9. Location of major oyster producing estuaries in NSW (NSW Oyster Industry Sustainable Aquaculture Strategy, 2016)

**Tasmania** - The Tasmanian oyster industry is focused on the cultivation of Pacific Oysters. Spat are obtained from commercial hatcheries, and grown out in various embayments throughout the state, predominantly on the south, north west and east coasts. There is also a small production of Native Oysters.

**Queensland** – To date oyster aquaculture in Queensland has been based around production of the Sydney Rock Oyster (*Saccostrea glomerata*), with most production areas located around Moreton Bay in South East Queensland. There is however a growing interest in tropical oysters, particularly the Blacklip Rock Oyster. There is a pioneering oyster farm in Bowen, and interest from indigenous communities further north to trial oyster cultivation.

**Western Australia** – In a similar scenario to Queensland, oyster aquaculture is fairly well established in the south of the state, with a production hub around Albany, while oyster cultivation in the north of the state is still in the pioneering phase. Trials are underway at Cone Bay and Dampier Archipelago in the Kimberley and Pilbara regions, and commercial leases have recently been established on the Abrolhos Island. The focus of production in the north is predominantly on Blacklip Rock Oysters, whilst production in south of the state is centred on Sydney Rocks.

**Northern Territory** – Oyster aquaculture in the NT is also very much in the research and pioneering phase. Research involving Blacklip Rock Oysters have been conducted on a trial farm on South Goulburn Island, with considerable assistance from Territory Government. A primary objective of the project is to support the development of Aboriginal aquaculture.

**Victoria** – Victoria has the capacity for the production of Native Oysters on existing leases in Port Phillip & Westernport Bay, however to date shellfish production in Victoria is largely focused on mussel aquaculture.

### 2.3.3. Gross Value of Production (GVP)

In 2018-19, the national GVP for the oyster industry totalled ~\$106m. Production over the last couple of years has been impacted by the outbreak of POMS (Pacific Oyster Mortality Syndrome) in Tasmania in 2016. While this outbreak curtailed production in Tassie, it had a major knock-on effect to South Australia. The South Australian oyster industry was reliant on Tasmanian hatcheries for seed, and with the outbreak of POMS, interstate import restrictions were put in place to mitigate the risk of disease translocation. At the time, South Australia did not have adequate hatchery capacity to provide the quality and quantity of seed requested by local growers.

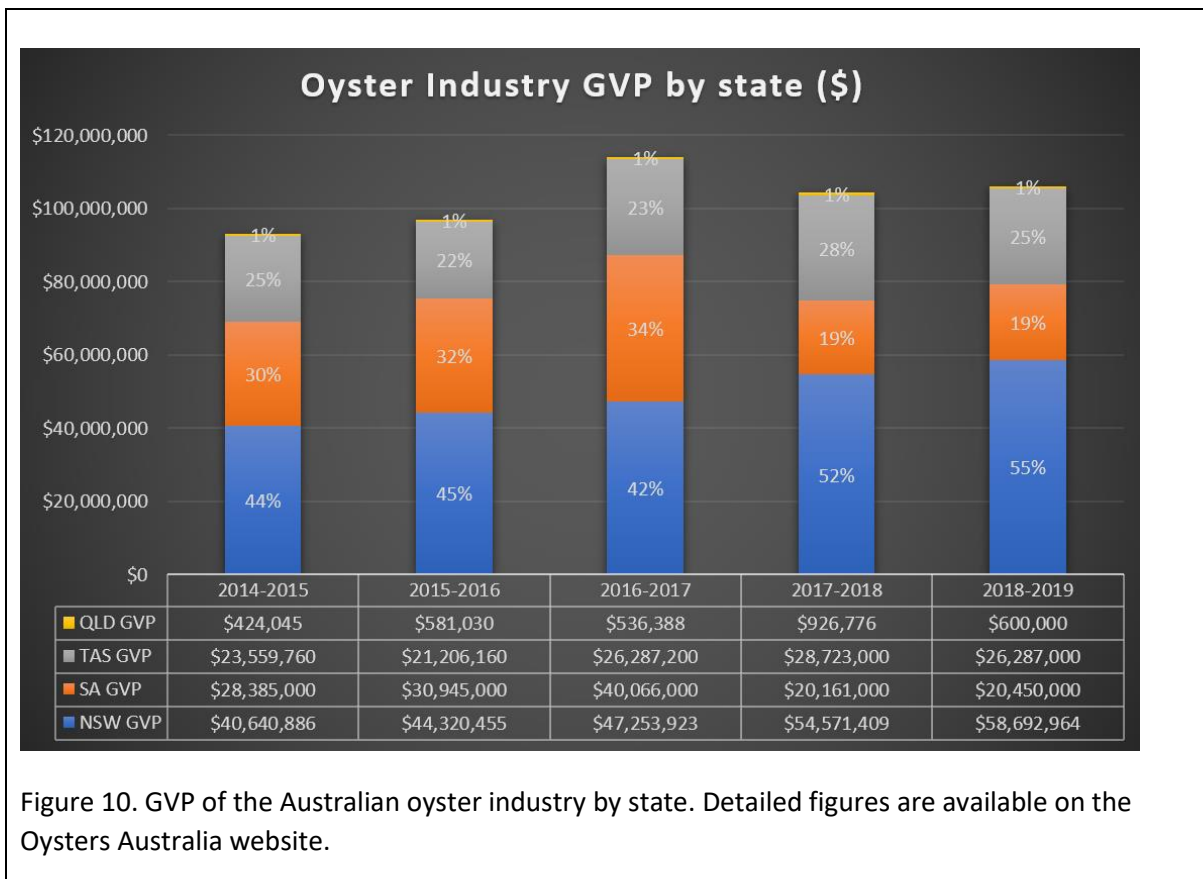
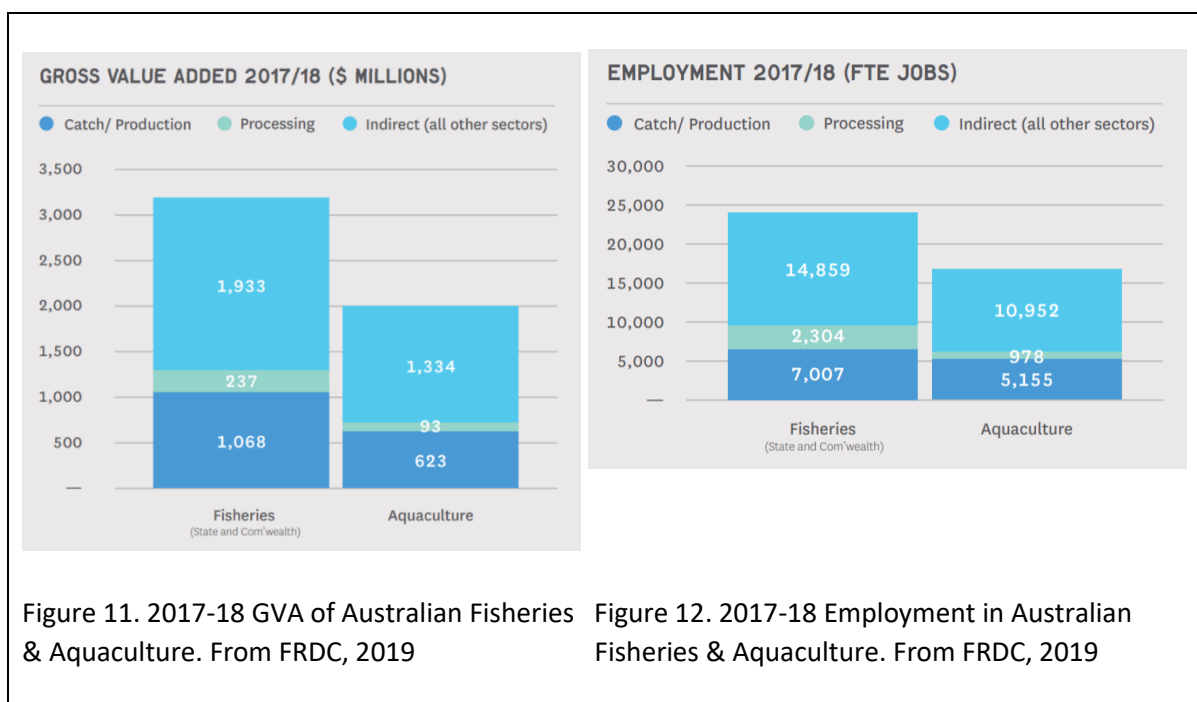


Figure 10. GVP of the Australian oyster industry by state. Detailed figures are available on the Oysters Australia website.

### 2.3.4. Economics & Employment

The Gross Value Added<sup>2</sup> (GVA) to Australia’s economy by aquaculture is estimated to be \$2 billion (FRDC, 2019) . The sector accounts for over 6,000 jobs directly and almost 11,000 jobs indirectly.



The oyster industry is a substantial component of the aquaculture industry in Australia and has been active in recent years to quantify the social and economic contribution of the sector. A report was published in 2016 by the University of Technology Sydney providing a ‘*Social and Economic Evaluation of NSW Coastal Aquaculture*’, and every year the South Australian Government engages an economic research consultancy to generate an ‘*Aquaculture Economic Impact Report*’. This provides an insight into the sectors employment figures, economic contributions and much more (see <https://www.pir.sa.gov.au/aquaculture/publications>). The data summarised in the table below has been extracted from these reports.

ITEM	South Australia	New South Wales	Tasmania	Total
Number of Oyster Farms	150	280	100	530
Number of Direct Jobs	206	370	280	856
Number of Indirect Jobs	506	1,758	450	2,714

Table 2. Employment data in the Australian oyster industry.

<sup>2</sup> Gross Value Added (GVA) represents the value of all goods and services produced in an industry, minus the cost of all inputs and raw materials used to produce that good or service. It provides a measure of the net contribution of an activity to the State/ Territory and national economies, excluding net taxes



### 2.3.5. Export vs. Domestic

Given the strong demand from the domestic market, there has been little incentive for the industry to export significant volumes of product in recent years. With production issues in SA and Tasmania following the POMS outbreak in 2016, the industry has struggled to keep up with domestic demand, and only 1% of national production is currently exported. Even prior to the POMS outbreak in 2016, only 2-3% of our national oyster production was sent overseas. As further evidence of the strength of domestic market, since 2015 Australia has been a net importer of oysters, with most of this product coming in frozen from New Zealand.

Export and import volumes trend throughout the year, with oyster exports peaking around July, and dropping off significantly over the Australian summer months. Oyster imports peak just prior to Christmas (Nov – Dec).

Export destination is dominated by Hong Kong, accounting for 75% of Australia's oyster exports. For further insights in oyster export & import, please visit the Oysters Australia website: [www.oystersaustralia.org](http://www.oystersaustralia.org)).

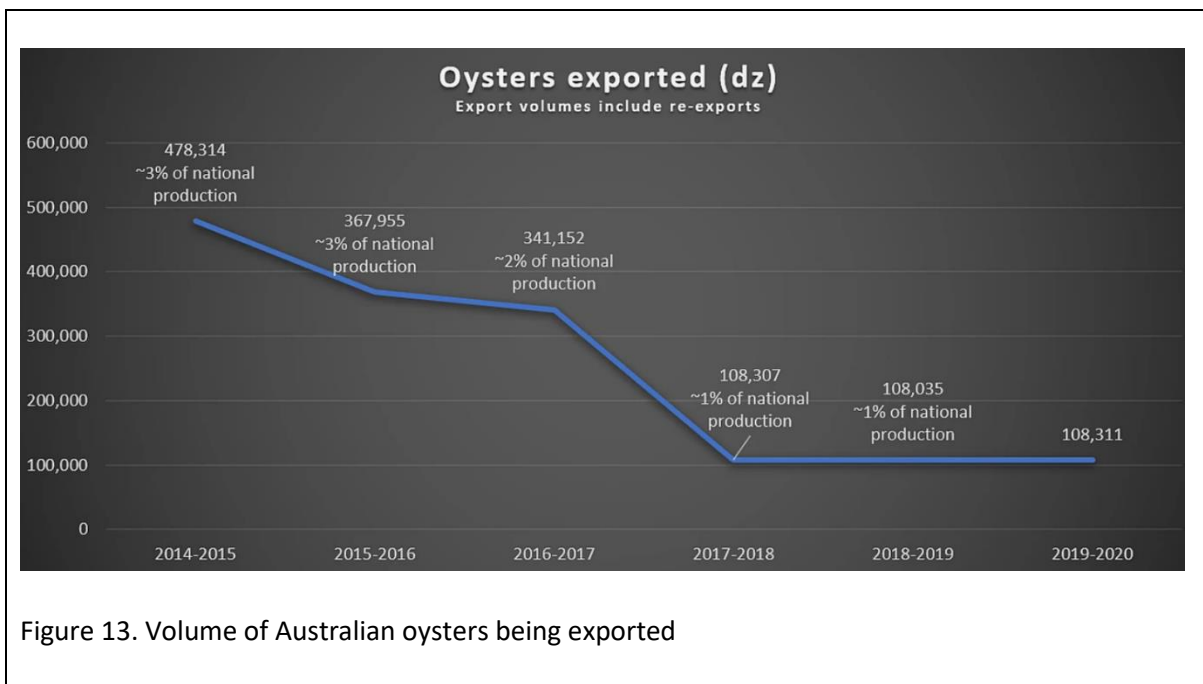


Figure 13. Volume of Australian oysters being exported

## 3. INDUSTRY STRUCTURE

### 3.1. Oysters Australia

Oysters Australia is the national body representing oyster growers (see Section 1).

### 3.2. State Industry Associations

Consistent with their dominance of the industry, this plan emphasises Pacific Oyster and Sydney Rock Oyster production in New South Wales, South Australia and Tasmania. However, wherever possible the plan aims to benefit oyster businesses in other States and growers who are producing other oyster species.

The main State associations are:

- South Australian Oyster Growers Association
- Oysters Tasmania
- NSW Farmers Association
- Queensland Oyster Growers Association

These bodies receive income through different membership and funding models and have different remits. This is reflected in the level of support that is provided within the state. Oysters Australia recognise that strong jurisdictional industry associations are essential to advocate on behalf of the industry and encourage farmers to support these bodies.

### 3.3. National Bodies

**Fisheries Research Development Corporation (FRDC)** – The FRDC is a co-funded partnership between the Australian Government and the fishing and aquaculture sectors. It was formed as a statutory corporation in 1991, under the provisions of the Primary Industries Research and Development Act 1989 (PIRD Act 1989) and is responsible to the Minister of Agriculture, Drought and Emergency Management.

FRDC's role is to plan and invest in fisheries research, development and extension (RD&E) activities in Australia. This includes providing leadership and coordination of the monitoring, evaluating and reporting on RD&E activities, facilitating dissemination, extension and commercialisation.

FRDC has a significant responsibility in ensuring, on behalf of the Australian Government, that research is undertaken to assist in the management of the fisheries and aquaculture resource for ongoing sustainability. This means that a significant proportion of funding is directed at research that has a benefit for the three sectors of the fishing industry: commercial (wild catch and aquaculture), recreational and indigenous and also delivers a public good benefit to the Australian community.

The recently released FRDC Strategic Plan, 2020 -25 (<http://rdplan.frdc.com.au/>) will guide future RD&E investment decisions by OA, particularly in collaborative projects that involve national issues.

**National Aquaculture Council (NAC)** – The body representing all aquaculture industries in Australia. The NAC is currently conducting a review to determine its role. The review is being conducted by McKinna et al Pty Ltd, under FRDC Project No 2019- 207, *Developing a value proposition and future track for the National Aquaculture Council*. Oysters Australia will decide whether it will join NAC after the review is complete.

**Seafood Industry Australia (SIA)** - Seafood Industry Australia (SIA) is the national peak-body representing the Australian seafood industry as a whole. With members from the wild catch, aquaculture and post-harvest sectors of the Australian seafood industry, it aims to be the voice of Australian seafood. Oysters Australia joined SIA in 2020.

**Ocean Watch Australia** - OceanWatch Australia is the national marine NRM organisation recognised and supported by the Australian Government. OceanWatch Australia works with the seafood industry and the community to ensure Australia's marine environment is healthy, productive, valued and used in a responsible way. The communication and extension services of Ocean Watch are used extensively by the oyster Industry.

### 3.4. Australian Shellfish Quality Assurance Program

The Australian Shellfish Quality Assurance Program (ASQAP) is a Government-Industry co-operative program designed to assure the food safety of shellfish. It applies to shellfish supplied to the domestic and export markets. The implementation of pre-harvest and some post-harvest ASQAP standards are the responsibility of State Government agencies. These agencies run shellfish programs that are modelled on the Australian Shellfish Quality Assurance Program (ASQAP). The basis of this program is to improve the safety of bivalve shellfish, by monitoring harvest waters for the presence of biological or chemical hazards and using comprehensive risk management systems to reduce the risk of food-borne illness.

Post-harvest standards, such as those relating to depuration, storage, handling and labelling, are largely the responsibility of shellfish producers.

The implementation of the ASQAP requires each growing area to have:

- A comprehensive sanitary survey which includes classification and management plan development.
- An ongoing bacteriological monitoring program.
- A continuous environmental monitoring program to ensure that harvesting only takes place within management plan criteria.
- A biotoxin monitoring program and management plan (PDF).
- A chemical residue testing program.
- An annual review of both the recent data collected and the current management plan.

### 3.5. Codes of Practice & Industry Strategies

In each jurisdiction there are a variety of strategies, plans and Codes of Practice which guide industry operation and development. Some of the most prominent are linked below.

#### **New South Wales**

- [NSW Oyster Industry Sustainable Aquaculture Strategy \(2016 – 3<sup>rd</sup> Edition\)](#) – Published by the NSW Department of Primary Industries, these guidelines have been developed by the Government in partnership with the industry, community, and other stakeholders. This strategy, known as OISAS, is accompanied by a set of best-practice guidelines for different growing techniques. The 4<sup>th</sup> edition is due out in mid-2021.
- [NSW Oyster Industry Strategy \(2015\)](#) - The strategy was led by oyster farmers to focus industry development into the future. A working group of farmers was established to drive

implementation of the actions, which was ultimately disbanded a couple of years ago. Carriage of the document currently rests with the NSW Shellfish Committee.

- [Aquaculture Research Advisory Committee, Research, Development & Extension Plan \(2017-2022\)](#) – This plan provides guidance for the development and implementation of RD&E in support of the NSW aquaculture industry
- [Healthy Estuaries for Healthy Oysters Guidelines \(2017\)](#) – This document was prepared by NSW DPI primarily for Local and State Governments to guide development that protects the oyster industry and estuarine water quality objectives.
- [Environmental Management Systems \(EMS\)](#) – Across 18 estuaries, local oyster farmers have banded together to explore potential environmental improvements that can be made within the industry. The EMS process also looks at what risks are present within the surrounding catchment that may impact on water quality. This information is compiled in estuary-wide Environmental Management Systems or EMS.

#### **Tasmania**

- [Best-practice guide for Tasmanian oyster producers – Biosecurity & Disease Preparedness](#) -
- [Tasmanian Seafood Industry Council Roadmap 2019-2022](#) – This strategic plan paves the strategic direction of the Tasmanian seafood industry over the coming years.
- [Oysters Tasmania Strategic Plan.](#)

#### **South Australia**

- [Code of Practice for the Environmental Management of the South Australian Oyster Farming Industry \(2017\)](#) – The aim of this Code of Practice is to assist oyster farmers in complying with South Australia’s EPA legislation and, in doing so, ensure that oyster farming activities do not cause environmental harm. This is achieved by identifying potential environmental issues associated with the farming of oysters and providing management actions to address these issues
- [South Australian Oyster Growers Association Strategic Plan \(2020-2025\)](#) – The Strategic plan aims to benefit growers by directing research & development conducted by the South Australian Oyster Research Council.

#### **Queensland**

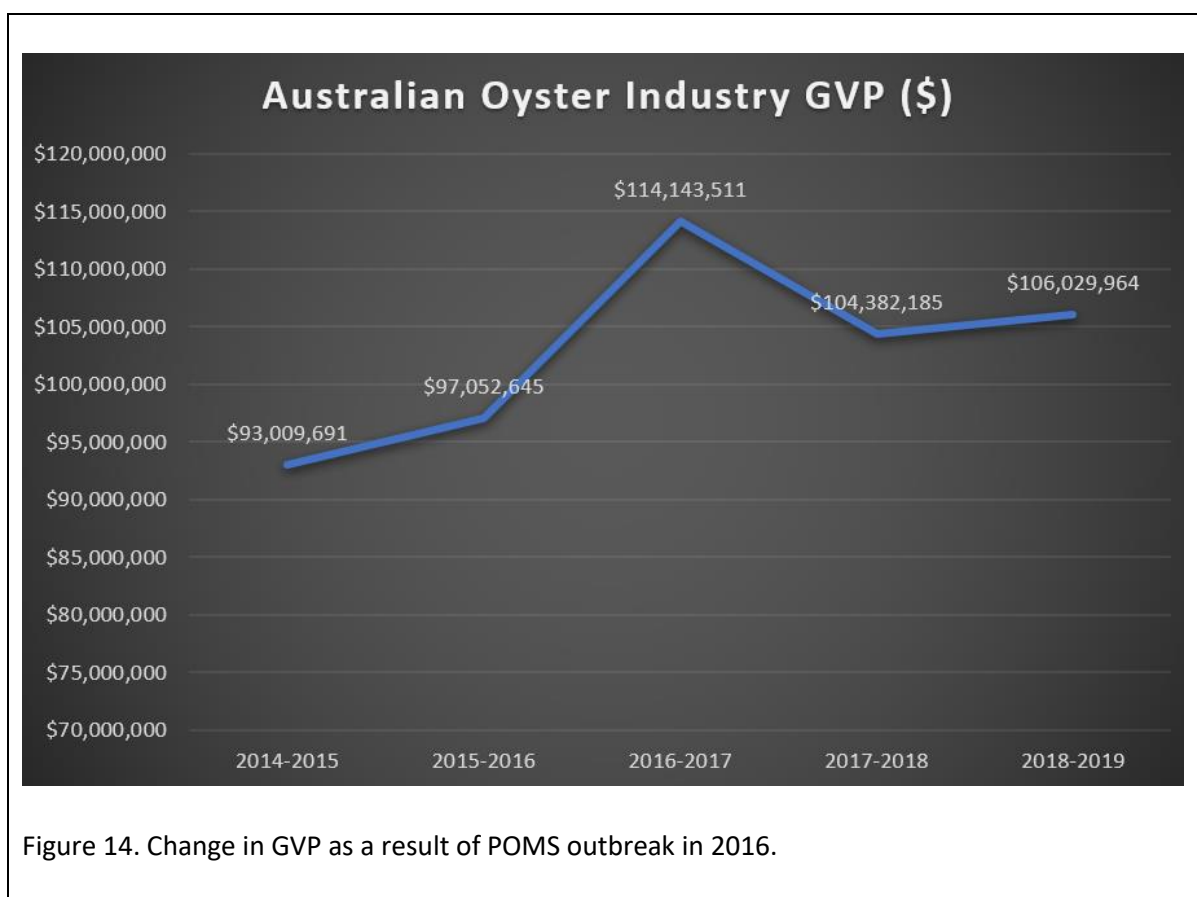
- [Oyster industry plan for the Moreton Bay Marine Park \(2015\)](#) – With the majority of oyster production in Queensland occurring in or around Moreton Bay, this plan supports and promotes the development of the commercial oyster industry in Queensland while providing for the ecologically sustainable use of the Moreton Bay Marine Park.

## 4. INDUSTRY ISSUES – CHALLENGES & OPPORTUNITIES

### 4.1. Disease

**Pacific Oyster Mortality Syndrome (POMS)** – In 2010 POMS occurred in Botany Bay and the Georges River in NSW, causing huge losses of Pacific Oysters. By 2013, it had spread to the Hawkesbury River; known for its large production of Pacific Oysters. The disease killed 10 million oysters over three days. Then, in January 2016, POMS struck in Southern Tasmanian waters. Sixty per cent of Tasmania’s oyster growing areas were affected and the industry lost 50 employees as a result of the commercial impact of the disease. In 2018 the disease was detected in the Port River in Adelaide (SA) but to date has not spread to the commercial oyster growing regions of SA. However, oyster production was reduced by half in South Australia because quarantine controls prevented farms from receiving oyster spat supplies from Tasmania.

The industry is only now recovering, due largely to the development of POMS resistant oysters by ASI and establishment of commercial hatcheries in SA.



**QX disease** – QX (for Queensland Unknown) disease is caused by the parasitic protozoan *Marteilia sydneyi*, and is the most serious disease affecting the Sydney Rock Oyster industry. The QX parasite has been identified in many NSW estuaries, with some suffering notable outbreaks (e.g. Hawkesbury & Clarence Rivers). The parasite destroys the digestive gland of the oyster so that it can no longer take up nutrients, and effectively starves to death.

As the operational breeder for the Sydney Rock Oyster breeding program, NSW Department of Primary Industries has had some success in breeding oysters that are resistant to QX disease.

**Winter Mortality** - The cause of Winter Mortality in Sydney Rock Oysters is the protozoan *Bonamia roughleyi*. As the name implies, Winter Mortality may occur over the winter months, although typically infected oysters don't tend to die until spring. In recent years the incidence of winter mortality has been low, and not many farmers have suffered notable mortalities. In other areas outbreaks have also been linked to oyster stress and overstocking.

Outbreaks tend to be restricted to the cooler, southern range of Sydney Rock Oysters. Mature oysters in their third winter, just prior to reaching market size, are the most susceptible.

**South Australian Mortality** – Over recent years there have been much higher than expected mortality rates of Pacific Oyster spat in many South Australian growing regions. Occasionally the mortality exceeds fifty per cent. The cause of these deaths is unknown; however, they are widely thought to be environmental and multifactorial.

**Bonamia** – Bonamiasis is a parasitic disease of flat oysters which has resulted in significant oyster mortalities overseas. In Australia, Native Oysters (*Ostrea angasi*) are susceptible and the pathogen responsible (*Bonamia exitosa*) have been found in stocks in NSW, VIC, TAS, SA and WA. Mortalities can occur year-round; however, the highest prevalence is in mid- to late-summer after oysters spawn.

It is worth noting that disease outbreaks are largely influenced by environmental factors, which impact both on the ability of the pathogen to infect the oyster, and on the oysters' ability to defend itself. Oysters growing in a healthy ecosystem are more resilient to disturbance than those growing in an unhealthy system.

#### 4.2. Water Quality

Oyster production requires water quality that supports healthy oyster growth and results in a product that is safe for human consumption.

Bacteria, viruses, marine biotoxins and environmental pollutants may all impact on the suitability of oysters for human consumption. Most are a direct result of human activity except for marine biotoxins. Monitoring of oyster leases for microbial contaminants is overseen by State Governments through quality assurance programs. If any of these agents occur at levels above set thresholds, the commercial harvest of oysters is stopped. Prevention and early detection of these problems is therefore critical for the industry to maintain reputation and ensure continuity of supply.

Oyster farmers invest considerable time and resources to mitigate exposure to risks, however as oysters are grown in natural systems, in public owned waterways, some degree of risk will be ever-present.

#### 4.3. Biosecurity

**Interstate Translocation of Oysters** – Translocation regulations apply in each State to prevent cross border introductions of diseases and pests. This is significant in relation to genetic improvement programs as the regulations in some instances prevent growers having access to elite germplasm.

**Aquatic Emergency Animal Disease Response Agreement (aEADRA)**– This agreement has been the subject of on-going negotiations between Australian Governments and aquaculture industry sectors. The purpose of the agreement is to facilitate timely, cohesive and jointly funded national responses to incursions of potentially devastating diseases of aquatic animals.

**Farm Biosecurity** – The need for heightened emphasis on biosecurity is emphasised in a new report issued by CSIRO in November 2020: *Australia’s Biosecurity Future, Unlocking the next decade of resilience (2020–2030)*.

<https://www.csiro.au/en/Do-business/Futures/Reports/Health/Biosecurity-Futures>

The report states that between 2012 and 2017, the annual number of interceptions of biosecurity risk materials at Australian borders rose by almost 50%, to 37,014. To contain this increasing risk a transformational change is proposed that will require stronger collaboration across Governments, industry, research and the community. Three themes of improvement are proposed:

- System connectivity – Digitising processes, enhancing partnerships and greater data sharing across supply chains.
- Shared responsibility – Harnessing the collective knowledge and capability of citizens, communities and industries to ensure national biosecurity efforts are optimised; and that all Australians are aware of, and value, their role in managing biosecurity risks.
- Innovation in science and technology – Creating national innovation platforms for developing and commercialising next-generation technologies and services that target priority biosecurity risks.

Strategically, the oyster industry will need to actively participate in the evolution of biosecurity planning over the next five years.

There is also a push for farm-level biosecurity plans in some jurisdictions. The preparation of such plans will ensure that businesses are aware of their regulatory requirements, pertinent diseases and pests, what to do if an event occurs, reporting pathways and assistance available.

**The Australian Shellfish Quality Assurance Program (ASQAP)** – Is a Government-Industry co-operative program that provides for the food safety of shellfish. The ASQAP Manual comprises the procedures and administrative practices that, if adhered to, enable food safety programs to comply with the Food Standards Australia New Zealand Food Standards Code and Export Orders as they relate to bivalve molluscs. Each State is responsible for implementing its own food safety program in accordance with the ASQAP guidelines.

**SafeFish** -provides technical advice to support Australia’s seafood trade and market access negotiations and helps to resolve barriers to trade. It does this by bringing together experts in food safety and hygiene to work with the industry and regulators to agree and prioritise technical issues impacting on free and fair market access for Australian seafood. *SafeFish* also supports emergency seafood incident response management and investigates emerging domestic seafood safety issues. Oysters Australia is a partner organisation in *SafeFish*.

#### 4.4. Covid19 & Market Development

In February 2020 when the global Covid19 pandemic took hold, the biggest effect on the oyster industry was loss of seventy percent of sales, due to shut down of food service outlets. This meant that many oyster farms retained stock they would normally sell.

Consumer research conducted by FRDC indicates that only 8% of Australians buy oysters regularly, compared to 24% for prawns (FRDC, 2019b) . It was also found that 49% of Australians do not buy oysters because they do not like the taste. So there is a large, untapped market for oysters. To date there has been no coordinated consumer marketing or promotion of oysters in Australia. However, in 2020 SIA received a grant of \$4million from the Australian Government for use in development of a national seafood promotion campaign. OA is participating in this campaign as it develops.

#### 4.5. Freedom to Farm (incl. Social Licence)

The oyster industry is aligned with the food and tourism industry and enjoys reasonable social licence.

Poorly managed and maintained leases and land-bases do however reflect negatively on the industry and impact the enjoyment that coastal residents and water users derive from the space.

[The NSW Oyster Industry Sustainable Aquaculture Strategy](#) includes a 'Good Neighbour Policy' to help growers mitigate these risks, and there are various initiatives across the country to improve the public perception of the industry. One example is the OceanWatch *Tide to Tip* Initiative which mobilises oyster farmers to undertaken estuary clean-ups in the same week. In 2020, almost 250 farmers volunteered their time, equipment, local knowledge & experience to complete local clean-ups in rubbish hotspots.



Figure 15. Port Stephens Oyster Farmers mucking in during Tide to Tip 2020



Oyster farming is conducted in public waterways under leases granted by State Governments. In the past, the short tenure of leases restricted growers from obtaining the capital investment needed to develop their farms. This has changed in recent years with South Australia and Tasmania able to obtain 30 year leases, and NSW pushing for the same arrangement. Given their lack of awareness and understanding about the industry, banks have also been reluctant to loan, and recognise oyster leases are collateral. In 2018, the Australian Government's Farming Together Program funded the development of a Finance Support Pack. The materials developed help to:

- Increase the ability of farmers to access appropriate and timely finance to upgrade, innovate and grow their business.
- Educate the finance industry about the oyster industry, and investment opportunities
- See <https://www.nswoysters.com.au/keyindustrydocs.html> for more details.

#### 4.6. Environment & Climate Change

It has been known for more than a decade that the direct effects on oysters of increased ocean acidity and temperature are lower fertility, slower growth and increased spat mortality (Parker et al, 2009). Indirect effects, such as pathogen activation are also possible (Pearson R, 2017).

Pollutant and nutrient inflows to estuaries have also been directly linked with crashes in oyster production. These include acid soil and anoxic runoff, poor sewage management and algal blooms (Pearson R, 2017).

The oyster industry will also be impacted in various ways with changes in rainfall patterns, freshwater inflows, water circulation, air temperatures, water heights and ecological changes in range & distribution of some species. Pacific Oysters are particularly susceptible to increases in predatory flatworms (Doubleday et al. 2013), which can be triggered by high salinity induced by drought (O'Connor and Newman 2001).

Oysters are increasingly recognised as having a positive impact on the coastal environment. They improve water quality by filtering algae from the water they function as a natural filter and improve water that is overloaded with nutrients. Oyster reefs are being restored along coastlines in many countries as a buffer to damage caused by storms and preservation of aquatic species (NOAA, 2019).

Oysters are also recognised as one of the more sustainable sources of seafood. The World Resources Institute produced a high-level policy paper in 2019 that evaluated various sources of nutrition in the ocean (Costello C, 2019). The paper concluded that sustainably expanding unfed mariculture (i.e. mariculture of species that do not depend on feed inputs for nutrition, such as bivalves and seaweed) can substantially increase nutritious food and feed with a lower impact on the marine environment, and may in some cases enhance wild fisheries by creating artificial habitats. The effects of ocean acidification on oysters may also be partly negated through a targeted breeding program.

Real time monitoring of water quality in oyster producing estuaries is becoming more achievable as technology improves and cost of the technology declines. Oyster growers may be able to use this technology to make management decisions based on tide levels, water temperature, air temperature and chlorophyll and/or nutrient levels. For example, monitoring food availability (phytoplankton) to enable oysters to be located in the most favourable growing areas.

#### 4.7. Changing Industry Business Models & Business Valuations

The majority of oyster farms are family businesses. However, over the past five years there has been some business consolidation, as larger farms purchase smaller farms. Some hatcheries are also vertically integrated, producing and finishing oysters on their own farms. One ASX listed company have also been established in recent years, with another preparing to list in the near future.

#### 4.8. Selective Breeding Programs

Family-based genetic selection is a proven, powerful technique used in Australia to improve the performance of oysters, by selecting for commercially significant traits. These include disease resistance, survivability, growth rate and conditioning. World – class breeding programs are in place to supply Australian hatcheries with elite Pacific Oyster and Sydney Rock Oyster brood stock. The Pacific Oyster program is conducted by Australian Seafood Industries Pty Ltd (ASI) and is funded by a service fee of \$2.80 per thousand spat sold by all hatcheries. The Sydney Rock Oyster breeding program is managed and commercialised by the Select Oyster Company (SOCo) since 2004 with NSW DPI acting as the operational breeder. This arrangement is currently being reviewed, with NSW DPI temporarily taking on the commercialisation role.

Genetic technology is improving exponentially, and the oyster industry needs to ensure that it secures the benefits available from the new technology.

#### 4.9. Technology

Rapidly advancing technologies are transforming the way in which food is produced around the globe. Application of these technologies is in turn attracting significant new capital into the food industry. Examples of these technologies include 3D printing, artificial intelligence, gene editing, data management, robotics, nanomaterials, synthetic biology and environmental sensors. Few of these technologies are currently being applied to oyster production, but the industry must be alert to opportunities to apply them in future.

#### 4.10. Engagement with Complimentary Industries (eg. Food & Tourism)

While the vast majority of oysters are sold through food service, individual growers all over Australia are now part of the gourmet food and hospitality sector. Food tourism is big business and the oyster industry needs to plan for its expansion. Rather than doing this alone, Oysters Australia may investigate opportunities to form alliances with industry associations representing tourism and hospitality.

## 5. OYSTER INDUSTRY RD&E Plan

Following an industry consultative process, five program areas have been established.

<b>PROGRAM 1:</b>	<b>PRODUCTION &amp; INNOVATION</b>
Indicative Funding:	30%
Desired Outcome:	Increase the sustainable, efficient production of oysters and their management on farm
<b>PROGRAM 2:</b>	<b>RISK MANAGEMENT</b>
Indicative Funding:	25%
Desired Outcome:	Minimise the impact of disease, waterway contamination, climate change and other risks
<b>PROGRAM 3:</b>	<b>PEOPLE &amp; KNOWLEDGE</b>
Indicative Funding:	15%
Desired Outcome:	Knowledge, skills & networks are developed, increasing the industry's human & data resources
<b>PROGRAM 4:</b>	<b>POST HARVEST &amp; MARKET DEVELOPMENT</b>
Indicative Funding:	10%
Desired Outcome:	Build consumer demand for oysters and increase profitability through the supply chain
<b>PROGRAM 5:</b>	<b>INDUSTRY PROFILE &amp; REGULATION</b>
Indicative Funding:	10%
Desired Outcome:	The oyster industry is recognised as a legitimate and responsible user of public resources, and operates under constructive regulation
<b>EXTENSION &amp; ADOPTION</b>	
Indicative Funding:	10%
Desired Outcome:	R&D outputs are extended appropriately & adopted
Oysters Australia consider extension and adoption fundamental components of all research and development projects, rather than a stone alone set of projects	

These programs and outcomes are described in more detail on the following pages, with key indicators and potential project ideas. These project ideas have been prioritised based on industry feedback, however these may change with time and OA welcome ideas not currently listed.

## Program 1: Production & Innovation

<b>Desired Outcome</b>	Increase the sustainable, efficient production of oysters and their management on farm
<b>Indicative Funding</b>	30%

### BACKGROUND

At the enterprise level, the pathway to maximise income for most oyster farms is to increase both the volume and efficiency of production, and to minimise the exposure to risk. In relation to increasing production and efficiencies on farm, this may be achieved directly through:

- the development of new cultivation & harvesting methods,
- changes to existing growing systems,
- the development and deployment of technology & mechanisation both on water & in sheds,
- optimising stock management.

Whilst many on-farm ‘improvements’ are developed by gear manufacturers, engineering companies and innovators outside of the industry, oyster farmers themselves are intuitively innovative. Not only do they have first-hand experience of a production issue but will likely have an informed view of workable solutions. This experience should be incorporated into projects wherever possible.

It is worth emphasising that gains in production or efficiency should not come at the expense of product quality. Australian oysters have an enviable reputation as a premium product and is often marketed as such. This reputation can be easily eroded if product quality slips. Likewise, changes to cultivation should be in-line with best-practice, ensuring that new methods have less impact on the environmental, or are even regenerative.

At a whole of industry level, the supply of oysters is likely to be increased over the life of this plan through the recovery of production in South Australia and Tasmania, the development of commercial initiatives in WA, NT and QLD, by expansion of production by new vertically integrated and ASX listed companies and by farms growing new oyster species. The increased supply will put downward pressure on price unless new markets are established (see Program 4). Therefore, it is debateable whether Oysters Australia should invest in activities that solely increase the supply of oysters.

### STRATEGIES & PERFORMANCE INDICATORS

Strategy	Performance indicators
Support innovation which can lead to efficiency or productivity gains on farm or in the supply chain	➤ Number of innovations that have been successfully implemented by end-users.
Provide a conduit between industry, innovators, and other stakeholders as appropriate	➤ Number of innovations that have been successfully implemented by end-users.

**EXAMPLE PROJECTS**

	Priority
Support development of technologies and innovation which will result in improved productivity and profitability (e.g., basket / bag retrieval, processing of oysters)	High
Select oysters for traits that improve productivity, such as growth rate, and condition.	High
Assess and report on the performance of selectively bred stock	High
Streamline integration of farm-management apps with other systems (e.g., state reporting requirements)	Medium
Support hatcheries & nurseries to overcome production issues (e.g., nursery guidelines)	Medium
Research opportunities for multi-trophic or multi-species aquaculture	Medium
Explore new or alternate aquaculture species, and the hatchery, nursery, and grow-out requirements (incl. other oyster species)	Medium

**EXTENSION & ADOPTION:**

All projects are required to extend outputs and encourage adoption where possible (see page 38).

## Program 2: Risk Management

<b>Desired Outcome</b>	Minimize the impact of disease, waterway contamination, climate change and other risks
<b>Indicative Funding</b>	25%

### BACKGROUND

The size, severity, timing, location and impacts of disease events and natural disasters are difficult to predict, and our changing climate increases the uncertainty about future risks. Some areas of risk to an oyster business, and to the industry as a whole, include:

- disease
- environmental extremes – e.g., floods, heat kill, drought and storms
- climate change
- water quality – e.g., harvest area contamination, toxic algae blooms

Oyster farmers invest considerable time and resources to mitigate exposure to risks, however as oysters are grown in natural systems, in public owned waterways, some degree of risk will be ever-present.

There are ongoing efforts to breed oysters that are resistant to disease. This includes POMS and South Australian mortality in Pacific Oysters and QX disease and Winter Mortality in Sydney Rocks. The ‘causative agents’ of these diseases often persist in the environment and are unable to be eradicated. These selective breeding programs are therefore essential for the continuation of the oyster industry in areas where disease reoccurs. Parallel to breeding programs, there has also been work undertaken to understand oyster diseases and how to manage stock during infection windows.

The oyster industry will be impacted in various ways with changes in climate. Adaptation will be required, and farmers will need to progressively adapt their systems and management to changes in rainfall pattern, freshwater inflows, water circulation, air temperatures, water heights and ecological changes in range & distribution. Increasing ocean acidity and temperature will reduce the reproductive output of oysters, while the impact of pathogens will likely increase.

Bacteria, viruses, marine biotoxins and environmental pollutants may all impact on the suitability of oysters for human consumption. Most are a direct result of human activity except for marine biotoxins. Monitoring of oyster leases for microbial contaminants is overseen by State Governments through quality assurance programs. If any of these agents occur at levels above set thresholds, the commercial harvest of oysters is stopped. Prevention and early detection of these problems is therefore critical for the industry to maintain reputation and ensure continuity of supply.

In recent years there has been an explosion in the development of real-time monitoring systems, which can measure a variety of parameters. The sophistication of these systems will undoubtedly increase in coming years, while costs will fall. Coupled with the rise of AI (Artificial Intelligence) these monitoring systems are capable of forecasting environmental conditions, giving farmers the capacity to make informed management decisions.

## STRATEGIES & PERFORMANCE INDICATORS

Strategy	Performance indicators
Grow oysters that are resistant to diseases and have traits desired by consumers	<ul style="list-style-type: none"> <li>➤ Increase in the estimated breeding values of oysters selectively bred for disease resistance</li> <li>➤ Prevalence of each disease declines</li> </ul>
Maintain and improve monitoring systems (incl. remote systems and those with predictive capabilities)	<ul style="list-style-type: none"> <li>➤ Number of monitoring systems supported / improved</li> <li>➤ Progressive decline in the number of contamination events.</li> </ul>
Implement sound biosecurity practices	<ul style="list-style-type: none"> <li>➤ Impact of ongoing and single event contamination is minimised</li> <li>➤ Biosecurity practices supported / improved</li> </ul>
Investigate causes of wide-spread mortality	<ul style="list-style-type: none"> <li>➤ Control mechanisms can be implemented</li> </ul>
Co-invest with national climate change adaptation initiatives	<ul style="list-style-type: none"> <li>➤ Partnerships developed</li> <li>➤ Climate change adaptations extended / adopted</li> </ul>
Breed oysters that are adapted to future climates	<ul style="list-style-type: none"> <li>➤ Climate adaptation is included as one of the traits considered by hatcheries in selection of brood stock available from breeding programs</li> </ul>
Investigate potential impacts of climate change on the oyster industry (points of weakness) and implement adaptation measures	<ul style="list-style-type: none"> <li>➤ Climate change adaptations extended / adopted</li> </ul>
Support a move to a carbon neutral industry	<ul style="list-style-type: none"> <li>➤ Reduction in industry emissions</li> </ul>

## EXAMPLE PROJECTS

	Priority
Continue genetic selection for disease resistant Pacific and Sydney Rock Oysters, while also enhancing other traits	High
Continuous, real time monitoring systems – meteorological & in-water data, inc. algae and bacteria as food and/or contaminants. Improve predictive capabilities of monitoring systems.	High
Develop methods to investigate unexplained mortalities (environmental & genetic influences)	High
Understand how climate changes in hydrodynamics impact on oyster growing areas	High
Prepare responses to emergency disease outbreaks	High
Assess and report on the performance of selectively bred stock	High
Evaluate and support rapid / in-situ tests	High
Continue to support SafeFish to provide technical input to management of contaminants.	High
Breed oysters adapted to new climate conditions (acidity & heat tolerance)	High
Introduce genomics into the breeding programs for faster, more accurate selection	High
Support hatcheries & nurseries to overcome production issues (eg. nursery guidelines)	Medium

Support farm-level biosecurity planning & implementation of strong biosecurity protocols	Medium
Increase public education & awareness of biosecurity risks & protocols	Medium
Understanding how adapting farm management can impact on exposure to risk	Medium
Assess impact and recovery from Covid over time. Grower & supply chain reflections / learnings.	Medium
Identify and monitor potential diseases in Queensland	Medium
Establish a set of natural capital accounting figures for oyster farmers for use in potential future offsets	Medium
Undertake carbon footprint analysis of oyster farms, and identify opportunities to reduce emissions / offset	Medium
Consistency in biosecurity protocols across states	Medium
Improved waste management and integration of the circular economy	Medium
Expanded testing for pollutants like microplastics and their long-term effects on food chains	Low
Develop standardised educational materials to influence landholder behaviour	Low
Explore new or alternate aquaculture species, and the hatchery / nursery / grow-out requirements	Low
Conduct research into improved external fertilisation and early-stage larval rearing of oysters	Low

**EXTENSION & ADOPTION:**

All projects are required to extend outputs and encourage adoption where possible (see page 38).



## Program 3: People & Knowledge

<b>Desired Outcome</b>	Knowledge, skills & networks are developed, increasing the industry's human & data resources
<b>Indicative Funding</b>	15%

### BACKGROUND

The oyster industry in Australia is a melting pot which attracts people from all walks of life. From multiple-generational farmers operating across states to hobby farm retirees, from ASX listed corporations to sole traders. In supporting production there is also a plethora of auxiliary roles across hatcheries, research, engineering, management, biosecurity, gear suppliers, transport, food safety and training, just to name a few.

Reflecting this diversity, the knowledge and experience of personnel also varies considerably, and there is a thirst for knowledge and connections to support industry activity and growth. Given the regional nature of oyster farming, these connections are not always easy to establish and maintain.

In the past, industry conferences have been organised on a state basis, with Tasmania & SA typically running annual gatherings, while NSW has traditionally hosted a biennial conference. Such events are enjoyed by attendees and provide a forum to not only share knowledge, but to build contacts and networks. The networks built during good times are invaluable during crisis.

The value of farmer-to-farmer gatherings also cannot be overstated. Farmer forums and estuary exchanges are valuable tools that enable farmers to connect and exchange practical information.

Knowledge and education are essential to the industry's prosperity. The cost of training can often be subsidised by Government or grant funding, but industry must be able to clearly articulate its training needs, and to encourage training providers to engage.

Recognising the value of knowledgeable and capable people involved in the industry is nothing new, but in recent years there has been growing interest in the accessibility and management of data related to the sector. This may be information collected on farm (eg. production data, growth rates, stocking densities etc), from the surrounding environment (eg. water temperature, salinity, pH, chlorophyll a, dissolved oxygen, etc.), or some other set of data (eg. satellites, machine learning).

This data resource adds value to the industry and can be used in a multitude of ways, including:

- benchmarking exercises,
- production forecasting,
- environmental management
- preparedness & response to adverse events,

There is also scope to influence the development of AgTech specifically for the sector, and to work with data providers (eg. BoM) to ensure their products are optimally used by the industry.

All industries compete for the "brain space" of the research community, and the industry needs to form partnerships with scientists as a strategy to gain early access to new ideas and technology.

## STRATEGIES & PERFORMANCE INDICATORS

Strategy	Performance indicators
Encourage and support opportunities to oyster farmers & aligned industries to network and share knowledge at a local, state, and national level	➤ Establishment of at least one facilitated oyster network for information sharing in each state
Identify industry training needs and access suitable training resources	➤ A training program is in place to deliver agreed learning outcomes
Build alliances with scientific institutions	➤ More scientists opt to study oysters
Establish a knowledge bank of data that can be shared under secure arrangements to improve R&D outcomes	➤ Access to datasets and resources for a variety of purposes
Identify areas of mutual benefit with other aquaculture sectors	➤ Number of collaborative programs that deliver valuable outcomes

## EXAMPLE PROJECTS

	Priority
National Oyster / Unfed Mariculture Conference	High
Support establishment of facilitated networks for technical exchange between growers	High
Development of improved capacity in oyster organisations to interact with Government to achieve regulatory change	High
Build strategic alliances with scientific agencies to encourage collaboration and ensure their long-term commitment to the industry	High
Support the meeting of the Australian Shellfish Quality Assurance Advisory Committee (ASQAAC) and the exchange of knowledge related to food safety and quality assurance programs	High
Covid response. Grower & supply chain reflections/observations and lessons - opportunities/constraints analysis as a learning tool	High
Register of georeferenced datasets of relevance to the oyster industry	High
State and National registers of sales transactions for oyster leases to assist valuation reports (onshore & water assets)	Medium
Mental health support / projects	Medium
Support leadership training & succession planning	Medium
Support business benchmarking	Medium
Integrate benchmarking & production forecasting algorithms within farm-management tools	Medium
Continue and expand the 'National Oyster Market Report' trial	Medium
Provide information for people wishing to enter and exit the industry	Medium
Support the development & extension of industry Codes of Practice	Medium

## EXTENSION & ADOPTION:

All projects are required to extend outputs and encourage adoption where possible (see page 38).

## Program 4: Post Harvest & Market Development

<b>Desired Outcome</b>	Build consumer demand for oysters and increase profitability through the supply chain
<b>Indicative Funding</b>	10%

### BACKGROUND

Traditionally, almost 70% of Australian oysters have been sold through the domestic food service sector. This exposed the industry to significant turmoil when restaurants and cafés were forced to close with Covid restrictions in March 2020. These restrictions came at the worst possible time for the Australian oyster industry with Tasmania & South Australian farms stocked heavily after coming back from recent production issues, and many farms in NSW also chocked with product after missing out on Christmas and summer sales due to bushfires.

The support from Commonwealth and State Governments has undoubtedly saved countless farming businesses, and many have now adapted their business models in response to the situation. This have predominantly involved new approaches aligned to gourmet food services, farm gate sales and delivery to consumers. This pivot is consistent with the insights from strategic consultants, Brand Council, who was engaged by OA to provide advice on market development.

The Covid pandemic has also sparked farmer interest in export markets, although this interest is yet to manifest in increased export quantities.

Historically there have been mixed views on the value of generic promotion of oyster - who should pay and who will derive the benefits. However, in response to the Covid-19 crisis there is increased willingness to invest in demand creation. The initiation of the \$4m seafood promotion campaign by Seafood Industry Australia (SIA) also creates an opportunity to build upon. It is recognized that funds used for marketing and promotion must be raised directly from industry, but it is possible to conduct consumer research and evaluation using RD&E levies.

Consumer insights suggest that one of the biggest impediments to seafood consumption is the perceived difficulty of preparation and cooking. This insight underpins the strategic approach by SIA in the national seafood marketing campaign ([www.greataustralianseafood.com.au](http://www.greataustralianseafood.com.au)), which promotes seafood consumption as 'Easy As.' Oysters are notoriously difficult to open, and many consumers are unsure how to store live seafood. The risks associated with getting either wrong are a significant deterrent for many to open product at home.

In both the Pacific and Sydney Rock markets there are several different size grading systems currently in use. This lack of a common language creates confusion and may lead to a discrepancy in pricing.

## STRATEGIES & PERFORMANCE INDICATORS

Strategy	Performance indicators
Facilitate development of new markets & products	➤ Progressive increase in consumer oyster eating occasions as determined by the SIA marketing survey
Co-invest with national promotion opportunities	➤ Increased demand for oysters ➤ Increase in farm gate price
Support export opportunities	➤ Export initiatives supported ➤ Oyster exports increase
Find alternative paths to consumers	➤ Number & range of consumer experiences increases
Promote oyster consumption through the SIA national promotion program	➤ Program evaluation demonstrates positive impact

## EXAMPLE PROJECTS

	Priority
Overcome barriers to domestic consumption at home (eg. storage, shucking)	High
Engage and co-invest with SIA to enable oysters to gain maximum benefit from the new seafood promotion campaign.	High
Engage and co-invest with SIA & FRDC to conduct consumer surveys to monitor levels of domestic oyster consumption and consumer satisfaction.	High
Standardisation of grading systems	Medium
Support training in marketing for oyster businesses	Medium
Build on research already conducted with Brand Council to develop marketing materials of use to individual businesses as well as a wider campaign	Medium
National Export Strategy – conduct research into overcoming barriers to export markets	Medium
Co-invest with businesses interested in developing new consumer products (eg. frozen, value added).	Low

## EXTENSION & ADOPTION:

All projects are required to extend outputs and encourage adoption where possible (see page 38).

## Program 5: Industry Profile & Regulation

<b>Desired Outcome</b>	The oyster industry is recognised as a legitimate and responsible user of public resources, and operates under constructive regulation
<b>Indicative Funding</b>	10%

### BACKGROUND

The oyster industry operates in publicly owned waterways or embayments which are used and enjoyed by the Australian community in a multitude of ways. They are also highly dynamic natural environments.

While State and National regulators provide various permits and licences, it is the Australian community that bestows a '*social licence*' for the oyster industry to operate in public waterways. Although intangible, this community support is essential to the ongoing operation and future growth of the industry. An erosion of social licence will likely result in complaints, higher levels of regulation, and ultimately higher operating costs. Maintaining social licence is a day-to-day responsibility of all oyster farmers. This is likely of highest concern in NSW, where oyster production often occurs in congested coastal estuaries, under the watchful eye of waterfront communities.

The oyster industry is part of the fabric of many regional and rural communities across Australia. While official documents often report the GVP, or farm-gate price of the product, what is often not measured is the combined social, environmental, and economic contribution of the industry to the region. Efforts have been made in recent years to quantify these values (see Section 2.3.4), however more can be done to create a compelling narrative in support of continued industry operation and growth.

The use of water bodies and surrounding catchments are governed by complex legislation and policy at national, state & regional level. These direct how, when and where the oyster industry can operate. A few examples include:

- vessel operation
- lease tenure, exclusivity of use & fees
- biosecurity
- catchment and waterway management
- permitted development and controls

Given the dynamic nature of the coastal environment and the stakeholders involved, legislation and policies need to evolve in a constructive way to reflect current and future operating scenarios. There is also the scope for oyster industries to look interstate and identify favourable legislation and policy that can be transferred and adopted favourably in other areas. For example, NSW are currently pushing for 30-year lease tenure arrangements, equivalent to what is on offer in South Australia and Tasmania.

## STRATEGIES & PERFORMANCE INDICATORS

Strategy	Performance indicators
Drive / support changes to Government regulations that are more favourable to the oyster industry	<ul style="list-style-type: none"> <li>➤ Changes to regulations that facilitate oyster farming</li> </ul>
Promote community benefits of the oyster industry and foster opportunities to increase their support	<ul style="list-style-type: none"> <li>➤ Number of media articles related to community support &amp; responsible practice. Positive vs. Negative</li> <li>➤ Increased social licence of the industry</li> <li>➤ Promote &amp; participate in community events (e.g., oyster festivals, clean-ups)</li> </ul>

## EXAMPLE PROJECTS

	Priority
Socio-economic studies to assess direct & indirect benefits of the oyster industry	High
Development of improved capacity in oyster organisations to interact with the community and Government to achieve mutually beneficial change	High
Conduct a research audit of regulations, development controls & costs relating to oysters in one or more states to identify opportunities for improvement	Medium
Use the audit to drive change in high priority specific areas	Medium
Establish a set of natural capital accounting figures for oyster farmers for use in potential future offsets	Medium
Undertake carbon footprint analysis of oyster farms, and identify opportunities to reduce emissions / offset	Medium
Preparation of a social licence plan	Low

## EXTENSION & ADOPTION:

All projects are required to extend outputs and encourage adoption where possible (see page 38).

## Extension & Adoption – Required for all projects

A fundamental principle governing the manner in which OA manages its RD&E portfolio is that the end-users of the research must be intimately involved in the design of each project and the work is not regarded as complete until the results are implemented by the end users in an economically sustainable manner.

The desired outcome of every project funded through the Oysters Australia IPA, is the adoption of new technologies, innovations, or other outputs that maintain or enhance oyster farmers profitability. Communication (raising awareness) and extension (influencing behaviour change) are essential to affecting that adoption.

Rather than a standalone suite of projects, Oysters Australia require ALL projects to incorporate communications and extension activities. It is recommended that 10% of the project budget be used for this purpose.

As with most sectors there are intricacies of working with the oyster industry. Knowledge of learning preferences, attitudes to information channels, decision drivers and barriers to adoption are important, even down to the location of extension events and tide state can influence success. It is highly recommended that applicants consult with state industry associations, extension officers and Oysters Australia in the design of these activities and consider the use of '*key influencers*' in delivery.

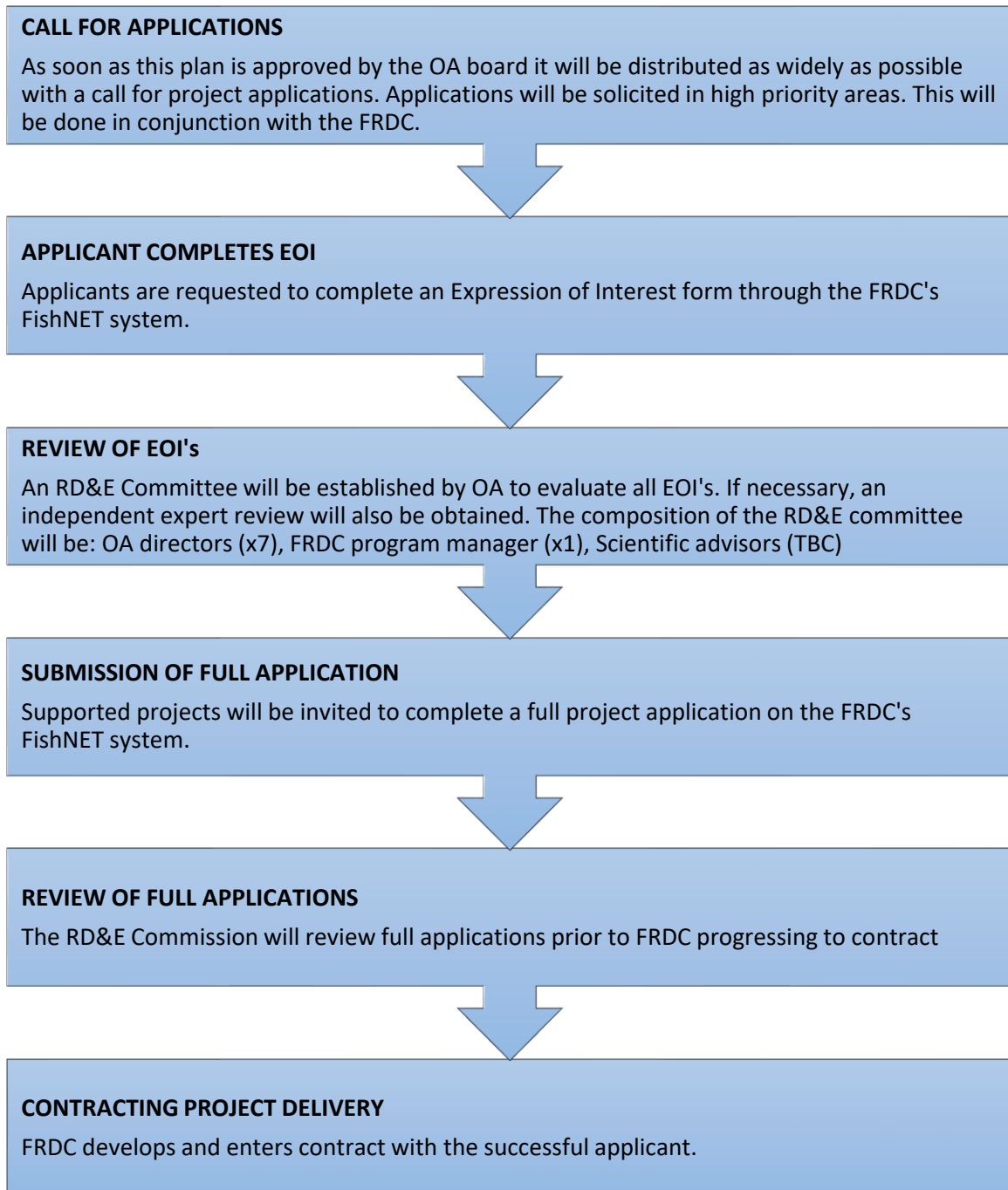
### Extension Requirements

1. Project teams should value extension and adoption activities in the same way as research activities.
2. All new project applications should consider how project outputs will be adopted by end users (ie. what is the pathway to adoption?). Focus on flexible delivery of extension services that meet the needs of primary producers.
3. Consider the use of existing industry communication platforms and leverage points in industry to maximise extension and adoption (eg. peak bodies, extension officers, conferences, farmer forums, newsletters etc).
4. It is requested that applicants consult with Oysters Australia & State industry associations on appropriate communication and extension activities prior to finalising Full Applications within the FRDC FishNET system.
5. Project extension activities are evaluated for their effectiveness and impact.

## 6. IMPLEMENTATION of RD&E PLAN

### 6.1. Custodian of the Plan

Oysters Australia is responsible for maintaining the plan and for recommending to FRDC those projects to be provided with funds. The process from call for applications to contracting of projects is outlined below.



It should be noted that in addition to the above process, OA may commission projects at any time.

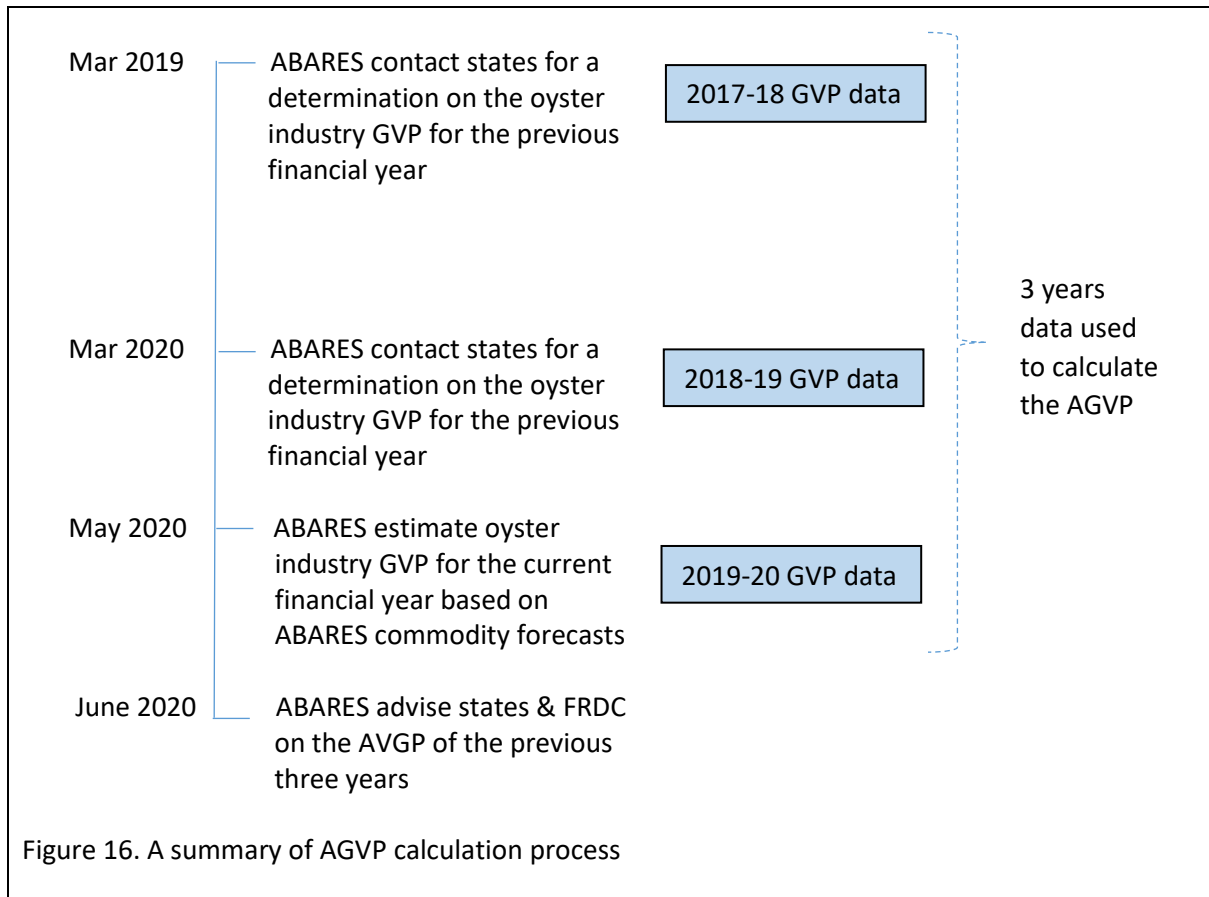


## 6.2. Resources

### 6.2.1. Oyster Industry Partnership Agreement (IPA)

The IPA is intended to govern the overall relationship between the FRDC and Oysters Australia in relation to use of levy funds collected from growers and matched by the Australian Government.

The amount of levy funds collected by State Governments is informed by a three-year rolling average of the gross value of production (AGVP), as calculated by the Australian Bureau of Agricultural & Resource Economics & Sciences (ABARES). This process of AGVP calculation is summarised in the figure below.



State Governments collect a levy from growers at a rate of 0.25% of the AGVP, with these funds forwarded to the FRDC. The states pre-emptively make these payments before the end of the financial year, and before the AGVP is calculated. Payments are typically made:

- by QLD in November,
- by TAS in March - April
- by NSW in April,
- by SA in May

These grower contributions are then matched by the Australian Government up to 0.25% of AGVP when these figures are calculated in June. The Australian Government also contributes an additional 0.5% of AGVP to the FRDC Public Good Fund.

The Public Good Funds are used for a range of activities and where it is appropriate to do so, OA will attempt to co-invest in these activities.

Additional funds may also be invested on a collaborative basis by industry associations and commercial entities. These funds can be matched by the Australian Government if there is a gap between the levy contributions received and 0.25% of the calculated AVGP for that year. These 'external' funds need to be accounted for before the industry contributions are matched by the Australian Government in June; there can be no retrospective matching of funds.

FRDC charges an administrative fee of twelve per cent to manage the IPA.

### 6.2.2. Projected IPA funding

The funds available to Oysters Australia through the IPA are shown in Table 3. Due to reduced RD&E investment in the past year, a substantial balance has accumulated. Figures included for years 2021-22 through to 2024-25 are estimates and will change in accordance with changes in AGVP and funds collected from the oyster industry.

Item	2020-21	2021-22	2022-23	2023-24	2024-25
<b>Income</b>					
Tas contribution	52,500	50,000	50,000	50,000	50,000
SA contribution	30,000	30,000	30,000	70,000	70,000
QLD contribution	0				
NSW contribution	115,000	115,000	115,000	115,000	115,000
FRDC contribution	195,000	195,000	195,000	235,000	235,000
Project income	2,106				
FRDC Management Fee	-46,800	-46,800	-46,800	-56,520	-56,520
<b>SubTotal</b>	<b>345,306</b>	<b>343,200</b>	<b>343,200</b>	<b>413,480</b>	<b>413,480</b>
<b>Expenditure</b>					
Project 2018-004 <i>Safefish</i>	29,870				
Project 2019-208 Strategic Plan of the Oyster Industry	33,000				
Project 2019-210 Oyster Industry response to Covid19 crisis	25,000				
Project 2020-064 SA mortality trials	121,700	90,000	105,000	15,000	
<b>SubTotal</b>	<b>209,570</b>	<b>90,000</b>	<b>105,000</b>	<b>15,000</b>	<b>0</b>
Annual Balance	135,736	253,200	238,200	398,480	413,480
Carry Over Balance	700,439	836,175	1,089,375	1,327,575	1,726,055
<b>Cumulative Balance</b>	<b>836,175</b>	<b>1,089,375</b>	<b>1,327,575</b>	<b>1,726,055</b>	<b>2,139,535</b>

Table 3. Oyster Industry IPA Financial Estimates

### 6.3. Collaboration & Co-investment

Oysters Australia will encourage co-investment and collaboration wherever possible in the development and implementation of projects. This can be achieved in numerous ways. For example:

- By joining in FRDC national programs in areas such as training, leadership, and climate change
- By attracting investment from end-users of the research. This might include Government and commercial entities.
- By joining with research providers to access other sources of funds, such as the Australian Research Council, Food Industry Australia Ltd and the Cooperative Research Centre Program.

Collaboration with other aquaculture sectors will also be pursued by OA when feasible.

## 7. MONITORING DELIVERY OF RD&E PLAN

There are several evaluation layers in relation to this plan.

### **Individual Project Evaluation -**

1. Each project contract contains milestones and performance indicators against which the researcher must report to FRDC. These milestone reports will be examined by the RD&E Committee, and action take as needed.
2. Once per year each project Principal Investigator will report in person to the RD&E committee, usually by Videolink. This will be a confidential discussion about the progress of the project and give committee members the opportunity to probe in detail. [NB – this is not a replacement for presentations to grower meetings for extension purposes].

### **Strategy Review -**

Once per year, OA will review all its activities to determine whether they are on track to deliver the outcomes specified in this plan. The review will include the RD&E portfolio as well as advocacy and communication activities. If deemed necessary, the budget will be adjusted and an updated plan will be issued.

If Covid-19 travel restrictions allow, the first annual review will be a significant activity, involving face to face discussions. The review will involve a facilitated *“Industry vision & innovation workshop”* where growers explore the future opportunities for the industry in a manner that has not been possible during the preparation of this plan.

The time-table for the application and monitoring process is shown below.

- 1<sup>st</sup> December 2020 – Plan released & call for projects made
- 28<sup>th</sup> February 2021 – Closing date for applications
- 31<sup>st</sup> March 2021 – RD&E Committee advises FRDC which projects to be funded
- April – May 2021 – Research contracts in place
- October 2021 - First portfolio review - vision / innovation workshop.

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