A National Industry Response to Pacific Oyster Mortality Syndrome (POMS)

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Acknowledgements

This report was commissioned by Oysters Australia Ltd and funded by the Fisheries Research and Development Corporation (FRDC).

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28 April, 2016

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1. Executive Summary

1.1 The disaster

Pacific Oyster Mortality Syndrome (POMS) has devastated oyster industries throughout the world; but, until fairly recently, Australian oyster growers had been spared this traumatic experience.

That changed in in 2010, when the first incursion of POMS in Australia occurred in Botany Bay in NSW. Later that same year, PCR testing confirmed a further outbreak of POMS in Port Jackson. POMS then spread to the adjacent waterway of the Hawkesbury River in 2012, with similar devastating consequences. These incursions left the NSW oyster industry reeling, and many have exited the industry as a result.

In February 2016, Pacific Oyster Mortality Syndrome (POMS) was detected in a major farming area on the east coast of Tasmania. This incursion was heralded by significant mortality of farmed Pacific oysters, and it soon spread to a number of growing areas. It caused devastation to affected oyster farming operations directly impacted by the disease. Many others in the value chain, and growers interstate, were also indirectly affected.

1.2 The disease

POMS is a virulent, transmissible and deadly disease that specifically affects Pacific oysters. It is caused by the *Ostreid herpesvirus-1 microvariant (OsHV-1 µVar)* virus. Much still remains unknown about how it spreads or how to completely control it.

As a result, all oyster growing areas in Australia are at serious risk of infection with POMS; and subsequent loss of current and/or potential production. This puts at risk much-needed regional employment and investment; it also threatens the viability of important rural family businesses.

1.3 The principal solution

There is unanimous agreement from stakeholders interviewed in researching this report that the only viable option to support recovery from the Tasmanian and NSW POMS events is the fastest possible development of a Pacific oyster resistant to POMS.

This is also the only means of ensuring that the Pacific oyster industry has a long-term future in Australia as it is widely agreed that POMS will spread to South Australia at some point.

The sustainable development of a POMS resistant oyster in Australia is the most important key to not only re-establishing currently affected oyster growing areas, but also to ensuring the continued growth of the Australian oyster industry.

1.4 Disruption to oyster farming in other states

South Australia is Australia's largest producing oyster state by volume. As yet, there have been no incursions of POMS in oyster farms in that state.

Growers, and others in the value chain, are nonetheless affected by the Tasmanian incursion as they are heavily reliant on the purchase of hatchery-based Tasmanian oyster seed (spat).

With the POMS outbreak in Tasmania, access to this source of spat has understandably ceased, as a result of stock stand still embargoes imposed as a biosecurity measure. The development of spat producing- capacity in South Australia has also been identified as a key component of this plan.

1.5 Oysters Australia's planned response

This National Response Plan was initiated by Oysters Australia with the support of the FRDC. It has been developed to identify programs that would improve the industry's capacity to recover from this event, and would also contribute to building resilience for future growth and sustainability.

The underlying components of support actions contained in this POMS Response Plan are separated into "Actions of Need" depending on ratings of urgency and impact. The content has been developed after comprehensive and urgent consultation by the author with a range of industry other stakeholders. The support actions outlined below are explored in more detail later in the report.

Support actions of critical need (timeframe rating 0 – 6 months)

- Ensure viability of Australian Pacific Oysters breeding program through ASI emergency funding;
- Ensure a viable hatchery and nursery sector in all states, with priority dependent on the level of state need;
- Strengthen leasehold asset classification;
- Develop a definitive POMS reference resource; and
- Undertake industry risk assessment.

Support actions of urgent need (timeframe rating 6 – 12 months)

- Review the current ASI levy system and replace with more robust option to ensure financial sustainability;
- Develop a farm biosecurity manual;
- Develop a national industry biosecurity plan;
- Refine production and husbandry systems;
- Improve value chain efficiencies;
- Develop environmental forecasting and monitoring system; and
- Develop national industry strategic plan.

Support actions of medium need (timeframe rating 12 – 24 months)

- Review industry investment capacity and levies;
- Investigate alternative business models;
- Develop stock forecasting and price monitoring system;
- Develop national regulation and compliance program; and
- Strengthen industry representation structures.

Support actions of long term need (timeframe rating 24 months plus):

- Investigate opportunities for diversification;
- Support industry emergency response deed;
- Introduce POMS resistant breeds;
- Develop comprehensive farm management system; and
- Develop industry capacity building program

1.6 Greatest current risk – the loss of the breeding program

The program to breed POMS resistant oysters is being carried out by Australian Seafood Industries Pty Ltd, a company jointly owned by the South Australian and Tasmania industry associations. It is based in Tasmania and funded by a levy on spat sales. ASI selectively breeds oysters as a service provider to oyster hatcheries through providing them with brood stock.

Loss of production in Tasmania and NSW has meant that income to ASI has been drastically reduced. Furthermore, POMS hit Tasmania at a critical phase of the breeding program.

These circumstances have placed the ultimate aim of breeding a POMS resistant Pacific oyster in severe jeopardy due to the loss of income to ASI which is now facing imminent financial collapse. This would have disastrous consequences.

Ensuring that ASI's work can continue is of paramount importance. Securing funding for this ongoing program is the highest priority of all suggested actions. Ensuring that hatcheries and nurseries remain viable in the short term is also important, as without them, rebuilding will be impossible. This is the second highest priority of need identified in this plan.

2. Background

2.1 Purpose of this report

Following the confirmed outbreak of Pacific Oyster Mortality Syndrome (POMS) in Tasmania early in 2016, the Fisheries Research and Development Corporation (FRDC) has agreed to fund Oysters Australia Ltd to deliver a report outlining a suggested National Industry Response to this outbreak on behalf of the Australian oyster industry. A copy of the terms of reference follows as Appendix A.

The report has been prepared in a relatively short timeframe to ensure that future investment in recovery activities is as targeted as possible. Recommendations in the report have been discussed with industry, individual farmers, researchers and government agencies. The information provided is of necessity high-level; and individual projects will need to be carefully scoped as they are addressed.

It is important to note that report is not intended to be a scientific or research response; nor is it intended to canvass the multiplicity of reports, studies and other materials about POMS. It is important also to note that the term 'agriculture' is used in this report to include both land and water based farming activities – including oyster farming.

2.2 About POMS

Pacific Oyster Mortality Syndrome (POMS) is a devastating disease affecting Pacific oysters (*Crassostrea gigas*). It is caused by the virus *Ostreid herpesvirus-1 microvariant (OsHV-1 µVar)*.

POMS has been associated with high mortality events involving Pacific oysters in Europe, New Zealand and NSW.

All ages of Pacific oysters may be affected, but spat and juvenile oysters often suffer higher mortalities. To date, there is no evidence of POMS affecting any other oyster species. The virus cannot be transmitted to humans.

The trigger for mass deaths is still not understood, but may be linked to climatic or environmental factors; and it is still not clear how the disease is spread. It is thought that international spread of the disease may have taken place in association with biofouling (eg oysters) attached to the hulls of ships. Within France and New Zealand, spread is most likely to have occurred through the movement of live infected oysters to uninfected areas, although spread by movement of equipment is another possible cause.

The virus is often not detected until oysters start dying in large numbers. Oyster mortalities occur quickly once animals are infected with the virus, and losses can be up to 100 percent of stock.

The virus is often inactive in cooler waters (below about 17^{o}C). It is possible for oysters to be carrying the virus and not get sick until the water temperature rises or the oysters are subjected to environmental or handling stress. Transmission over small distances is likely to occur through the movement of particles suspended in the water column.

In France, higher mortalities were first reported in 2008. The UK, Jersey, Ireland and the Netherlands have all suffered high mortality events.

In New Zealand, the disease was confirmed in late 2010. The virus appears to be widespread in the northern part of the North Island. It is estimated that the virus may have cost the industry around NZ$36 million between 2009 and 2014, assuming price and output levels of 2010 had continued. Pacific oysters are grown in three states of Australia: NSW, South Australia and Tasmania.

The first POMS event in Australia occurred in late 2010, when high mortalities occurred in two estuaries in NSW (Botany Bay and Port Jackson). The impact of the disease in key NSW estuaries has been devastating. Since then, nearly all of the cultivated Pacific oysters in the Georges River (Botany Bay) have died; cultivation of Pacific oysters has ceased altogether in some areas; and other areas have only minimal production.

The initial event was a wakeup call to all producers. Awareness was heightened across the industry; biosecurity measures were reviewed and strengthened; husbandry practices were adapted.

Despite all these measures, the disease occurred in Tasmania earlier this year.

At this stage, South Australia remains free of the disease – but, despite best endeavours, this situation is unlikely to continue. With so little information as to causative factors, it is clear that biosecurity measures alone will not halt the spread of the disease.

For that reason, the only viable means of addressing this serious risk is POMS resistant oysters.

Restrictions imposed on affected areas means that no oysters, parts of oysters or oyster equipment can be moved from these locations to other areas. Significant economic losses caused by mortalities have been experienced by affected farms. Job losses have been experienced, both directly and indirectly.

The disease represents a major threat to the ongoing viability of the Pacific Oyster industry in Australia. Therefore the development of a comprehensive national response plan is of paramount importance to ensure ongoing industry sustainability.

2.3 About the oyster industry

The Australian oyster industry is predominately a family owned, owner-operated industry. Including owner operators, the industry directly employs in the vicinity of 2,000 full and part time employees and owners. Production is mainly located in NSW, South Australia and Tasmania.

Two species of oysters are grown in diverse situations across these three states. In NSW, the native Sydney Rock Oyster (*Saccostrea glomerata*) is the main product grown in estuaries, tidal lakes and lagoons. Increasingly, the NSW industry is diversifying into exotic Pacific oysters (*Crassostrea gigas*), which dominate the production in Tasmania and South Australia.

Angasi (flat) Oysters (*Ostrea angasi*) are grown in small volumes across all states. The Milky Oyster (*Sacostrea cucullata*) and the Blacklip Oyster (*Striostria mytiloides*) are also found in small volumes.

The Pacific oyster is native to Japan, with production concentrated in China and the US. Sydney Rock Oysters and Angasi (flat) oysters are native to Australia and shells have been found in ancient Aboriginal middens.

As filter feeders, oysters are susceptible to changes in water chemistry, temperature and the availability of algae and other food. The industry in NSW and Tasmania is largely estuarine-based and can be affected by upstream human actions that alter environmental flows and water quality. Bacterial matter, turbidity, salinity, temperature and a variety of other factors can make oysters vulnerable to disease or cause loss of condition.

Most Pacific oysters begin life in a hatchery environment before being grown out in trays, baskets and rafts. This has enabled growers to take advantage of advances in selective breeding. Production in Tasmania and South Australia is wholly dependent on hatchery raised spat.

The infrastructure used is mostly found in the intertidal zone of South Australia, Tasmania & NSW coastal waters; where oysters are exposed at low tide. A series of posts either support lines, from which baskets are suspended, or racking for trays. The grower will often chose a culture type suited to the local growing conditions and/or the target market. Some production is also found in the subtidal zone where baskets and trays of oysters are suspended from rafts or pontoons into deeper water.

Oysters are handled a number of times in their lifetime. Handling is for grading oysters by size as they grow, to remove dead stock or to reduce oyster spatfall (catch) and infestation from other species. This usually occurs by mechanical means to allow higher processing volumes at least cost. Again, the equipment used varies by farming method. Grading by tumbler or sieve is the most commonly used followed by specialist digital machinery.

According to the most recent ABARES data, edible oysters dominated the production of molluscs in 2013–14 by value and volume. In 2013–14, edible oysters accounted for 9 per cent of the total value of Australian aquaculture production. Between 2012–13 and 2013–14, edible oysters decreased in value by $3 million (3 per cent) to $90 million. This was primarily the result of an 8 per cent decrease in production volume.

Figure 1: The economic value of edible oyster aquaculture in Australia 2013/2014

State	Tonnes	GVP	% of GVP	note
NSW	3 266	$36 007 000	38.9%	90% Sydney Rock Oyster
Queensland		$522 000	0.5%	100% Sydney Rock Oyster
SA	4 900	$32 080 000	36.9%	98% Pacific Oyster
Tasmania	3 236	$21 684 000	23.6%	98% Pacific Oyster
Total	11 402	$90 293 000	100.0%	

(Source: ABARES, 2014)

Exports in 2013/2014 were valued at $791 000. Over 80 per cent of exports were destined for markets in Singapore. Imports in the same period were valued at $ 8 634 000.

Oyster farmers rely on a complex supply chain for oysters to reach the market. It is estimated that 56 per cent of Australian oysters are bought from food service outlets, 32 per cent from fishmongers, 7 per cent from chain retailers and 2 per cent directly from growers.

Over 97 per cent of oysters bought by Australians are fresh in the half shell. The remainder are bought either live whole or frozen in the half shell.

As well as POMS, there are a number of other diseases and environmental conditions that can increase stock mortality rates but have no effect on human safety. These include QX disease (*Marteilia sydneyi*) and winter mortality (*Bonamia roughleyi*) in Queensland and NSW, and summer mortality in SA. Biotoxins from harmful algal blooms can contaminate oysters and make them harmful, even lethal, to humans.

New South Wales

The NSW industry is the oldest industry by far, with a history that goes back over 100 years. IT is made up of more than 300 small farming operations.

Production is heavily focused on Sydney rock oysters which are wild caught rather than farmed. Pacific oysters are considered feral in most growing estuaries so permits are required to grow them from the NSW government. Port Stephens is the only area currently allowed to farm non-triploid Pacific oysters, although other areas are now being considered. Growers are starting to develop innovative growing technology for both species.

Some farms are transitioning from Sydney Rocks to Pacific oysters. Everywhere else at this time where permits are required can only use hatchery-produced triploid Pacific oysters.

Until the POMS outbreak in Tasmania, triploid Pacific oysters were being supplied into NSW by Tasmanian based hatchery, Shellfish Culture

However, NSW seems to have some level of being able to produce triploid Pacific oysters from local hatcheries, so there is not quite the same level of urgency relating to hatchery sustainability in NSW at this point as in other states.

South Australia

South Australia produces more oysters by mass than any other state. It produces predominantly Pacific oysters, which are heavier on average than the Sydney rock oysters that form the majority of production in NSW; but Sydney rocks bring more per dozen. Hence, more oysters are produced in SA, but more value is generated in NSW

The South Australian industry is the most recently established in the country, having been operating at any level of commerciality for only 25 years. The industry has been totally hatchery based since establishment and it has high level of innovation. As an example, the adjustable longline system was invented in SA.

The industry is based mostly on the Eyre Peninsula and is virtually all intertidal production. Approximately 350 people are employed in the industry on both part time and full time bases.

The bulk of production is Pacific oysters; there are also a few native Flat Oysters grown; but very few Flat oysters are grown any more due to slow growth and high mortality.

Spat has predominately been purchased from Tasmanian hatcheries until this outbreak. Local SA hatcheries have struggled in the past to get a foothold in this market, particularly as Tasmania Spat has been perceived by industry to be a superior product.

Tasmania

According to Oysters Tasmania, the industry currently employs more than 300 people throughout Tasmania, from the far north-west coast through to the southern part of the D'Entrecasteaux Channel south of Hobart. These farms produce around four million dozen oysters each year, with a current estimated farm gate value of $26 million.

As noted previously, Tasmanian hatcheries were also supplying approximately 90 per cent of the Pacific Oyster spat for production regions in other states.

2.4 About the Tasmanian POMS event

In early February 2016, Biosecurity Tasmania and Oysters Tasmania began to investigate oyster mortality at a Pitt Water grower's lease where it was determined the deaths were linked to the Pacific Oyster Mortality Syndrome (POMS).

It is not clear when or how the POMS virus was introduced into Tasmania. Biosecurity Tasmania's surveillance testing in March 2015 did not find any evidence of POMS in the State. However, tests of frozen samples collected for other purposes in December 2015 have given some positive indication of POMS. So evidence would indicate the disease arrived in the state at some time between March and November 2015. It is thought that the warmer water temperatures and significant rainfall in late January and early February this year assisted the virus to take hold, as it can be spread by ocean currents.

At the time of detection, NSW and SA immediately took precautionary steps by placing a ban on the importation of spat stock from Tasmania. A ban was also put in place to stop stock being moved around Tasmania.

By the end of February 2016, there were six marine growing areas confirmed as POMS infected, with a further four areas suspected of being infected. The areas infected are Upper and Lower Pitt Water, Pipe Clay Lagoon, Blackman Bay, Dunalley Bay, Island Inlet and Little Swanport. Wild Pacific oysters from the Derwent River estuary are also affected.

Efforts are continuing to manage this incursion, as eradicating the disease is not considered a practical option. Priority is being given to containing the disease, while mapping areas that are known to be infected, as well as those areas that are free of the disease. It is hoped that some growing areas will remain free of the disease.

Tasmania's four oyster hatcheries supply approximately 90per cent of Australia's Pacific oysters. These licensed marine farms produce juveniles, known as spat, and grow them on to market size. These are then sold to growers in Tasmania, South Australia and New South Wales. Even if not in the disease-affected areas, movement and quarantine restrictions have impacted severely on these operations – and this will have knock-on effects across the entire Australian industry.

The immediate response included restrictions on the movement of oysters onto oyster farms while a structured testing program was undertaken to determine where the virus was present in the state. This testing program has been completed.

Based on this information, three areas of differing disease risk have now been determined as a basis for issuing movement permits.
These areas are:

- POMS free area across the north of Tasmania;
- intermediate risk areas where there is little or no evidence of disease, but a risk of introduction of the disease; and
- an infected area where POMS is known to occur.

Stock movements within a risk area and into another area where there is a higher risk are now allowed under permit. Movements are not allowed from an area of high risk to an area with a lower level of risk.

Breeding Program experts have estimated that the survival rate of specially bred family line oysters exposed to the virus in Tasmania ranges from a low 3per cent up to 93per cent, in the best performing lines. It is important to note that these are preliminary results only and the highest surviving lines are not yet available for commercial production.

There is the potential for growers to lose up to two years income when affected by the virus; even growers not directly affected will suffer as a result of stock movement standstills and stock depletion. Hatcheries, too, will suffer significant loss of income while they rebuild stock levels and transition to more resistant breeds as these become available.

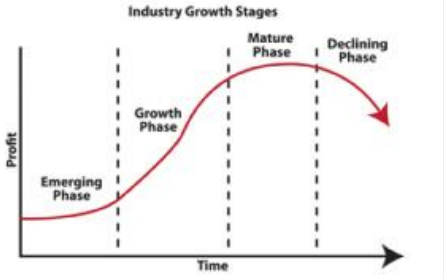
To date, in Tasmania alone, it is estimated the direct costs of the virus have exceeded $12 million and that around 80 people have lost their jobs. Reliable figures are not yet available for other jurisdictions.

3. Industry development strategies

3.1 Stages in industry development

Life cycle models are not just a phenomenon of the life sciences. Industries also experience a similar cycle of life. Just as a person is born, grows, matures, and eventually experiences decline and ultimately death, so too do industries.

Figure 2: Typical Industry Growth Stages



Source: Adapted from Barnes, P., Multifactor Productivity Growth Cycles at the Industry Level

Within an industry, individual products and businesses will be at very different parts of the cycle. However, the stages are generally the same for all products and industries, even though some will last longer for one sector and pass quickly for others.

In a product life cycle, things often pass through a decline cycle and disappear. Industries are different, because within an industry there is a constant updating of products. For example, TV manufacturers first produced monochrome TVs, then colour TVs and subsequently home entertainment systems. Within the colour TV segment, the screen technology has evolved from cathode ray displays to flat screens such as plasma screens. Now 3D TVs and Smart TVs are commonplace.

However, eventually some industries may contract sharply and even disappear. For example passenger sea transport (other than cruising) has been replaced by air travel; photo-chemical photography has been replaced by digital photography; video rental shops are being replaced by digital downloads or video on demand.

Interestingly, agricultural production industries tend not to experience a true decline phase because people always need food. Products come and go within agricultural production sectors; but it is rare for an industry as a whole to disappear, as happens in non-food related sectors.

Much work has been done on understanding industry growth cycles; and on developing strategies to promote industry growth. There is inevitably a strong focus on research and development in those industries which successfully transition through growth stages.

While not focused on rural industries, work published by the Australian Stock Exchange and the Australian Business Foundation sought to identify success factors in Australian industries. The research considered the cases of the Australian mining and wine industries which have both experienced their share of 'boom and bust'.

Based on the experiences of these industries, the authors narrowed a broad range of critical success factors into eleven critical levers which they argued can define the success or failure of a particular industry:

- Cyclicality: understanding and appreciating cyclicality is an important driver of success.
- Inherent Australian characteristics: the industry is well suited to Australian conditions, skills and culture.
- Clustering, cooperation and integration: For those seeking to sustain a failing new industry, the completion of cluster structures (ie filling in missing elements or re-invigorating defunct ones) can be a key trigger for injecting new life into the industry. Conversely, missing parts of the structure can be fatal if not replaced.
- Market opportunities: identification of highly specific market opportunities can help to sustain an industry during a downturn.
- Entrepreneurial champions: sustaining an industry beyond its growth phase can be difficult without the vision and energy of industry champions.
- A seminal/iconic document: a visionary strategic document can be effective in resolving debilitating obstacles in an industry and can serve to unite disparate and sometimes hostile stakeholders to combat a common problem.
- Collaboration and competition: an industry is less likely to survive without an effective collaboration structure to complement the accepted high level of competition.
- Networks: effective networks drive growth.
- Professional industry associations: these can provide a potent vehicle for the fostering and sustaining of new industries.
- Equity investors and financial infrastructure: Many small to medium enterprises (SMEs) attempt initial public offerings (IPOs) prematurely, before they are robust enough to withstand the pressures of public funding; however, the public equity investor often provides the cheapest (and most controllable) source of funds.
- Knowhow and innovation: the existence of a well thought out strategy to ensure and fund innovation was considered the key to sustaining a new industry.

There are many elements in common with the success factors reported here for rural industries. The importance of collaboration, champions, networks, and professional industry associations is noteworthy.

The Rural Industries Research and Development Corporation (RIRDC) has had a strong focus on this area for agricultural industries. In fact, it has developed its own strategic plan around the research, development and extension (RDE) needs of new and emerging industries.

Figure 3 below depicts a generic model of industry RDE needs at various phases of growth.

The figures for industry value shown in the table may be misleading, as examples of industries with varying dollar values can be found across all stages of the growth cycle. However, the characteristics and RDE needs analysis are remarkably consistent. Positoning within the growth stage matrix is more determined by the human skills present in an industry than on its turnover.

Figure 3: Research and development needs at various phases of industry growth

		New	Emerging	Mature
Industry characteristics	Growth	Limited growth	Growth acceleration	Growth stabilisation
	Size	Typically small (<$5mn)	Can be small or medium ($2-$10mn)	Typically >$5mn
	Stakeholder profile	A few pioneers, very enthusiastic about a novel idea, starting their own research	Increasing # of farmers trying to develop the industry, mostly family business Very fragmented	Emergence of private investors Starting consolidation
	Industry organisation	No cohesion (no association / levies) Under developed infrastructure	Emerging industry association and levies Emerging value chain Increasing engagement with R&D	Stronger industry cohesion, with established association and levies More established value chain
Industry R&D needs	R&D type	Feasibility studies (review of possibilities, market potential)	Development & extension research focused on specific R&D issues. Greater understanding of production systems & demand	Development and extension research focused on more specific R&D issues, with well defined objectives Maintenance research for niche industries
	R&D size	Limited R&D cost per project, seeking to spend the least amount of money before going any further	Larger R&D projects, with larger investment	Larger R&D projects, with larger investment
	RIRDC role	Important, nurturing and advising role Managing R&D needs	Critical role supporting industry growth and development	Important for niche industries (sustainability) Decreasing need as industry infrastructure expands (e.g., shift to Established Industries)

(Source: New and Emerging Industries National Research, Development and Extension Strategy, RIRDC, 2010

3.2 There's nothing new under the sun

There is surprising consistency in research done across a wide range of agricultural industries in developing strategies for growth. Individual research reports prepared for many industries come up with almost identical lists of issues – even when the industry groups themselves are convinced that their situation is unique.

RIRDC's National RDE Strategy for New and Emerging Industries identified the following areas as high priority for RDE investment:

- new product development;
- production and supply chain;
- stock breeding and selection;
- increasing competitiveness, capability and capacity; and
- improving product compliance.

In his RIRDC-funded report 'Critical Success Factors for New Rural Industries', the well-known industry analyst, David McKinna, identifies the following key characteristics of successful industries:

- A primary focus on customers and marketing;
- A viable source of competitive advantage;
- Capability in quality control;
- A well-functioning supply chain;
- Effective leadership and strategic planning across the industry;
- Business proficiency and access to capital; and
- Commercial and cutting edge research and development.

One of the most interesting reports was 'Climate Change Adaptation in the Australian Edible Oyster Industry: an analysis of policy and practice', undertaken by Peat Leith and Marcus Haward for UTAS in 2010. Whilst the study was focussed on climate change implications and adaptation, the recommendations are equally applicable to this situation.

This report recommended a range of specific cross-jurisdictional and regional priorities for building adaptive capacity and resilience, such as:

- investigation and development of improvements in coastal and estuarine monitoring programs, which integrate automated and other monitoring and utilise a central repository for data;
- ongoing improvement and where possible streamlining of processes for regulatory compliance and assessment of development and planning applications for oyster aquaculture;
- continued efforts between growers, industry, banks and state governments to ensure that growers are able to borrow against lease entitlements;
- continued development of knowledge action networks that include growers, industry bodies, scientists, Natural Resource Management (NRM) organisations, and representatives of state and local government; and
- on-going development of industry-government relations through effective communication of clear and concise information that allows reciprocal understanding of the process of oyster farming and needs of growers, on the one hand, and of government regulatory and approvals processes on the other.

Many of the reports and studies already undertaken in the oyster industry include recommendations that reflect these findings and priorities.

3.3 Relevance to the oyster industry

There are many lessons in this work for the oyster industry – particularly as a result of the disruption caused by the Tasmanian POMS event.

Most importantly, there is a need to understand that there is nothing new under the sun. Other industries have been through disasters on an even greater scale and survived or even thrived.

In researching for this report, the author reviewed many documents and reports prepared prior to the Tasmanian POMS event. A number of these are listed in the bibliography in Appendix 2.

There were consistent themes coming through in assessments of industry needs – and these were very much aligned with the themes identified in the previous section. In fact, many could have been re-printed here without acknowledgement and still been seen as relevant.

Most of the strategies outlined in the next section were developed from previous experiences in other industry sectors that have been facing challenges of various natures - before reading all this material. This reinforces the fact that there are basic industry development strategies that are consistent across all agricultural industries as they position for success.

Whilst there are elements of the industry profile that meet each of the sectoral stages outlined in Figure 3 above, it is clear that the oyster industry as a whole could best be classified as an 'emerging' sector.

The fact remains that so many reports are coming up with the same results and recommendations – yet little has been done in any structured or coherent way at the national level to address the issues that have been clearly identified as barriers to growth.
Many previous industry reports have highlighted the susceptibility of industry to disease or similar issues; and another outbreak of POMS (or a similar exotic disease) has been clearly flagged as a risk. The relative lack of preparedness demonstrated in the wake of the Tasmanian POMS event is therefore surprising.

However, after the NSW outbreak, considerable investment was redirected into the POMS resistant breeding program as a key industry strategy to the threat of POMS. This demonstrates an increasing degree of industry maturity.

The Australian Seafood Co-operative Research Centre (CRC) also encouraged greater industry collaboration and cohesion. However, the funding for this CRC ended on June 2015 and this opportunity was thus ended. Reflecting industry appreciation for the benefits flowing from the CRC model, industry came together to submit a proposal for establishment of a new industry CRC in the recently-closed funding call. This effort has highlighted an evolving maturity and willingness to co-operate nationally for industry progress.

4. Industry needs analysis

4.1 First responses

Government agencies were quick to come to the aid of Tasmanian growers affected by the POMS outbreak, with a range of assistance measures designed to help the oyster industry manage this disease into the future.

The Australian Government has allocated $1.47 million to deliver critical measures to manage, contain and understand the outbreak of POMS in Tasmania. This funding will be used to:

- provide rapid and reliable diagnostic tools;
- engage personnel to advise industry of ways to successfully produce oysters in the presence of this disease and adapt its management approaches; and
- offset the costs of recovering viable stock from infected farms and removing non-viable stock.

Other support services are also available as part of general assistance packages for agricultural producers. These include:

- Farm Household Allowance;
- Farm Management Deposits (FMD);
- Taxation measures;
- Rural Financial Counselling Service (RFCS);
- Farm Finance Concessional Loans;
- Managing Farm Risk Programme; and
- Enhanced social support.

The Tasmanian Government has also announced a range of POMS recovery measures.

This includes the following components:

- Fee Relief
  Fee and levy relief has been extended to provide 24 months relief, and is available to all marine farming leaseholders licenced to farm Pacific oysters. The package is worth approximately $1.6 million. Fee relief includes waiving:
  - licence fees;
  - the lease rental fees;
  - the Tasmanian Shellfish Quality Assurance Program (TSQAP) levy; and
  - the Primary Produce Food Safety Accreditation fee.

- Clean-Up Assistance
  Assistance of up to $4,500 per hectare is available for affected farmers. This assistance is provided to support clean-up activities undertaken since 1 March 2016.

- POMS Recovery Concessional Loan Scheme
  A $5 million POMS recovery concessional loan scheme has been established to provide funding for stock recovery and clean-up of affected farms; to help re-start and re-develop hatcheries; to provide POMS-related infrastructure modifications and re-stock affected oyster farms, and for debt reconstruction. The loan scheme is open to Tasmanian owned and operated oyster growers, and hatcheries and nurseries located in POMS-affected areas.

Loan amounts will generally be between $30,000 and up to a maximum of $250,000, and will be at concessional interest rates.

- Other Support Services
  - The Department of State Growth has a Rapid Response Unit to provide advice to outline the types of employment support services that are available to assist employers and employees.
  - Rural Alive and Well provides one-on-one support to individuals who are struggling as a result of this situation.
  - Rural Business Tasmania runs a Rural Financial Counselling Service that provides free, confidential and independent advice to farmers and producers suffering hardship.

On 7 March, the ban on sale of spat imposed at the outset of the outbreak by hatcheries was lifted for intra-state sales in Tasmania. This is a positive step forward and will relieve some pressure on farmers who are desperate for new stock after being affected by the virus. The lifting of a ban on spat exports to South Australia has yet to be finalised.

FRDC is also assisting the industry by investing $155,000 in research and measures to recover from the outbreak, including acceleration of the existing breeding program to produce oysters more resistant to POMS. This report is part of that funded response.

4.2 Industry investment priorities

The substantive purpose of this project brief was to develop a national co-ordinated industry response to deal with POMS. This involved identifying needs, assessing relevance and priority, and documenting the outcomes in a report. In order to do this, a range of sources was consulted – including growers, researchers, research agencies, departmental staff and consultants. Reviews were undertaken of a number of previous studies and reports relevant to POMS and the oyster industry. Consideration was also given to issues of a broader nature, encompassing industry development and emergency responses.

However, the short time period allocated for this report precluded anything other than a cursory analysis of feasibility, relevance, costs, and responsibilities.

Before embarking on any of the proposed investment projects, it would be necessary for appropriately qualified personnel to develop a detailed project brief that addresses these issues.

Proposed projects were considered in a dual matrix context:

- According to time frame: is the need something that required attention in the immediate, short, medium or long term. This recognises that some projects will require initiation in the short (or even immediate) time frames; but will not deliver outcomes until further down the track.
- According to recognised RDE themes: enhancing sustainability, increasing profit and productivity, and promoting leadership and innovation. While a number of projects could be considered to address more than one theme, classification in this sense was considered useful in terms of the development of a holistic and comprehensive industry strategic plan at a later date. It may also be of assistance in identifying potential funding sources.

Suggested investment projects are summarised in Figure 4 below; some further explanation follows for each project. With the exception of those identified as high priority, there is no particular ranking of proposed projects within the categories. Many of the projects identified as of immediate and short term importance will feed into, or deliver outcomes that would inform, later projects.

Figure 4: Summary of suggested investment priorities

Theme	A. Enhance sustainability	B. Increase profit & productivity	C. Promote leadership & innovation
Time frame			
1: Critical 0-6 months	Secure funding for ASI [1] Ensure a viable hatchery and nursery sector [2] Strengthen leasehold asset classification	Develop a definitive POMS reference resource	Undertake industry risk assessment
2: Urgent **6-12 months**	Review the voluntary ASI levy system Develop a farm biosecurity manual Develop an industry biosecurity plan	Refine production & husbandry systems Improve value chain efficiencies Develop environ forecasting & monitoring system	Develop national industry strategic plan
3: Medium **12-24 months**	Review industry investment capacity & levies Investigate alternative business models	Develop stock forecasting & price monitoring system Develop national regulation & compliance program	Strengthen industry representation structures
4: Long **> 24 months**	Investigate opportunities for diversification Support industry emergency response deed	Introduce POMS resistant breeds [3] Develop comprehensive farm management system	Develop industry capacity building program

Notes: There is unanimous agreement that the POMS resistance breeding program is key to the future of the industry. This leads to inevitable prioritisation of the suggested investment priorities to ensure this aim can be achieved.

1 Ensuring that ASI's work can continue is of paramount importance. Securing funding for this ongoing program is the highest priority of all suggested actions.
2 Ensuring that hatcheries and nurseries remain viable in the short term is also important, as without them, rebuilding will be impossible. This is the second priority.
3 Assuming that the breeding program continues and delivers resistant breeds, commercialisation of these new breeds should be the third priority.

In these instances, it will be important to ensure the initial brief is constructed in a manner that recognises this and ensures costly duplication is avoided.

In most instances, industry will need to take a leading role and drive delivery of the projects. This includes development of collaborative approaches and multi-party funding solutions. This will require industry leaders to step up to the plate and take ownership of what could be difficult and sometimes controversial solutions.

4.2.1. Immediate priorities (< 6 months)

A.1 Secure funding for Australian Seafood Industries (ASI) Pty Ltd

It is clear that the key risk management strategy for dealing with future incursions of POMS is breeding of POMS-resistant oysters.

To its credit, this aim has been given priority by industry through its direct and indirect investment in Australian Seafood Industries (ASI) Pty Ltd. ASI is an industry-owned company established with the sole responsibility of breeding POMS resistant Pacific oysters by 2018. Oysters that are partially resistant to POMS have been produced and these oysters offer the best solution to the industry for restocking following the outbreak of POMS. It will take twelve months to breed a sufficiently large number of these partially resistant oysters for restocking.

The company's only source of income is a voluntary levy on oyster spat sales that generates $730,000 per year. However, as a result of the POMS outbreak, spat sales have ceased. Even when movement bans have been lifted and hatcheries are restocked, it will take some considerable time before the situation returns to pre-outbreak levels. In the meantime, income to ASI will be severely limited. As with any operation of this type, only minimal cash reserves are held, as income is invested in achieving the aim for which it was set up. As a result, ASI is now faced with the immediate prospect of insolvency.

ASI has indicated it anticipates the funding shortfall until 30 June 2017 to be almost $1 million. (A detailed breakdown is available.) After that time, income generated by the reinstated industry levy should once again be sufficient to cover the company's costs.

Without the breeding program that is now well-established within ASI, there is little prospect of recovery from this disaster.

The impact of the virus not only affects growers and hatcheries within Tasmania. It also affects the tourism industry and transport companies, restaurants and processors through the value chain. With the industry's footprint largely in areas of regional Tasmania already economically challenged, this would be a crippling blow. Furthermore, it will also devastate the industry in South Australian which is reliant on Tasmanian spat; and some NSW producers, again who also import spat from Tasmania. This too will have a serious economic impact in regional areas.

Securing ongoing funding for ASI therefore be accorded the highest priority in any future investment activities.

Obviously, direct grant funding would be the best solution.

A.2 Ensure a viable hatchery and nursery sector

Based on the high mortality and rate of spread seen in previous outbreaks of this disease in NSW, it is expected that Tasmanian oyster production will be severely impacted over the coming year.
As the hatcheries in Tasmania supply most of the Pacific Oyster spat, production in SA and NSW will also be impacted.

Hatcheries and nurseries are facing difficult times financially. Income from sales will be significantly reduced at the same time as they must upgrade facilities to provide more secure quarantine facilities and protected growth areas; and also transition to POMS resistant breeds. There is also a willingness for some facilities to look at diversification into non-affected areas; and this too is dependent on access to finance.

Ensuring the viability of the hatchery and nursery sector is basic to the recovery of the industry; so this has to be accorded high priority.

Direct grant funding would be one solution; as would loan facilities. Governments are encouraged to consider the possibility of expansion of eligibility requirements for existing programs, including industry development grants and low interest loans programs.

A.3 Strengthen leasehold asset classification

At a time when oyster growers need ready access to finance, finance providers are reluctant to lend against leases because there is no certainty in the asset class – unlike, for example, water rights where an active trading market has developed. There are considerable differences between lease conditions in different states; and this adds complexity. A nationally consistent system would provide more certainty for financiers and thus ease some financial pressures on growers.

This is a matter that could be readily resolved by state government actions, at minimal cost.

It is recommended that state governments review lease and permit systems to consider:

- introduction of longer and standardised lease terms;
- establishment of a register where banks and other financial institutions can have their interests in oyster leases registered to enable them to be used as collateral for security to raise funds or refinance businesses;
- ensuring exclusive possession of leased land, where appropriate;
- Review of provisions for inactive leases ie leases which have not been farmed for say 5 years and where the leaseholder is unable to demonstrate any plans for farming.

Whilst some of these issues are dealt with effectively in some states, there is no consistency across jurisdictions.

A.4 Develop a definitive POMS reference resource

There has been a lot of work done on POMS, both here and overseas. However, finding information is difficult because there are so many sources of information held in so many places and by so many people.

This would be a virtually impossible task in an emergency, or in preparing for an emergency, without access to people who have been in the industry for a long time and have had an interest in POMS. This includes growers, researchers, research agencies, departmental staff and consultants.

Even then, there is no easy way to quality control the information. For example, one research paper may suggest that a particular husbandry technique will help in managing POMS; while another will say that may work in one place but further studies have shown it won't apply more generally.
There is also no way of knowing if more recent research or practice has shown new strategies that are more effective. Further, there seems to be little formal documentation of international links and resources.

People come and go in an industry – and tacit information such as this is easily lost. It seems likely that there will be further POMS outbreaks in Australia and the industry needs to be better prepared.

A detailed and definitive POMS reference resource needs to be developed. This would entail a desktop study by a technically proficient researcher, with input from others with broader skills including industry development and emergency response.
This should be an online tool rather than a print one; perhaps in the form of an information portal and forum site. Resources would need to be allocated to ensure regular updating to maintain currency.

A.5 Undertake a comprehensive industry risk assessment process

We've all heard the old saying that 'when you're up to your neck in alligators, it's hard to remember that the original aim was to drain the swamp' – or some version thereof.

It is always difficult to look to the next potential crisis when the current one is yet to be resolved; yet without looking ahead, possible opportunities and solutions will be lost.

Many of the issues that have arisen during the POMS event are not unique to POMS and will have relevance much more broadly in the industry.

As a matter of high priority, there is a need for the industry to undertake a comprehensive risk assessment process. Without knowing the risks, it is hard to plan for the future – especially where long term research programs may need to be commissioned.

What are the next disease risks in the pipeline? What social licence issues might be coming? Are there lessons to be learnt from experiences in other agricultural industries – like how to react if an animal welfare issue arises?

This would later feed into a strengths/weaknesses/opportunities/threats (SWOT) analysis that will inform the development of an industry-wide strategic plan.

4.2.2. Short term priorities (6 - 12 months)

B.1 Review the system of voluntary levies supporting ASI

The POMs event in Tasmania has demonstrated the fragility of the current system of voluntary levies supporting the breeding program being undertaken by ASI.

The POMS spat levy was introduced in 2014, and approved under an authorisation of the ACC for a period of 10 years.

The levy is collected from oyster growers who purchase Pacific oyster spat from hatcheries. The levy commenced at $2.80 per 1000 spat, and is to be indexed annually by CPI. ASI uses the collected monies to fund research designed to produce Pacific oyster brood stock with an increased resistance to the Pacific Oyster Mortality Syndrome (POMS).

The levy system is cumbersome, and prone to abuse. Hatcheries collect the data from their sales and forward this to an independent third party (Wise Lord and Ferguson Accounting and Audit). In return for a fee, WLF advises ASI of the amounts due from each grower and ASI raises invoices. The lack of a direct link between the sale and the invoice encourages avoidance and exacerbates 'free rider' issues. It also requires considerable work on the part of ASI and double handling depletes the value of the collected funds.

Whilst the need for separation was perhaps initially understandable; the scheme has now been in place for some time and could readily be simplified.

There are several possible options:

- The easiest and most straightforward way would be to revise the current system to require hatcheries to include the spat levy in their invoices to growers, and then to remit the funds to ASI. This would require additional effort on the part of hatchery owners, and consideration could be given to some form of payment to cover costs.
- Moving the levy to a statutory levy under the Primary Industries Research and Development (PIERD) Act 1989, administered by the federal Department of Agriculture and Water Resources. This legislation allows for the collection of compulsory (statutory) levies for the purposes of RDE, marketing and biosecurity. Most land-based agricultural industries have instituted levies under this system. The process for instituting such a levy is clearly set out in departmental guidelines.
- Moving the levy to a statutory state-based system would be another way of dealing with this. States have the ability to raise 'fee for service' levies, but the attitude to this option varies state to state. The degree of difficulty inherent in getting three states to agree to such a system must not be underestimated.

B.2 Develop a Farm Biosecurity Manual

Farm biosecurity is a set of measures designed to protect a property from the entry and spread of pests, diseases and weeds. Frontline farm biosecurity is the responsibility of the farm owner, and that of every person visiting or working on a farm – whether that farm be land or water based.

Producers play a key role in protecting Australian plant and livestock industries from pests and diseases by implementing sound biosecurity measures on property.

If a new pest or disease becomes established on a farm, it will affect the business through increased costs (for monitoring, production practices, additional chemical use and labour), reduced productivity (in yield and/or quality) or loss of markets. Early detection and immediate reporting of an exotic pest or disease increases the chance of effective and efficient eradication.

A farm biosecurity manual contains information to help producers to implement biosecurity on-farm.

The content of farm biosecurity manuals varies, but they usually contain an overview of biosecurity, fact sheets to identify the high priority pests or disease risks, husbandry management practices, and how to manage people, vehicles and equipment to minimise biosecurity risks. Manuals may also contain a biosecurity self-assessment list, and templates for surveillance, vehicle cleaning and visitor records.

Through AQUAPLAN 2014–2019, biosecurity plan templates and guidance documentation are being developed. These templates and documents will set out best practice biosecurity planning tailored to specific sectors. Sector-level guidance will facilitate a nationally consistent approach to biosecurity planning and help meet common levels of biosecurity risk management. Current state and territory biosecurity planning activities will be considered as part of this activity.

Manuals can be pest or disease specific; or cover a more general approach to biosecurity risks. It is suggested that priority be given to a POMS specific manual, which can then be expanded more broadly. The manual should be virtual so it can be made readily available and updated. However, hard copy should also be available for on-farm use.

B.3 Develop a national Industry Biosecurity Plan

Industry biosecurity is the protection from risks posed by exotic organisms through actions such as exclusion, eradication, and control. Effective industry biosecurity relies on all stakeholders, including government agencies, industry, and the public.

Biosecurity can be regarded as insurance against risk; whereby the access to good information and the implementation of good decision making processes makes it possible to act pre-emptively, trading off the risks avoided against the costs of measures imposed.

In order to be successful, this approach requires rigour in risk management and decision making to ensure that the costs of biosecurity activities don't outweigh the benefits. At the same time, biosecurity should not just be viewed as insurance against risk but also as an enabler.

As food safety and security become increasingly important around the world, a best practice biosecurity regime can improve market access opportunities. It can also play an important role in enabling the sustainable expansion and intensification required to realise the growth opportunities that exist for our agriculture sector.

Minimising and managing risks while capitalising on the opportunities that a successful biosecurity regime presents will only be possible through a coordinated approach involving government, industry, scientists and the general community. As the biosecurity successes and failures in one area or industry are intertwined with the fate of the others, there needs to be a focus on finding common solutions in order to maximise our return on investment and resources. Importantly, any future approach needs to optimise and integrate the use of policy, science and technology, and education and engagement.

A balance is also required between the initiatives that help to prepare for, and those that allow better responses to and recovery from biosecurity threats.

Ensuring the oyster industry has the capacity to minimise the risks posed by pests, and to respond effectively to any pest threats is a vital step for the future sustainability and viability of the industry.

Biosecurity planning provides a mechanism for an agricultural industry, government and other relevant stakeholders to achieve that balance, by actively determining pests of highest priority, analysing the risks they pose and putting in place procedures to reduce the chance of pests becoming established, and minimise the impact if a pest incursion occurs. Through this pre-emptive planning process, the industry will be better placed to maintain domestic and international trade, negotiate access to new overseas markets, and reduce the social and economic costs of pest incursions on both growers and the wider community.

Industry biosecurity plans (IBPs) are common features in most land-based agricultural industries; but have not been used often in the aquaculture industries.

IBPs set out an agreed range of biosecurity activities to mitigate risks from exotic diseases and pests to particular industries. In general, six areas are covered by biosecurity planning. Agreed actions may include promoting on-farm biosecurity, developing diagnostic protocols and contingency plans for particular diseases and pests, raising awareness of specific diseases and pests, and appointing biosecurity officers.

Among other things, the IBP would also address these issues:

- surveillance monitoring, including monitoring and possible control of feral populations of Pacific oysters;
- need for quarantine facilities;
- import protocols – intra and inter-state and also for international imports;
- biosecurity accreditation; and
- development of standard testing protocols.

An IBP also address responsibilities and cost sharing in the case of an emergency. It will also ensure improved preparedness capacity is developed by offering emergency training to key stakeholders, and encouraging industry and government to work together on trial emergency response exercises.

B.4 Refine husbandry and production systems

Adaptive husbandry and production system approaches will be needed to improve production efficiencies, sustainability and produce quality to ensure farm resilience. Learnings from the POMS reference resource will help inform further work to document best practice by growers on-farm and by researchers and consultants.

This will be an iterative process, with constant review and revision ensuring continuous improvement. It may involve appropriate stakeholders undertaking investigations in overseas production areas to see first-hand what adaptations have been made on farm to deal with POMS after an event.

To be effective, the project will need a designated ‘owner’ tasked with engaging with various stakeholders, updating the ‘manual’ and identifying gaps.

B.5 Improve value chain efficiencies and relationships

The agricultural value chain refers to the whole range of goods and services including products, knowledge and information necessary for an agricultural product to move from the farm to the final customer or consumer.

Australian food value chains continue to undergo significant change. Significant rationalisation and integration of food supply chains continue as large food retailers pursue efficiencies through cost savings and greater scale.

Ongoing changes in lifestyles, demographics and food habits of Australian consumers are driving the evolution of food distribution and retail formats. However, information on non-supermarket distribution channels is often limited and fragmented, which means that it is difficult for many suppliers to understand the evolving industry structure, to take advantage of emerging opportunities and to minimise significant risks.

Better understanding of value chains offers opportunities to capture value at each stage of production, marketing and consumption processes. Growers need to engage more effectively with value chains in order to gain added value, to reduce risk and to improve resilience.

A major aim of this project would be to identify the scope for improved performance of the oyster industry in the face of changes in consumer preference, pressures from the global food market and the strategic responses of major food sector participants.

In providing updated information and knowledge on food distribution channels relevant to the oyster industry, the study would most likely include the following elements:

- analysis of industry risks including trade trends, production risks and vulnerability ;
- identification of key pressure points in industry value chains, including imports of fresh and processed oysters;
- examination of future trends and opportunities ;
- examination of the role and contribution of the hospitality and food service sectors in the oyster industry value chain; and
- analysis of consumer behaviour and preferences, including profiling segments of the consumer market, and their characteristics and spending habits.

A useful tool in undertaking this study would be FOODmap. This was developed by the federal government's then Department of Agriculture Forestry and Fisheries in 2007 and was updated in 2009. FOODmap examines the way our food supply chain is evolving - including the way consumer demands have changed since the global economic situation of 2008. It identifies in detail major factors affecting supply chains at the food category level, as well as the associated challenges and opportunities for the industry including stability of supply.

B.6 Develop a national oyster industry strategic plan

If the oyster industry is to recover from the recent POMS events and achieve the potential participants believe possible, then it needs an overarching national industry strategic plan.

This plan will provide a structured guideline for investment in the future. It will need to be developed in consultation with leading growers and levy payers from around Australia. It should be based on reviewing past investments and identifying what has worked, as well as understanding the issues facing the industry into the future.

The plan should also result in detailed investment strategies for industry RDE, marketing and promotions and communications. There is a range of standard templates for industry investment plans, and the development of a plan is a requirement of establishing a levy under the PIERD Act (as outlined in C.1 below).

B.7 Establish a best-practice environmental monitoring and forecasting system

One of the prime considerations in future sustainability of the oyster industry will be careful management of environmental data.

In the study conducted by UTAS into implications of climate change of the oyster industry, the need to access existing environmental monitoring data and to relate it to industry operations historically and into the future in order to better manage changes was identified as being of high priority. There was a strong view that the lack of integration between bio-physical knowledge and industry knowledge currently constrained effective management of the oyster industry.

The fact that there is currently no uniform framework with which to deal with the diversity of coastal monitoring initiatives and provide available information to the oyster industry was identified as a significant barrier to industry development.

Activities undertaken alongside this study have shown that new technologies and better cooperation have the potential to better distribute information that already exists (ie estuary and oyster health monitoring and reporting). This work has also provided industry members and natural resource managers and other industry and catchment stakeholders the chance to access existing information and interpret it with relevance to their industries and catchment processes. In addition, it has been possible to demonstrate that these options will assist the governance framework of the industry to be better informed to make decisions in relation to climate change and to facilitate the long term viability of the industry.

There are a number of service providers offering various forms of data collection, analysis and distribution.

Oyster growers in both NSW and Tasmania have been trialling technology offered by one such service provider, The Yield, an Australian company leading the world in sensor technology.

When it rains, oysters accumulate contaminants from land run-off. The regulator will then close oyster farms temporarily to protect human health. Weather closures have cost the Tasmanian oyster industry alone an average of $4.3m a year for the past three years. Oyster growers have predominately fixed costs. Technology can help get more revenue from the same investment by being open more and reducing mortalities.

The Yield is working with the industry with the aim of using data generated from its system sensors as part of an adaptive regulatory system. More sophisticated and objective data should allow for opening and closing of farm areas based on real-time salinity data, instead of rainfall from the nearest BOM station.

The Yield's solution delivers the underpinning dataset of salinity, water temperature and water depth in 10 minute increments automatically uploaded to the cloud on the hour. This data will better inform both growers and regulatory decision makers, and minimise both the number and duration of closures.

Furthermore, the data is made available free of charge to researchers. Access to this type of data will be critical to accelerating research outcomes into POMS and other diseases, as it means researchers can focus their resources on understanding the triggers for disease and how to manage the risks rather than collecting data.

There is a strong return on investment case for this program. Based on data from the last three years, the Tasmanian oyster industry would get back over 4 times its investment with an estimated 30 per cent reduction in unnecessary closures. This would mean an addition $1.2m in sales added to the industry for no additional investment in production infrastructure.

This program should be adopted nationally; and investigations should be undertaken to determine what other possibilities the program may offer.

4.2.3. Medium term priorities (12 - 24 months)

C.1 Review industry investment capacity and levy arrangements

As outlined in B.1 above, the oyster industry has not yet fully investigated options for increased industry-wide investment capacity.

One of the key options that needs to be investigated is that of increasing statutory levies.
The Primary Industries Research and Development (PIERD) Act 1989, administered by the federal Department of Agriculture and Water Resources, makes provision for the collection of compulsory (statutory) levies for the purposes of undertaking co-operative RDE, marketing and biosecurity activities. The federal government will provide matching dollars to invest in RDE programs funded through industry levies, thus leveraging available investment funds and generating closer stakeholder linkages.

The industry currently has a levy in place to support RDE activities. This levy is set at the rate of 0.25per cent of gross value of production. It is matched dollar for dollar by the federal government through the Fisheries Research and Development Corporation (FRDC) which operates under the PIERD Act. However, Industry Partnership Agreement (IPA) in place between Oysters Australia and FRDC, the levied amount is limited to a maximum of $400,000 pa.

Over recent times, it has become clear that the funds available under this arrangement are insufficient to deal with the current range of problems confronting growth and profitability in the industry. As a result, uncommitted funds available to address RDE needs are extremely limited; and there is little capacity to invest in programs to assist the industry to become more "resilient".

Many land-based agricultural industries have instituted marketing levies under this system and there is well documented evidence of successful outcomes. For example, independent review of the recent lamb marketing program undertaken by Meat and Livestock Australia showed a 35.3per cent uplift in sales over the period of the campaign.

The process for instituting such a levies is clearly set out in departmental guidelines.

Adoption of a levy can deliver significant benefits to an industry, and enables industry to an effectively double its RDE budget through the matching funding arrangements. Through the levy arrangements, the industry contributes to its own research and development needs. This gives industry a substantial influence on the direction of the research effort. It also ensures that scarce resources are directed to the highest priority outcomes.

C.2 Investigate alternative business models including co-operatives

Investment in agricultural industries has been in the spotlight for a number of years, and is increasingly being seen as a series of “land grabs”. However, other types of investment are also common, such as joint ventures, cooperatives, management contracts, contract farming etc.

Although not without their own drawbacks, these business models can be profitable for farmers and investors, while at the same time being socially and politically acceptable— especially by allowing farmers to maintain control over their land, water and other natural resources.

One of the models that warrants further investigations is that of the cooperative.

Modern cooperative models have addressed many of the issues that in the past showed cooperatives were not without their own challenges. They may well provide a valuable potential avenue for investors and farmers to enter into collaborative partnerships and ensure an equitable distribution of returns.

The federal government has recently put increasing emphasis on this issue. Earlier this year, the federal Minister for Agriculture and Water, Barnaby Joyce, announced $13.8 million to fund the Farm Co-operatives and Collaboration Pilot Program to be run by Southern Cross University. This would be worth investigation as a source of funding, but also as a means of engaging researchers to develop industry-specific case studies.

C.3 Establish a best-practice stock forecasting and price monitoring system

In business, as in most things, knowledge is power. In most agricultural industries, farmers have been disadvantaged by the fact that others further up the value chain have controlled relevant information.

Modern technology has made sophisticated forecasting and price monitoring systems possible. This information would help to redress the existing imbalance of power and return some value to the farm gate.

In order to achieve this, though, industry players will need to understand the importance of co-opetition – in other words, cooperative competition. Whilst industry participants will be fiercely competitive in the marketplace, there is advantage to be gained in working together to achieve the benefits of group action.

There are many platforms available that will assist in the development of both production forecasting and price monitoring systems.

These systems should be readily able to integrate with other farm management systems; and will help with objective benchmarking processes for individual businesses.

Industry has been traditionally unwilling to make the necessary investments in developing and maintaining effective information systems in the firm belief that they cannot afford the resources.

However, it needs to be remembered that, by providing reliable information, such information systems can help all stakeholders avoid the high costs of coping with an unexpected, or poorly prepared for, disaster event. Clearly, the reliability of the information systems available to industry relating to production and market forecasts will have a direct bearing the ability of participants to plan ahead.

C.4 Develop and implement a national regulation and compliance alignment program

Get two farmers together, and it won't take long for talk to turn to the rapidly mounting burden of red and green tape. This is not just a knee-jerk reaction to any regulation. Independent research has shown that burgeoning bureaucracy is a reality and, in a word, farm profits are going down the drain. In 2013, Ernst and Young carried out a government-funded study in Tasmania to assess the extent of regulatory burden across several industry sectors. This study discovered that the agriculture, fisheries and forestry sectors accounted for just 10 per cent of Tasmania's gross state product; yet they carried more than 25 per cent of the total bill for legislative and regulatory compliance.

The National Farmers' Federation (NFF) also weighed into the debate, and not long after revealed a study by consultancy firm Holmes Sackett that demonstrated the real cost to farmers of red and green tape.

Their report looked not only at the direct cash expense of meeting the administrative and compliance requirements of red tape; but also the cost of time spent in complying with regulations between 2007 and 2013.

If you put the two together, the bottom line was that the average Australian farmer spent more than $31,000 year on bureaucratic red tape; and it took them four working weeks a year to comply with all these rules and regulations. This equated to almost 14 per cent of net farm profit.

The most frightening aspect of this analysis comes from reading between the lines. Many farmers would wish that the Holmes and Sackett assumption that all farms make a profit each year was true. However, no matter whether or not a farm does make a profit in any given year, the cost of regulation would change very little.

So, even in times when a farmer makes a loss, and is struggling to keep his head above water, the cost of compliance with unnecessary rules and regulations takes precedence over all other priorities – in some cases, even over paying the electricity bill or putting food on the table.

Many farms these days operate across jurisdictions, and they are often faced with conflicting requirements. This should not be the case in a country the size of Australia, especially for an industry as small as the oyster industry.

This project would investigate regulations in all jurisdictions and ensure that, as much as possible, there is good alignment in requirements both across government agencies within jurisdictions and also across jurisdictions.

Ongoing improvement of existing arrangements, programs and structures will ensure efficiency by reducing red-tape and duplication of effort; and this will have a direct bottom-line benefit to all industry participants.

C.5 Strengthen industry representation structures

There are many challenges in representing any agricultural industry; and the oyster industry is not alone in struggling with these issues.

The need for any industry to be recognised for its economic value and national importance is paramount.

Maintaining that recognition and ensuring governments and decision-makers deliver policy that eases access to markets and streamlines supply and delivery channels is the key role of an effective representative industry organisation.

Across the board, industry representative groups in the agriculture sector struggle with:

- external perceptions of farm sector disunity and inability to coordinate nationally;
- legacy-based structures defending ‘parts’ rather than the ‘whole’ structure of farm sector representation;
- excessive duplication of resources and effort across all levels of representation (national, state, commodity); and
- inefficient allocation and questionable returns on the limited funds available for representation.

It is an unfortunate reality that there are simply too many competing organisations knocking on the doors of a decreasing number of decision makers, often with conflicting and uncoordinated messages. There is a need for rationalisation, stronger engagement with stakeholders, and greater effectiveness if industry representative groups are to remain relevant.

Developing a more unified approach will increase the ability of farmers to have their collective voices heard. A stronger representative voice will facilitate the reciprocal understanding of the process of oyster farming and needs of growers, on the one hand, and of government regulatory and approvals processes on the other. It will also enable more effective communication of industry messages to other stakeholders, including consumers.

Future industry growth and development is dependent on achieving a more effective and efficient approach to industry representation. This will involve strengthening and empowering existing structures at both state and national levels to work cooperatively.

This imperative has been highlighted in the discussion of industry growth cycles in the previous section. It is clear that, regardless of the specific industry sector, growth potential is most likely to be achieved where there is a more sophisticated and capable industry leadership group.

Further, engaging more widely with other shellfish production sectors would undoubtedly deliver further benefits. The establishment of a national shellfish industry council should be investigated as part of this project.

4.2.3. Long term priorities (>24 months)

D.1 Investigate opportunities for diversification

At the risk of mixing a metaphor, the oyster industry currently has most of its eggs in two baskets – Pacific oysters and Sydney rock oysters. That's a risky strategy, as the recent POMS event has clearly demonstrated.

In order to better manage risk and to improve business resilience, it will be important to actively investigate opportunities for diversification. This could include identifying and/or developing innovative new products. New and diverse products may provide opportunities for changing climates, as well as changing consumer trends.

One obvious opportunity for diversification is the Angasi oyster (more commonly known as the flat oyster).

This is a native species that was once highly abundant on the east and southern coasts of Australia, including Tasmania. They now account for less than 1per cent of total oyster production in Australia. A relative of the French grown 'Belon oyster', flat oysters are well accepted in export markets and have a growing profile in the Australian restaurant scene.

Value adding possibilities also need to be examined. These may be covered in the value chain project outlined at B.5 above; but should also be included in the scope of this project.

D.2 Introduce POMS resistant breeds

Within this timeframe, and assuming ASI's funding can be secured, POMS resistant breeds should be coming available for commercialisation. Clearly, commercialisation in a market sense will be the province of commercial entities supplying the stock.

However, there is much more to be done at an industry level to ensure the successful uptake of new breeds. Careful planning will be necessary to ensure all the tools required for successful adoption are available to growers and others in the value chain.

This includes development of appropriate husbandry and production processes, clarity as to value chain processes and pathways to market, understanding of likely consumer reactions and, if needed, preparation of promotion programs to ensure consumer acceptance.

A detailed project plan should be developed in the medium term, to ensure this process can be successfully delivered.

D.3 Develop and implement a national industry capacity building program

Modern day agriculture is undergoing rapid and significant changes. Among the many issues facing farmers and other agri-business people are the development of biotechnologies, the decline of on-farm and rural populations, the emergence of new public policies, concerns over food safety, globalisation of markets, sensitivity to environmental issues, and the influence of regional and global trade agreements.

Given the complexity of these issues, and the distinctiveness of various regions and products in the Australian oyster industry, there is a need for national leaders who understand the issues, and have the skills and networks to construct effective responses to those issues.

This is important, too, in referencing back to the discussion in the previous section of this report on stages of industry growth. Without skilled leaders and industry champions, the industry will not be in a position to move along this continuum – or even to ensure that many of the initiatives outlined in this report are pursued.

There are a number of very effective rural leadership programs already operating in Australia. The most well-known of these is the Australian Rural Leadership Foundation, which has been operating now for more than 3 decades. It offers a range of leadership programs including the Australian Rural Leadership Program and the Australian Agribusiness Leadership Program.

The Marcus Oldham Agricultural College in Victoria has a different offering, with an intensive short course targeted more at new industry entrants and younger participants.

As technology delivers increasingly sophisticated systems and processes, human resource needs across the whole agribusiness industry are converging. This means that in future individual industry sectors will be competing for trained staff in a tight and fiercely competitive marketplace.

So it will be important for the oyster industry to conduct a specific industry Training Needs Analysis (TNA). A TNA, which is also known as a gap needs analysis, identifies skills and competency gaps by isolating the difference in and between current and future skills and competency needs.

This will enable the industry to ensure that training programs at all levels (entry, secondary, trade and vocational, tertiary) recognise its specific needs. This will ensure a wider pool of competent and capable potential employees.

It is not necessary to re-invent these wheels. FRDC has done considerable work in this area, as have other RDCs. It is understood that a training needs review was conducted under the CRC program. Once these needs have been determined, the oyster industry should then work with existing providers to tailor offerings to meet the identified needs.

D.4 Support adoption of a national Industry Emergency Response Deed

Land-based agricultural industries have adopted Emergency Response Deeds to codify responsibilities and cost-sharing. These Deeds have been extraordinarily successful in raising awareness about the emergency risks and in streamlining responses when emergencies do occur.

Australia's emergency aquatic animal disease preparedness and response arrangements include formal arrangements for decision-making (the Aquatic Consultative Committee on Emergency Animal Diseases, AqCCEAD), a comprehensive national contingency planning framework (the Australian Aquatic Veterinary Emergency Plan, AQUAVETPLAN 2014-2019), arrangements and resources to underpin early detection and diagnosis of diseases, incident management systems (for example, the Biosecurity Incident Management System) and communication networks (for example, the Biosecurity Incident National Communications Network).

AQUAPLAN 2005–2010 made significant progress toward the development of emergency aquatic animal disease response arrangements. However, no formal industry–government arrangements equivalent to cost-sharing deeds in place for emergency terrestrial plant and animal disease responses exist for emergency aquatic animal disease responses.

Such arrangements would enable aquatic animal industries and governments to formalise shared responsibilities and costs for managing emergency aquatic animal disease incidents.

Through activities under AQUAPLAN 2005–2010, industry and government agreed that a joint deed may be an appropriate policy approach and should be the subject of further work. Industry and government have endorsed a detailed work plan to develop terms of an industry-government deed; and this work is now being undertaken through Animal Health Australia Ltd.

Yet progress remains slow.

If there is no immediate prospect of implementation of sectoral-wide plan as envisaged in AQUAPLAN, then the oyster industry should take immediate steps to investigate the possibility of establishing a Deed to cover the shellfish industry.

Whilst establishment of an emergency Deed is listed as a long-term priority in this report, it is recognised that there are many steps in achieving even an informed consideration of this proposal. Development of a project plan should be a short-term priority, in order to ensure that steps can be taken as and when possible to cumulatively result in the implementation of a Deed.

D.5 Develop a comprehensive farm management system

A Farm Management System (FMS) provides a way for growers to deal with their entire farm and business management needs in an integrated and efficient way. The system helps growers to integrate their planning and documentation (and possibly auditing) for all aspects of running a successful, profitable and sustainable farm business, such as:

- business planning and risk management;
- food safety;
- quality assurance (QA);
- property planning;
- environmental management;
- quarantine and interstate certification;
- workplace health and safety (WH&S); and
- financial and business management.

The Farm Management System (FMS) approach is designed to help growers to:

- better plan their management processes;
- assess their management performance and effectiveness of management practices;
- identify opportunities for improvements or efficiencies; and
- demonstrate management practices and outcomes to external stakeholders.

A management system for any business supports better planning, risk assessment, management actions, monitoring and review. An FMS is used to track and review the implementation of a range of plans; and it assists in efficient record keeping. Importantly, it also encourages the farm manager to generate and analyse information from farm maps, risk assessments, benchmarks, records, documented procedures and monitoring data and use this information to identify opportunities to find efficiencies or improvements.

This integrated management system approach can help enhance profitability, sustainability and professionalism of running a farm business by addressing critical business development needs, managing risks, and meeting environmental and sustainability goals.

Self-management by farmers throughout an industry can reduce the need for the introduction of new government regulations. This requires demonstration of effective management of environmental issues, natural resource efficiency, food safety, farm safety and other community concerns.

An effective national FMS can also help growers demonstrate compliance with regulatory requirements and maintain certification to a range of market standards and assurance schemes.

The oyster industry is part-way along this path, with the development of quality assurance plans and grading standards. Documentation and national standardised of these existing processes will be important; and development of other modules to address other farm management requirements should be prioritised.

5 Conclusion

It is clear that the POMS event in Tasmania has been a major disaster for oyster growers and hatcheries, not only in Tasmania but also in other states.

Responding to this challenge will require a carefully planned and coordinated effort by all stakeholders - industry, individual businesses, government and the wider community.

This report has been developed to identify a range of investment priorities that will work towards achieving the desired outcomes. The suggested priorities have been outlined at high level only – and detailed briefs would need to be developed before commencing work on any of the projects.

And there is always a silver lining in every cloud.

If this set-back causes people to stop and refocus, then there is every chance the industry will grow strongly and once again contribute to the development of a prosperous and viable national oyster industry.

Appendix A: Terms of Reference

Background

Following the confirmed outbreak of Pacific Oyster Mortality Syndrome (POMS) in Tasmania early in 2016, FRDC has agreed to fund Oysters Australia P/L to deliver a National Industry Response to this outbreak on behalf of the Australian oyster industry.

Need

The POMS outbreaks and subsequent significant mortality events have now occurred in Pacific Oyster grower regions in New South Wales and Tasmania and threaten the Pacific Oyster industry throughout Australia.

Whilst governments are willing to provided assistance at a federal and state level, a lack of coordinated response so far across all pacific oyster growing states threatens to confuse and undermine confidence of those capable of providing assistance to industry. This approach initiated by Oysters Australia aims to achieve a coordinated response to genuine industry need giving Federal and State stakeholders greater confidence to provide targeted assistance.

Approach

Oysters Australia will engage a specialised coordinator on a consultancy basis to engage stakeholders, continuously liaise with Oysters Australia and deliver the outcomes. Oysters Australia will assist the person/entity engaged to target relevant stakeholders for urgent consultation to ensure a diligent and urgent process.

Specifics

In delivering the project the POMS response coordinator will have regards to the following key points:

- Identify industry needs to deal with POMS from infected and uninfected areas through urgent communication with relevant key stakeholders from industry and agencies in Tas, SA, NSW (OA to provide those stakeholders);
- Document (and where possible and relevant, prioritise) needs in consultation with OA and stakeholders if possible;
- Seek agreement if possible between state industries and state agencies on key issues and priorities in relation to them;
- Formulate a relevant response plan on this basis that balances these views and identified needs where realistically possible;
- Assist OA in taking leadership role in developing and delivering a national POMS response;
- Document outcomes as best possible, investigate funding opportunities at Federal level to assist those stakeholders to report back to key stakeholders through OA;
- Assist OA to report these outcomes to the relevant agencies plus relevant Federal Ministers;
- Ensure needs of OA are met and continuously report back to OA and seek direction from President then board;
- Engage key stakeholders in an appropriate and sensitive manner given the level of devastation this virus has caused and may cause.

Reporting

The POMS Coordinator will report initial findings based on interviews and discussions with key stakeholders by the Coordinator to Oysters Australia Board and other industry stakeholders on Thursday 7 April 2016.

Key issues associated with this project and Stakeholder Interaction will then presented at a Tasmanian industry POMS Workshop on Friday 8 April 2016 and relevant feedback noted.

The final report will be delivered to FRDC after approval by the Board of Oysters Australia as soon as practical after this workshop, not later than COB 22 April 2016.

Delivering Outcomes

Once approved by the FRDC, the POMS Coordinator will then deliver the key outcomes of the Response to relevant Federal Ministers and agencies to help guide relevant assistance processes. The POMS Coordinator will remain available for enquires and communication where needed for one month after delivering the National POMS Strategy.

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