

Review of AQUAPLAN 2014-2019: How national aquatic animal health has improved



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Summary

AQUAPLAN 2014–2019 was Australia’s third national strategic plan for aquatic animal health. It was jointly developed and implemented by aquatic animal industries and governments to address five objectives central to strengthening Australia’s aquatic animal health systems. The plan built on substantial progress made through AQUAPLAN 1998–2003 and AQUAPLAN 2005–2010.

This document presents the results of a review of AQUAPLAN 2014–2019 that is based on the views of beneficiaries and investors in the plan—principally aquatic animal industries and governments. These stakeholders were invited to comment on the plan’s development (section 3), implementation (section 4), achievements (section 5), and considerations for a successor strategy (sections 6 and 7). Sixteen organisations contributed to the review.

The review findings are clear: AQUAPLAN 2014–2019 has been a success. The plan made substantial progress in key areas of Australia’s aquatic animal health management arrangements. The achievements most valued by stakeholders are highlighted in section 5 of this document and include progress on enterprise biosecurity, laboratory diagnosis, surveillance, emergency preparedness and veterinary medicines. At the conclusion of the plan, 18 activities were complete, four were ongoing and two were discontinued. A thorough description of progress for all 24 activities of the plan is provided in Appendix A.

A key factor in the success of AQUAPLAN 2014–2019 was its ability to attract resources to the common priorities that had been agreed by governments and industry. The plan attracted over \$3.5 million in direct investment, far exceeding the investment in AQUAPLAN 2005–2010. Considerable in-kind resources were also contributed. These investments indicate that AQUAPLAN’s priorities were meaningful and supported by investors and beneficiaries of the plan.

The review identified a strong ongoing need for a national strategic approach to aquatic animal health in Australia. AQUAPLAN is a proven model that can be further utilised and strengthened to guide investments in Australia’s systems for managing aquatic animal health.

The review aimed to draw on learnings from the entire lifecycle of AQUAPLAN 2014–2019 of relevance to a possible successor strategy. While the plan was successful, stakeholders identified areas for continued emphasis or reconsideration in the approaches to develop a successor. Key issues identified include the ongoing need for a strategic approach to aquatic animal health, the need to address existing and new needs and priorities, the need to emphasise return on investment, the benefit of a component of seed funding to provide momentum, and flexibility to adapt to changing needs. Section 7 of the review explores these key issues of relevance for development of a successor plan.

A principle factor of AQUAPLAN’s success has been the collaborative approach to identifying and pursuing common goals. This review has found that this collaborative approach must be cultivated in a successor strategy to ensure that common needs are pursued, that all partners are engaged appropriately and that maximum return on investment is achieved.

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1. Introduction

Sustainable growth of Australia's aquatic animal production presents numerous opportunities for producers, fishers, regional communities and livelihoods, and provides the Australian community access to fresh Australian grown or caught seafood. However, aquatic animal disease is considered one of the greatest threats to continued growth and sustainability of aquaculture and fisheries industries. It also represents a significant threat to biodiversity and ecosystems. Recent experience in Australia and overseas demonstrates that the threat is real and substantial.

To mitigate the risk of disease it is essential to have a strong aquatic animal health system that keeps pace with changes in risk profiles. Strategic investment in building and maintaining a strong aquatic animal health system reduces disease risk and protects and supports:

- the \$3.15 billion GVP of fisheries and aquaculture sectors (2019-20), of which 51 per cent (\$1.60 billion) is attributed to aquaculture and 49 per cent (\$1.58 billion) to fisheries (Steven, Dylewski & Curtotti, 2021)
- the 41,245 people who are either directly or indirectly employed through fisheries and aquaculture activities (Fisheries Research and Development Corporation, 2019)
- the supply of safe, sustainable and high-quality fisheries and aquaculture products for domestic consumption
- the enviable disease-free status of Australia which promotes a relative advantage for industries that supply products to export markets
- the diverse and unique ecosystems in which native aquatic animals are an integral part
- the recreational fisheries that over 3.4 million people enjoy annually (Henry & Lyle, 2003) and whose activity contributes \$2.56 billion (in 2013) to national, state and regional economies (Colquhoun, 2015)
- the continued customary fishing and traditions that form an integral part of Aboriginal and Torres Strait Islander cultures and livelihoods.

At a national level, Australia's aquatic animal health system has been shaped by aquatic animal industries and the Commonwealth, state and territory governments through investment in three national strategic plans: AQUAPLAN 1998-2003, 2005-2010, 2014–2019. Appendix B provides additional information on these plans.

Australia's aquatic animal health management system consists of functional elements that address biosecurity, laboratory testing, surveillance, emergency preparedness and response, and international leadership. These components are strengthened through the strategic planning of AQUAPLAN, good governance and stakeholder engagement. At its core, AQUAPLAN is underpinned by partnerships among government and industry sectors that focus investment on the highest priority common needs to enhance the system.

The third national strategic plan for aquatic animal health, AQUAPLAN 2014–2019, had five objectives and 24 activities that aimed to strengthen various aspects of the aquatic animal health management system. Its five objectives were:

- 1) improving regional and enterprise level biosecurity
- 2) strengthening emergency disease preparedness and response capability
- 3) enhancing surveillance and diagnostic services

- 4) improving availability of appropriate veterinary medicines
- 5) improving education, training and awareness

AQUAPLAN 2014–2019 concluded in June 2019. This review considers AQUAPLAN 2014–2019’s effectiveness, documents its achievements and considers needs and approaches for a fourth AQUAPLAN.

2. The review process

At the time this review was initiated, stakeholders had acknowledged that there was an ongoing national need for governments and aquatic industries to coordinate their efforts to improve aquatic animal health management. The conclusion of AQUAPLAN 2014–2019 provided an opportunity to review the strategy to understand how it has served stakeholder needs and to inform development of a likely successor strategy.

The review of AQUAPLAN 2014–2019 was to address all phases of the plan’s development and implementation, including:

- 1) development of the plan – including foresight activities, consultative processes and resource implications
- 2) implementation processes – including stakeholder roles, monitoring, prioritisation, resourcing and communication
- 3) achievements – contributions to and progress of projects within AQUAPLAN’s five objectives and description of ongoing work
- 4) considerations for a successor strategy – need and desirable approach.

The review was conducted predominantly by direct contact with stakeholders, by email or phone, to obtain their views on the areas outlined above. The then Australian Government Department of Agriculture and Water Resources provided a review secretariat to coordinate the review and consultative processes.

Aquatic animal industry representatives, Commonwealth, state and territory governments, and other government and non-government agencies were asked to complete a detailed questionnaire that covered a range of issues within the review’s scope. Sixteen responses were received.

This review report draws on the responses of stakeholders and provides consensus views, as well as significant minority views where they were provided. Outcomes and achievements of the plan were also informed by activity lead project reports. Sections 3 to 6 provide a summary of stakeholder’s views on the four key areas considered under the review.

3. Development of AQUAPLAN 2014–2019

In 2013, industry and governments commenced developing the third national strategic plan for aquatic animal health, AQUAPLAN 2014–2019. To guide its development, industry and governments formed a working group which included representatives from industry and the Sub-Committee on Aquatic Animal Health (SCAAH).

An AQUAPLAN development workshop was held in September 2013 for industry and governments to discuss the priority issues to be included in AQUAPLAN 2014–2019. Workshop participants included representatives from industry (including wild catch, aquaculture and ornamental fish sectors), the Australian Government and state and territory governments, and other government and non-

government agencies (including the then CSIRO Australian Animal Health Laboratory and the Fisheries Research and Development Corporation [FRDC]). The workshop had three objectives:

- 1) to provide workshop participants with information on Australia's previous national strategic plan, AQUAPLAN 2005-2010, and the need for a new strategic plan.
- 2) to determine common aquatic animal health related risks (and opportunities) that may impact on industry sectors over the next five or more years.
- 3) to determine priority activities for inclusion in Australia's third national strategic plan for aquatic animal health, AQUAPLAN 2014–2019.

Industry-government workshop

Stakeholders agreed that the 2013 industry-government workshop was the most appropriate approach to set priorities for AQUAPLAN 2014–2019. Collaboration between industry and governments was identified as fundamental to the success of AQUAPLAN—to establish goals of common benefit and national importance to the industry and government investors in AQUAPLAN.

Foresighting and future planning

Foresighting (future planning) techniques were used during the 2013 development workshop to anticipate future needs and priorities for AQUAPLAN 2014–2019. This approach was underpinned by industry presentations on their vision for the future state of each industry sector (including aquatic animal health risks and opportunities) which then shaped the objectives and activities of AQUAPLAN. This approach was thought to have worked best when stakeholders consulted within their organisation on priority issues before the workshop and then presented their consolidated views.

Ministerial endorsement

AQUAPLAN 2014–2019 was endorsed by the Agricultural Ministers Forum in August 2014.

Stakeholders strongly agreed that ministerial endorsement of the plan was valuable to obtain the necessary authority to allocate resources to or seek funding for its implementation. Ministerial endorsement was also considered to provide governments with a mandate to allocate in-kind resources to projects and gave all stakeholders the confidence that priorities were agreed at the highest level.

Key findings – development of AQUAPLAN

- An industry-government workshop was an effective way to establish priorities of common interest and benefit to all sectors.
- Future planning activities informed by industry knowledge was valuable to setting strategic priorities.
- Ministerial endorsement enabled governments to allocate resources to implementation and gave industries and governments confidence that strategic priorities were supported at the highest level.

4. Implementation of AQUAPLAN 2014–2019

This section addresses the implementation of AQUAPLAN 2014–2019 in four sections: roles and responsibilities, monitoring and prioritisation, resourcing, and communication.

Roles and responsibilities

AQUAPLAN 2014–2019 was a cooperative industry–government initiative with responsibility for the plan shared by both aquatic animal industries and governments. Responsibilities for specific AQUAPLAN 2014–2019 activities were outlined in the plan.

In addition to responsibilities for specific activities, other key roles in implementation of AQUAPLAN 2014–2019 were agreed by aquatic animal industries and governments when the plan commenced. These roles are summarised in Table 1.

Table 1 Summary of roles and responsibilities in AQUAPLAN implementation

Role	Who
Oversee implementation of AQUAPLAN and monitor progress of activities.	Sub-Committee on Aquatic Animal Health (SCAAH)* which considered the consolidated progress reports of activity leads and progress toward implementing the plan.
Represent industry interests in implementation of AQUAPLAN and monitoring progress of activities.	National Aquaculture Council; industry sector association representatives for specific activities (for example, through membership of working groups).
Lead specific activities within AQUAPLAN, including developing project plans and seeking funding.	Activity Leads who consulted with relevant stakeholders about implementation of specific activities.
Coordination of AQUAPLAN implementation	The then Australian Government Department of Agriculture (superseded by the Department of Agriculture and Water Resources in 2015) which coordinated the implementation and communication plans of AQUAPLAN.

*SCAAH included representatives from the Australian, state, Northern Territory and New Zealand governments, the CSIRO Australian Animal Health Laboratory and Australian universities, and the National Aquaculture Council as an observer.

Clarity of roles and responsibilities

The Sub-committee for Aquatic Animal Health (SCAAH) was seen as an appropriate and efficient forum through which to coordinate the national implementation of AQUAPLAN 2014–2019 and monitor and prioritise activities. Stakeholders agreed that governments' roles and responsibilities were clear from the outset, but industry's roles and responsibilities were sometimes less clear.

The National Aquaculture Council (NAC) was represented as an observer on SCAAH, and this was considered an appropriate and efficient way to represent industry interests in monitoring, prioritising and implementing AQUAPLAN activities. However, NAC membership changed throughout the life of the plan and became less representative of Australia's major aquaculture industry sectors. Through the review, stakeholders agreed that the best mechanism for industry engagement in the implementation of AQUAPLAN needs to be re-considered. This is essential to facilitate industry–government cooperation to jointly implement the plan.

Activity leads were generally clear on their role, however, difficulties arose when activity leads changed (for example, due to organisational restructure), when activities needed to be modified or when there was difficulty attracting funding. More guidance and clarity for activity leads would have assisted, especially when challenges or changes arose.

Stakeholder suggestions to improve clarity of roles and responsibilities included:

- providing additional guidance for the roles, responsibilities and expectations of activity leads
- providing greater flexibility in the management of activities, to account for staff changes and/or changes to activity aims
- increasing the opportunities for industry and governments to jointly monitor and guide implementation of AQUAPLAN activities.

There was positive feedback from stakeholders about the Australian Government Department of Agriculture and Water resources coordination role in that it provided strong support to activity leads, to SCAAH and for implementing the AQUAPLAN communication plan.

Key findings – roles and responsibilities

- It was efficient to use an existing mechanism (i.e., SCAAH) to oversee implementation of AQUAPLAN.
- Representation of industry interests throughout the life of the plan would require reconsideration in a successor strategy to promote strong industry-government collaboration.
- Roles and responsibilities were generally clear; however, additional guidance, especially for activity leads, may help with implementation of activities.

Monitoring and prioritisation

Activity leads provided written reports on progress biannually, which were used to provide broader updates on progress to stakeholders. Activity progress reports were considered at SCAAH meetings. Progress of AQUAPLAN activities were discussed as were any need to prioritise resources for specific activities. The SCAAH workplan included numerous AQUAPLAN activities and this was reviewed and updated annually. The then Australian Government Department of Agriculture supported this process and worked with SCAAH and aquatic animal industries to monitor the implementation of activities.

Updates on the plan's activities were also provided at industry forums, to conferences and to relevant national committees (for example, Animal Health Committee and Aquaculture Committee). This provided additional opportunities to discuss and seek feedback on specific AQUAPLAN activities. These opportunities were considered to have greatest effect when undertaken in a collaborative and outcome focused manner.

Monitoring

Stakeholders agreed that the frequency of reporting was appropriate. However, some stakeholders commented that they were not aware of many of the AQUAPLAN monitoring mechanisms. Stakeholders suggested that consideration needs to be given to how industry and governments can jointly and efficiently monitor AQUAPLAN activities.

The AQUAPLAN seminar series was seen as a useful way to receive updates on the plan's activities, and this could be one mechanism for industry and governments to discuss and collaborate on specific activities. Another suggestion was that an industry–government forum could be added to the end of the annual SCAAH face-to-face meeting, to discuss AQUAPLAN activities and updates.

Prioritisation

Stakeholders agreed that the approach to prioritisation was useful. Activities of higher importance to industry and governments naturally had higher priority, and were driven more easily, compared to those of a lower priority. This highlights the importance of the development process in establishing objectives and activities that are true shared priorities for industries and governments.

On-going suitability

Many of AQUAPLAN 2014–2019's activities were successfully funded, progressed or completed. This suggests that the plan continued to meet stakeholder needs and priorities for improving aquatic animal health. However, the on-going suitability of AQUAPLAN 2014–2019's activities was more difficult to assess for some stakeholders that were not privy to the implementation process overseen by SCAAH.

It may be beneficial to increase opportunities for industry and government to consider whether AQUAPLAN is continuing to meet stakeholder needs during the life of the plan, especially as the aquatic animal health landscape can change over the course of a five-year strategic plan (for example, a major disease outbreak can shift priorities). One additional mechanism may be a mid-term review, which would allow joint consideration of any modifications to be made in a strategic manner.

Key findings – monitoring and prioritisation

- Biannual reporting from activity leads was an appropriate frequency to facilitate monitoring and prioritisation.
- Mechanisms for monitoring progress should be visible to all stakeholders throughout the life of the plan.
- AQUAPLAN 2014–2019 continued to meet stakeholder needs, however, a mid-term review by aquatic animal industries and governments may provide additional opportunity for the plan to adapt to changes in priorities.

Resourcing

AQUAPLAN 2014–2019 was intended to attract resources to its agreed objectives and activities for improving aquatic animal health nationally. Guidance on the resourcing required to complete each activity was included in the plan, for example, by identifying the need for new direct funding or the availability of an existing funding source.

Activities in AQUAPLAN 2014–2019 had varying resource requirements and each activity was managed by different activity leads. Where direct funding was required for specific activities, the activity lead was responsible for identifying and sourcing funding.

In-kind resources were provided by the then Australian Government Department of Agriculture to fulfil its coordination role. In-kind contributions were also provided by industry and governments to

fulfil their roles in leading or participating in specific activities. The in-kind contributions were substantial.

Direct funding

AQUAPLAN 2014–2019 was successful in attracting over \$3.5 million in direct investment to specific activities (Table 2), with considerable additional investment of in-kind resources by industry and governments. Stakeholders noted that this is an achievement to be celebrated as the investment in AQUAPLAN 2014–2019 is comparable to AQUAPLAN 1998–2003 which had a dedicated funding source. Direct investment in AQUAPLAN 2014–2019 was substantially more than AQUAPLAN 2005–2010, which attracted direct investment of at least \$1.2 million.

Table 2 Estimated direct investment in AQUAPLAN 2014-2019 by objective

Development of the plan	
Workshop and publication	\$67,000
Implementation of the plan	
Ob 1. Improving regional and enterprise level biosecurity	\$496,523
Ob 2. Strengthening emergency disease preparedness and response capability	\$1,100,000
Ob 3. Enhancing surveillance and diagnostic services	\$1,838,900
Ob 4. Improving availability of appropriate veterinary medicines	In-kind contributions
Ob 5. Improving education, training and awareness	\$44,830
Total	\$3,547,253

There were difficulties in attracting direct funding for some activities; for example, some activities related to aquatic veterinary medicines, benchmarking, and education and training. These difficulties did not necessarily relate to funding availability but other matters such as the complexity of a project and consequent difficulty in developing a sound and supported project proposal, competing demands on the time of project leads, changes to project leads, and uncertainty about available funding sources. Stakeholders proposed some solutions to resolve these difficulties, and improve the overall approach to resourcing:

- Develop stronger project proposals
 - Securing industry and government support and establishing clear aims and strong objectives in project proposals can increase eligibility for specific funding sources.
 - Additional support for activity leads (where required) in developing proposals may assist in strengthening project proposals and increase eligibility for funding.
- Leverage and maximise funding sources
 - Guidance on potential funding sources could assist activity leads to select the most appropriate funding sources from the start of the project.
 - Building awareness of AQUAPLAN and its activities among new and existing funding partners, including industries, can raise the profile of AQUAPLAN and make its activities attractive for investment.

- Integrate AQUAPLAN activities into day-to-day business
 - At an organisation level, formal recognition of staff’s contributions to AQUAPLAN’s activities through their individual workplans, especially for activity leads, could assist in securing dedicated time for personnel to work on these activities.

In-kind contributions

In-kind contributions to implement AQUAPLAN 2014–2019 activities were substantial. For example, industry members led and participated in a number of projects and shared their knowledge, time and expertise; government staff led many activities; government and industry personnel contributed time and travel costs for meetings and workshops to progress specific activities.

Many stakeholders mentioned the success of objective 4 (improving the availability of appropriate veterinary medicines), which was supported predominantly through in-kind contributions.

Resource guidance

Stakeholders agreed that the guidance on required resources that was included within AQUAPLAN 2014–2019 was somewhat useful in setting general expectations. Additional guidance on possible funding sources and the approximate cost of each activity could be helpful; however, it was noted that it may not be possible to provide an accurate indication of required resources until detailed project plans have been developed. An operational funding plan to accompany AQUAPLAN might provide more detail on the amount of funds required to properly resource an activity as it becomes known and can be updated throughout the life of the plan.

Key findings – resourcing

- AQUAPLAN 2014–2019’s model of attracting investment to achieve shared priorities of industry and governments was a success.
- The success in attracting resources to implement AQUAPLAN activities (direct and in-kind) was attributed to their value to stakeholders, emphasising the importance of engaging all parties to determine the highest common priorities for inclusion in the plan.
- Additional guidance to project leads on their expected role, support to develop project plans and to target suitable funding sources could provide efficiencies.
- Building understanding of the objectives and benefits of AQUAPLAN and its activities, could raise its profile and make its activities more attractive for investment.

Communication

In addition to the formal reporting channels discussed in the sections on roles and responsibilities and monitoring and prioritisation, a range of other methods were used to communicate with stakeholders on AQUAPLAN 2014–2019 (Table 3). Governments and industry developed a communication plan to achieve four objectives:

- 1) increase awareness and understanding of AQUAPLAN
- 2) encourage involvement in and support of AQUAPLAN activities
- 3) provide progress updates on activities
- 4) communicate and encourage uptake of outcomes.

Implementation of the communication plan was led by the then Australian Government Department of Agriculture. Stakeholders commented that this centralised approach provided efficiencies and was generally performed well by the department. However, stakeholders noted that there were limitations to the reach of the communication methods and there could be improvements by communicating in more audience relevant ways. The challenge would be to achieve this in an efficient manner.

Table 3 AQUAPLAN 2014–2019 communication methods

Method	Purpose
AQUAPLAN website	Advise primary and secondary stakeholders of progress and outcomes of AQUAPLAN activities.
AQUAPLAN seminar series	Advise primary and secondary stakeholders of progress and outcomes of AQUAPLAN activities.
Bi-annual SCAAH newsletter	Advise primary and secondary stakeholders of progress and outcomes of AQUAPLAN activities.
Activity final report	To inform SCAAH of the completion of the activity and identify the key stakeholders impacted or influenced by the outcome.
Conference presentations (including industry meetings and conferences)	Advise primary and secondary stakeholders of progress and outcomes of AQUAPLAN activities.
Committee reports	Advise committees of progress and outcomes of AQUAPLAN activities.
Magazine articles	Advise primary and secondary stakeholders of progress and outcomes of AQUAPLAN activities, and upcoming events (for example, FISH magazine).
FRDC Aquatic Animal Health and Biosecurity Subprogram: Health Highlights newsletter	Advise primary and secondary stakeholders of progress and outcomes of AQUAPLAN activities that the FRDC is leading or funding.
Media releases	Inform stakeholders of key AQUAPLAN 2014–2019 events or activities (for example, when AQUAPLAN 2014–2019 was agreed).

Improvements to communication

Stakeholders had mixed views on the most appropriate and useful communication methods (Table 3).

Stakeholders agreed that the AQUAPLAN seminar series and the FRDC’s Aquatic Animal Health and Biosecurity Subprogram - Health Highlights newsletter were the most useful communication tools. For those stakeholders involved in SCAAH, they found the AQUAPLAN website, SCAAH newsletter and activity final reports very useful. Industry tended to find these methods less useful.

Stakeholders agreed that the centralised approach to communication was appropriate, and offered some suggestions for improvement:

- provide quality, outcome focused materials to key contact points within industry and government which can be disseminated and discussed within their networks

- communicate good news stories and the work that is being done proactively
- target mass media and social media network user groups
- develop and maintain a set of standard AQUAPLAN PowerPoint presentations or materials that can be used by personnel attending industry annual general meetings
- share responsibility for communicating relevant AQUAPLAN information within stakeholder networks
- AQUAPLAN branding on all communications and reports related to its activities
- provide a dedicated AQUAPLAN newsletter rather than incorporating into the SCAAH newsletter
- provide more information on the AQUAPLAN website, including links to activity projects or contact details for activity leads.

Key findings - communication

- A centralised approach to AQUAPLAN communication provided efficiency. The role was generally performed well by the Australian Government Department of Agriculture however the reach of communication could be extended.
- Communication materials should be of a high quality and focused on outcomes relevant to the audience.
- All stakeholders need to share responsibility for sharing materials and promoting AQUAPLAN within their networks.

5. Outcomes and achievements

There has never been a time of such significant investment in aquatic animal health by Australian industries and governments. This investment has built on the robust systems established under AQUAPLAN 1998-2003 and AQUAPLAN 2005-2010.

Stakeholders nominated numerous projects as significant achievements of AQUAPLAN 2014–2019 and those most mentioned include:

- development of generic aquaculture biosecurity plan guidelines, and several sector-specific biosecurity plan guidelines (objective 1): these activities were achieved through partnerships between government and industry sectors and have made a direct impact on aquatic animal health management.
- development and implementation of the Abalone Health Accreditation Program (AHAP) (objective 1): the program continues to support certification of disease-free status and facilitates trade of farmed abalone.
- completion of a draft Aquatic Deed (objective 2): this project involved substantial direct investment and commitment from many industry and government sectors over a sustained period of time to resolve complex policy issues for sharing the responsibilities and costs for emergency aquatic animal disease responses.
- strengthening of Australia's diagnostic capability (objective 3): activities improved capabilities for rapid identification of disease, including emerging diseases, and diagnostic capability to support surveillance for a range of purposes.

- improvements in the availability and safe use of appropriate veterinary medicines (objective 4): industry and governments collaborated to identify common needs and to prioritise permit applications. Funding was attracted to prepare permit applications for agreed priorities.

The detailed outcomes of each of the five objectives and their respective activities are summarised in Appendix A.

6. Future approaches for aquatic animal health

Industry and government stakeholders have agreed that there is a strong, ongoing need for a nationally coordinated approach to aquatic animal health in Australia. Continued improvements in Australia's arrangements for managing aquatic animal health will be required to maintain the competitiveness and sustainability of aquatic animal industries and to protect Australia's aquatic animal resources and environments.

A joint approach across industry sectors and governments is needed due to the varied nature of aquatic animal health interests (for example, capture fisheries, recreational fisheries, aquaculture, ornamental fish and the environment) and a relative paucity of resources available to individual sectors. By taking a national strategic approach, resources can be allocated to common priority needs to strengthen Australia's aquatic animal health management arrangements in a consistent and efficient manner.

AQUAPLAN 2014–2019 attracted substantial investment of resources and made considerable progress in strengthening aquatic animal health management in Australia. Stakeholders were supportive of a similar joint industry–government approach for a successor strategy; however, they suggested several areas where the approach of a successor strategy might be improved, including:

- re-examining the mechanisms for industry–government collaboration in implementation of AQUAPLAN to ensure representation and engagement is achieved throughout the process of developing and implementing the plan.
- providing mechanisms to ensure the plan remains flexible and can be adapted to changing circumstances and continue to meet stakeholder needs throughout the life of the plan.
- provide additional guidance to stakeholders on implementation of the plan to ensure continuity and desired outcomes, for example, guidance for activity leads on the aims of specific activities and to support them to seek funding.

The success of AQUAPLAN is underpinned by the strength of the industry and government partnerships that are formed to achieve its objectives. Throughout this review, stakeholders presented different views on how industry–government partnerships could be cultivated for a successor strategy. There is no single formula for success, however, building on the strengths of the existing partnership approaches are likely to be beneficial. Stakeholders have raised several points through this review that can be jointly considered in development of a successor strategy, including:

- how best to apply the finite resources of both government and industry organisations for maximum effect, including through leveraging partnerships. There will be changing demands and pressures that arise within each organisation throughout the life of the next plan and these may affect priorities and available resources.
- how all stakeholders can remain engaged throughout both the development and implementation of AQUAPLAN to ensure common needs are identified, prioritised, and achieved to maximise return on investment.

- how AQUAPLAN governance arrangements can ensure implementation is efficient and effective and engages stakeholders to achieve the points above.

Possible activities in a successor strategy

Most stakeholders were of the view that the existing objectives in AQUAPLAN 2014–2019 would be appropriate to continue in a successor strategy. This would ensure continuity of projects with a logical progression to a new phase and for those of a long-term nature.

Stakeholders also suggested activities that might be suitably addressed in a successor strategy. Proposed issues and activities for consideration in the next AQUAPLAN are summarised in Table 4.

Table 4 Activities for consideration in a future national strategic plan, suggested by AQUAPLAN stakeholders

Issue	Details
Anti-microbial resistance	Assess sources of anti-microbial resistance in aquaculture production and the aquatic environment.
Aquatic animal health services	Analyse what aquatic animal health services (private and public) are required for growing the aquaculture industry and work to understand how that demand for services can be met in the long term.
Aquatic animal health system	Strengthen understanding of the national aquatic animal health system to prioritise investment in its activities. For example, preparedness activities can become undervalued if there are no incidents for a prolonged period.
Aquatic Deed	Finalisation and ratification of a mutually beneficial Aquatic Deed.
Availability of appropriate veterinary medicines	Build on the progress made through AQUAPLAN 2014-2019.
Disease surveillance and testing	Develop a national strategy for disease surveillance and testing, including non-government laboratory testing, and improve the sensitivity of passive surveillance system and our understanding of the broader system.
Domestic translocation of animals	Improving market access and the safe movement of genetic materials and animals.
Domestication of aquatic animals	Assessing methods of domestication and the use of wild animals for broodstock.
Education, training and awareness	Stakeholders noted the importance of this objective but recommended reconsideration of the approach in a successor strategy.
Emergency response simulation exercises	Development and implementation of a series of emergency response simulation exercises for industry.
International activities	Capacity building and reducing risk by investing in activities offshore.
On-farm biosecurity planning	Progressing on-farm biosecurity plan development and implementation across industry sectors.

Issue	Details
Import risk assessments	Improve assessments of risk, the quality of information available and examine approaches to managing risk pre- and post-border.
Priority disease list	The development of a priority disease list for aquatic animal diseases, to target prevention and preparedness activities toward high priority threats.
Response manuals and plans	Development of additional response manuals for new diseases and generic response manuals and procedures to improve response capability for emerging diseases.

Note: topics are not shown in priority order.

When considering future approaches for aquatic animal health, many stakeholders raised challenges that do not necessarily pertain directly to aquatic animal health, but which may impact the operating context of a successor strategy and therefore need to be kept in mind. These challenges included:

- industry representation: not all sectors have fully functioning national representative bodies that include a mandate for aquatic animal health issues.
- a changing climate and its current and possible impacts on aquatic animal health.
- rapid advances in technology which have the potential to change how we operate and provide opportunities that were previously not possible. Maximising these opportunities needs to be considered (for example, in surveillance approaches).
- increasing community expectations about provenance and traceability, animal welfare and social licence.
- environmental issues (for example, water quality and pesticides).

7. Conclusion and the way forward

Aquatic animal diseases, including new and emerging diseases, will continue to threaten industry productivity and aquatic environments. During the life of AQUAPLAN 2014–2019, several serious disease incidents have occurred in Australia that have impacted on aquaculture industries and fisheries. Two examples include outbreaks of Pacific oyster mortality syndrome (Tasmania, 2016 and South Australia, 2018) and white spot disease (south-east Queensland, 2016). The white spot disease outbreak instigated the largest emergency aquatic animal disease response that has occurred in Australia. These incidents demonstrate that aquatic animal disease threats are real, current and have potentially serious consequences for fisheries, aquaculture and public users of aquatic resources (for example, recreational fishers).

New disease threats have also emerged overseas that were previously unknown to science when AQUAPLAN 2014–2019 commenced. These include decapod iridescent-1 (DIV-1) which affects numerous crustacean species and Lates calcarifer herpesvirus (LCHV) which affects barramundi.

Global and domestic trends in trade and aquatic animal production indicate that Australia will require increasingly strong and resilient systems to ensure aquatic animal disease risks can be managed effectively. AQUAPLAN 2014–2019 made considerable progress in strengthening Australia's aquatic animal health systems; however, several priority areas require ongoing and concerted effort to ensure future needs are met.

Through this review, stakeholders have commented on matters of importance to the future management of aquatic animal health. Key findings of relevance to development and implementation of a successor strategy to AQUAPLAN 2014-2019 are summarised below.

Strategic approach

A strategic approach to managing aquatic animal health in Australia is required.

This review found that there is a strong ongoing need for a nationally coordinated approach to aquatic animal health in Australia. A strategic approach involving industry sectors and governments is essential to ensure consistent national systems can protect industry productivity and the environment. While individual sector and government interests may differ in some areas, there are many areas where common principles apply, and a national cooperative approach is warranted. A common approach is also essential to ensure limited resources are applied in the most efficient and effective manner.

Future focus

The objectives from AQUAPLAN 2014–2019 have guided substantial improvements to the aquatic animal health system and remain relevant in a new strategic plan—additionally, new objectives may be warranted.

This review found that all of the objectives from AQUAPLAN 2014–2019 remain relevant for a successor strategy. These objectives relate to key elements of our system for managing aquatic animal health and will continue to guide industry and government partnerships to maintain and strengthen the system. However, there are additional issues that may benefit from being addressed in a new strategic plan, such as improving assessments of risk, antimicrobial resistance and forecasting of aquatic animal health service needs to keep pace with a growing industry.

Industry-government cooperation

The approach to industry–government cooperation in implementing the plan needs to be re-emphasised.

Strong partnerships among industry and government sectors underpin AQUAPLAN. This review has found that the mechanisms for these partnerships need to be considered with a view to ensuring that common needs pervade the life of the plan, and all partners are engaged appropriately to maximise return on investment.

Resourcing

Any new strategic approach should be clearly targeted and aim to provide strong return on investment, including that of in-kind resources.

AQUAPLAN 2014–2019 was successful in attracting significant resources (direct investment and in kind) to pursue its activities. Having a national strategic plan in place provided a mechanism to target available resources at pre-agreed priorities. A successor strategy would benefit from a component of dedicated seed-funding to continue the momentum achieved in AQUAPLAN 2014–2019 and ensure stakeholder confidence in the new plan.

Beyond direct funding, successful implementation of AQUAPLAN relies on people to drive its activities. Quite often this is in the form of in-kind contributions. It is well acknowledged that there

are finite resources of both government and industry sectors. For a future strategic plan, the human resources required to drive cooperation and investment will need to be considered.

Flexibility

Mechanisms for flexibility need to be built into a new strategic plan.

This review found that mechanisms are required to allow a new strategic plan to be flexible and adapt to changing needs through the life of the plan. While the objectives should not require change, there may be benefit in having a process for activities to evolve. One mechanism that may facilitate flexibility is a mid-plan review process, where stakeholders consider progress achieved, activities that remain to be implemented, if work is on track towards achieving the desired outcomes or whether changes need to be made.

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Appendix A: Achievements of AQUAPLAN 2014–2019

AQUAPLAN 2014–2019 had five objectives:

- 1) Improving regional and enterprise-level biosecurity
- 2) Strengthening emergency diseases preparedness and response capability
- 3) Enhancing surveillance and diagnostic services
- 4) Improving availability of appropriate veterinary medicines
- 5) Improving education, training and awareness.

Each objective was supported by activities to address specific aquatic animal health management issues associated with infectious diseases of finfish, molluscs and crustaceans. At the conclusion of the plan, 18 activities were complete, 4 were ongoing and 2 were discontinued.

The achievements of AQUAPLAN 2014–2019 are considered against these original objectives and activities.

Objective 1. Improving regional and enterprise-level biosecurity

Activity 1.1 Develop sector-specific biosecurity plan templates and guidance documents

Expected outcomes

Access to best practice biosecurity planning and guidance tailored to aquaculture and fisheries (where applicable) sectors, leading to the development of sector-specific biosecurity plans.

Outcomes

A generic aquaculture biosecurity plan guideline, which can be adapted for the purposes of any sector, was developed through this activity. The Aquaculture Farm Biosecurity Plan – generic guidelines and template was published on the Australian Government Department of Agriculture and Water Resources website in 2016.

Sector-specific biosecurity plan guidelines, tailored to the needs of specific sectors, were also developed. Biosecurity plan guidelines were developed for land-based abalone, oyster hatcheries, barramundi aquaculture and Australian prawn farms. All biosecurity plan guidelines were developed and endorsed with close collaboration between industry and governments. All are available on the department's website, with the exception of the biosecurity plan guideline for Australian prawn farms which is available on request from the Australian Prawn Farmers Association (Figure 1).

This activity provided industry sectors with access to consistent, best practice biosecurity planning guidance. Implementation of these plans at the enterprise level will lead to improved aquatic animal health and reduced disease risk.

Status

Complete. The aims of this activity have been met however some additional activities have been identified and commenced as described below.

Follow-on activities

The development of two additional sector-specific plans (for the native freshwater finfish and marine sea-cage sectors) commenced in September 2019.

Figure 1 Generic and sector-specific biosecurity plan guidance documents and templates

Activity 1.2 Develop a support program to support farms to develop and implement enterprise-level biosecurity plans

Expected outcomes

Enterprise-level biosecurity practices that manage aquatic animal disease risks effectively and may underpin translocation and market access, leading to improved sustainability and profitability

Outcomes

A survey of Australia's major aquaculture industry sectors was conducted to determine if support was required to implement on-farm biosecurity plans, and the most appropriate support approaches for each sector. One hundred and twenty-two farm owners and managers from across the abalone, barramundi, edible oyster, pearl oyster, prawn, salmonid, southern bluefin tuna and yellowtail kingfish aquaculture sectors participated.

All eight sectors indicated approaches to support development and implementation of on-farm biosecurity plans including individual expert support to write, review and improve on-farm biosecurity plans specific to their business, as well as biosecurity plan training workshops tailored to their sector. An important finding was that the approaches need to be sector specific.

A recommendation of survey was to create a network of trained biosecurity auditors to assist the aquaculture industry with evaluating and improving on-farm biosecurity plans. Two auditor training courses were provided. The courses trained 28 people, including aquaculture industry personnel, aquatic veterinarians and government officers, to conduct an external audit according to relevant standards (ISO 9001:2015 and ISO 19011:2018) and to apply these skills to biosecurity plans.

Status

Ongoing. The support needs of industry sectors have been identified and planning initiated to provide that support as described below.

Follow-on activities

A project to deliver sector-specific and system-specific biosecurity plan writing/reviewing workshops will be developed.

Activity 1.3 Develop a model aquaculture enterprise health accreditation scheme using abalone aquaculture as an example

Expected outcomes

A generic framework for aquaculture health accreditation that meets international standards, is agreed by state and territory governments and facilitates interjurisdictional trade.

Outcomes

The Abalone Health Accreditation Program (AHAP) was developed to provide consistent requirements for abalone aquaculture enterprises to establish disease free compartments and address biosecurity risks inherent in any stock translocation.

The AHAP was developed cooperatively by the abalone industry and governments. It was endorsed by industry and governments and made available for the land-based abalone industry to implement. Implementation of the program has occurred at a jurisdictional level. To date farms in 3 states have achieved accreditation.

Status

Complete.

Follow-on activities

Implementation of the program is ongoing, and the farmed abalone sector are custodians of the program. Other sectors may also wish to explore the feasibility of applying the AHAP model within their sector.

Objective 2. Strengthening emergency disease preparedness and response capability

Activity 2.1 Implement an agreed work plan to develop industry-government emergency aquatic animal disease response arrangements

Expected outcomes

In-principal support of draft terms of formal industry-government arrangements as applied to multiple aquatic animal industry sectors.

Outcomes

This project was supported by several activities to develop an aquatic emergency animal disease response agreement (the Aquatic Deed). The Aquatic Deed is an industry-government agreement for managing and funding responses to aquatic emergency animal disease outbreaks. It also includes obligations for risk mitigation to lessen the likelihood of disease outbreaks occurring in the first place. It is a formal, legally binding agreement among government and industry sector peak bodies that choose to sign it. A draft Aquatic Deed was developed cooperatively by representatives from aquaculture industry sectors, some capture fisheries sectors, the Commonwealth Government, state and territory governments, and Animal Health Australia.

The draft Aquatic Deed was developed through extensive engagement and collaboration with prospective parties (governments and industry), to develop an agreement that is mutually beneficial. Favourable evaluation of the costs and benefits by each party will be key for parties deciding whether to ratify.

Status

Complete.

Follow-on activities

The draft Aquatic Deed was provided to prospective parties (governments and industry) for their evaluation and decision on whether they wish to ratify.

Activity 2.2 Develop a program of national and sector-specific emergency aquatic animal disease response exercises, including field and operational activities

Expected outcomes

A coordinated national program of emergency aquatic animal disease response exercises and outbreak evaluations to test and improve established systems, identify gaps and train personnel on a priority basis.

Outcomes

Activity 2.2 documented past aquatic animal disease response exercises and responses in each jurisdiction, analysed past, present and future exercises and responses and completed a gap analysis in order to identify priority areas where future exercises could focus. Three thematic areas arose that could form the basis of a future emergency response exercise/s:

- Communication procedures among industry and governments during national aquatic emergency animal disease incidents.
- Training to increase the pool of available resources across industry and government (beyond the NBRT) to respond to national aquatic emergency animal disease incidents.
- Planning and preparedness to examine practical considerations and resource requirements for responding to national aquatic emergency animal disease incidents.

This activity was supported by the in-kind contributions of the SCAAH Emergency Response Exercises working group.

Status

Ongoing.

Follow-on activities

Based on the findings of this activity, a series of industry-government workshop-style exercises are being designed to test practical considerations for conducting an emergency response to an exotic disease outbreak. Other exercises may also be explored and prioritised in a successor strategy.

Activity 2.3 Strengthen national first response capability to ensure inclusion of specific aquatic animal disease expertise

Expected outcomes

National rapid response team that includes members with specialist aquatic animal health skills trained for certain roles (for example, epidemiology and operational roles).

Outcomes

This activity added aquatic animal health skills in the National Biosecurity Response Team (NBRT) arrangements. The NBRT is a cross-sectoral pool of response ready personnel which can be accessed by a jurisdiction's biosecurity agency when responding to a biosecurity incident. The NBRT supplements the existing resources and expertise within jurisdictions. Having the NBRT in place means that the range of expertise required to mount a rapid and effective response is nationally available and can be deployed as needed to support the combat jurisdiction.

Status

Complete.

Objective 3. Enhancing surveillance and diagnostic services

Activity 3.1 Identify possible improvements to increase the sensitivity of Australia's passive surveillance systems for aquatic animal diseases

Expected outcomes

Improved confidence in Australia's ability to detect significant emerging and exotic diseases and to substantiate Australia's disease status.

Outcomes

This activity was supported by a single project that examined Australia's passive surveillance system for aquatic animal diseases and identified strengths and opportunities for improvement. A social science survey undertaken in 2018 was used as a basis for these considerations. Participants included the farmed abalone, barramundi and yellowtail kingfish sectors, seafood processors, government laboratories, government and private veterinarians, aquatic animal health consultants, biosecurity officers and policy makers. The project found that passive surveillance could be strengthened through several avenues such as improving knowledge of available awareness materials, exploring mechanisms to encourage reporting, and quantitatively assessing the sensitivity of passive surveillance.

The project was funded by the then Australian Government Department of Agriculture and Water Resources.

Status

Complete.

Follow-on activities

A project has been developed that will quantify the passive surveillance sensitivity for a pilot industry sector for specific diseases of concern.

Activity 3.2 Make the Aquatic animal diseases significant to Australia: identification field guide available as an application for mobile devices

Expected outcomes

Improved awareness and reporting of significant diseases by target audiences and improved quality of disease reports

Outcomes

The fourth edition of the Aquatic animal diseases significant to Australia: identification field guide (the field guide) was deployed as an application across Android, Windows and iOS platforms in March 2017.

The fifth edition of the field guide was developed in 2019 and incorporates new and updated information gathered from an extensive review of the fourth edition. It covers 53 aquatic animal diseases of significance to Australia that affect species of finfish, crustaceans, molluscs and amphibians. Both the website and mobile versions of the field guide were updated and made available in December 2019.

The field guide is a tool that aims to increase awareness and reporting of significant diseases to aquaculture and fisheries in Australia by helping people recognise those diseases.

Status

Complete.

Activity 3.3 Undertake aquatic animal health benchmarking for specific aquaculture industry sectors

Expected outcomes

Improved baseline health status information across a range of indicators for enterprise use to improve husbandry and provide a mechanism for early warning of emergency health issues.

Outcomes

This activity was supported by a single project to develop a system for interested industries to benchmark health and production parameters. The project aimed to provide a means for producers to evaluate and anonymously compare important production and health parameters as a means for performance improvement. Several industries were consulted to determine their interest. The abalone farming industry was identified as a model industry for a pilot project.

A project was approved by the Fisheries Research and Development Corporation (FRDC) in late 2019 to focus on the abalone industry and the use of the 'Ab-track' software. The activity was also supported by the in-kind contributions of the SCAAH Benchmarking working group.

Status

Ongoing. This activity will be complete on conclusion of the pilot project.

Follow-on activities

Any further activities will be determined on completion of the pilot project.

Activity 3.4 Adopt processes (new or existing) for formal recognition of validation status of diagnostic tests and identify specific test validation priorities

Expected outcomes

Increased awareness of the validation status of diagnostic tests and their fitness for specific purposes.

Outcomes

This activity was supported by multiple projects to assess the validation status of diagnostic tests and their fitness for specific purposes.

A set of guidelines for the development, evaluation and communication of new tests developed in Australia and New Zealand for infectious aquatic animal diseases were developed for use in animal health laboratories. The guidelines consolidated available information on diagnostic test procedures from the World Organisation for Animal Health (OIE) and Sub-Committee on Animal Health Laboratory Standards (SCAHLs). A set of minimum requirements for molecular tests were subsequently included in the guidelines.

A series of standalone experiments for the validation of specific diagnostic tests were designed for application across participating laboratories. Each experiment considered what tests were currently available (including any 'gold standard' test), the purpose of those tests, the analytical approaches for the data, the verification of high critical threshold (CT) data and the methods of processing, including the effects of pooling on sensitivity and specificity.

A review of appropriate assays for the detection (proof of freedom) of megalocytiviruses in gouramis, cichlids and poeciliids was performed. The findings of the review were considered in the review of the new Australian and New Zealand Standard Diagnostic Procedure (ANZSDP) for megalocytiviruses.

Specific test validation priorities were identified for future activities, beyond those identified within the scope of this activity. This activity was supported by the in-kind contributions of the SCAAH Validation of diagnostic testing working group.

Status

Complete.

Follow-on activities

Further validation work was undertaken as part of activity 3.6.

Activity 3.5 Develop stable positive control material and internal controls for molecular tests for detection of important endemic and exotic pathogens

Expected outcomes

Greater harmonisation of test protocols, expansion of laboratory testing capability and rapid identification of false positive test results where they may result from positive control contamination.

Outcomes

This activity was supported by a single project ([FRDC project 2014/002](#)). Quantified synthetic RNA materials and quantified plasmid DNA controls were developed for 42 PCR assays. Assays included conventional and real-time PCR, and reverse transcriptase and standard PCR assays. The CSIRO Australian Centre for Disease Preparedness provided participating laboratories with procedures and advice on the implementation of the materials.

Internal controls provide laboratories greater confidence in their test results and can be used to identify potential issues that may lead to a false positive or false negative result. These materials are readily available on request from the CSIRO Australian Centre for Disease Preparedness.

Status

Complete.

Follow-on activities

Positive control materials are available on request from CSIRO-ACDP.

Activity 3.6 Develop validated diagnostic tests for significant new and emerging diseases of aquatic animals in Australia

Expected outcomes

Increased capability and capacity to manage new and emerging diseases/agents.

Outcomes

This activity was supported by nine projects, all with the aim of improving or developing diagnostic tests to detect new and emerging diseases in Australia including: abalone herpesvirus, oyster oedema disease, pilchard orthomyxovirus, yellow head virus genotypes, Perkinsus species, bacterial hepatopancreatitis in prawns, white spot syndrome virus and ostreid herpesvirus 1.

Project 1 ([FRDC project 2009/032](#)) validated the in-situ hybridisation test for abalone herpesvirus (AVG) and developed a quantitative assay for determining infectious dose of the virus. It also determined the sensitivity of the virus to physico-chemical conditions, the role of mucus in transmission of the virus, the susceptibility of remnant populations of abalone (previously exposed to AVG) to AVG, and whether AVG can remain latent.

Project 2 ([FRDC project 2013/002](#)) aimed to identify the presence of nucleotide sequences associated with oyster oedema disease affected oysters using next generation sequencing, to improve understanding of the disease and possible causative agents or factors. Quantitative real-time PCR was used to measure prevalence of these nucleotide sequences in a broad range of oyster samples.

Project 3 (FRDC project 2013/033) aimed to determine the relationship between pilchard orthomyxovirus (POMV) and the orthomyxovirus detected in salmon in Tasmania in 2006 and 2012, to improve understanding of their disease-causing potential in infected fish and to develop diagnostic capability for this new pathogen. These aims were achieved by sequencing the genomes of a number of virus isolates from both pilchards and farmed salmon, conducting pathogenicity trials and developing new diagnostic tests.

Project 4 ([FRDC project 2013/036](#)) aimed to determine which yellow head virus (YHV) genotypes exist in wild *Penaeus monodon* populations in Queensland, Western Australia and the Northern Territory. It also sought to revise PCR test designs as necessary to ensure their specificity in discriminating YHV genotypes (particularly the highly virulent YHV-1) and to acquire or generate appropriate control nucleic acids specific to each genotype for use in PCR tests. The existence and prevalence of other endemic viruses were also determined.

Project 5 ([FRDC project 2015/005](#)) aimed to determine the susceptibility of *P. monodon* and *P. merguensis* to the enzootic YHV genotype 7, and the exotic YHV8 and YHV10 genotypes. This information is critical for appropriate biosecurity measures. The protocols and controls developed for diagnostic tests for these genotypes will be transferred to state diagnostic laboratories for their use as required.

Project 6 ([FRDC project 2016/009](#)) aimed to develop and evaluate optimised diagnostic capabilities for Australian *Perkinsus* spp. isolates for sampling and testing based on estimates of sensitivity and specificity to meet accepted standards for detecting infection and for testing for freedom.

Project 7 ([FRDC project 2016/013](#)) aimed to compare the pathogenicity and pathology of exotic acute hepatopancreatic necrosis disease (AHPND) and the presumptive bacterial hepatopancreatitis in *P. monodon* and *P. merguensis*. Tests were optimised through interlaboratory testing and improved diagnostic tests for the Pir toxin gene were implemented.

Projects 8 and 9 aimed to develop validated diagnostic tests for white spot syndrome virus and ostreid herpesvirus 1, to improve laboratory capability and confidence in the diagnostic performance of molecular tests for these diseases. These projects were funded by the then Australian Government Department of Agriculture and Water Resources.

Status

Complete.

Follow-on activities

Aquatic animal diseases emerge regularly, making development and validation of diagnostic tests an ongoing requirement.

Activity 3.7 Improve the breadth of data in Neptune, particularly histopathology slide collections

Expected outcomes

Improve availability of aquatic animal health information and resources for research, teaching and diagnostic purposes.

Outcomes

Neptune is Australia's aquatic animal health information management system. It includes an extensive database of all published records of aquatic animal pathogens and diseases from Australia and a digitised histopathological image collection to aid in diagnostics and training. This activity was supported by a single project that redeveloped Neptune from the Australian Biosecurity Intelligence Network (ABIN) archive and established permanent hosting arrangements on CSIRO IT-infrastructure to make it available for Australia's aquatic animal health community.

Neptune provides the aquatic animal health community, including industry, governments and research institutes, greater access to aquatic animal health information and resources for research, teaching and diagnostic purposes.

Neptune can be accessed via the following URL: <http://neptune.csiro.au>. The project was funded by the then Australian Government Department of Agriculture and Water Resources.

Status

Complete.

Follow-on activities

Neptune will require on-going maintenance and to keep data and the histopathological slide collection up to date.

Activity 3.8 Describe existing components of Australia's aquatic animal disease diagnosis network to identify interactions, responsibilities and performance measures

Expected outcomes

Components of Australia's aquatic animal disease diagnosis network described, interactions identified and performance measures for maintaining components agreed.

Outcomes

An overview document describing Australia's aquatic animal disease diagnosis network (diagnostic network) has been drafted. The document describes key components of the diagnostic network.

Status

Ongoing. This activity will be complete when the description of the diagnostic network will be made available on DAWE's website.

Objective 4. Improving availability of appropriate veterinary medicines

Activity 4.1 Consider aquatic animal production issues to inform development of the national antimicrobial resistance framework

Expected outcomes

A national antimicrobial resistance strategy that addresses issues relevant to aquatic animal production.

Outcomes

Input on aquatic animal production issues was provided to inform the development of the cross-sectoral National Antimicrobial Resistance Strategy 2015-2019. This activity was supported by the in-kind contributions of the Sub-Committee for Aquatic Animal Health.

Status

Complete.

Activity 4.2 Run an industry-government workshop to identify ways to improve access to veterinary medicines and chemicals, including low-risk chemicals

Expected outcomes

Improved understanding of industry requirements and identification of ways to improve access to veterinary chemicals.

Outcomes

The National Aquaculture Council (NAC) represented aquaculture industries at several strategic meetings and workshops to progress the Australian Government's \$8 million commitment to help farmers gain improved access to safe and effective AgVet chemicals. NAC contributed to discussions on administrative and legislative reforms, to the AgVet Collaborative Forum and helped prioritise aquaculture production issues for grant funding under the commitment. Aquaculture's existing and categorised priorities were registered on a master list of priorities of all animal and plant sectors at the AgVet prioritisation workshop held in 2015.

Status

Complete.

Activity 4.3 Develop arrangements to improve industry coordination of minor use permit applications to the Australian Pesticides and Veterinary Medicines Authority

Expected outcomes

More efficient minor use permit application processes, better availability of veterinary medicines and improved guidance on use for veterinarians and producers.

Outcomes

Through this activity industry and government representatives shared information on aquatic veterinary medicines to facilitate national activities led by NAC and other permit holders or applicants. Since 2014, over 15 veterinary medicines have been progressed to minor use permits with the Australian Pesticides and Veterinary Medicines Authority (APVMA). This included several new chemicals (for example, praziquantel and 2-phenoxyethanol), renewed permits (for example, benzocaine and hypochlorite) and several amended permits to allow for different uses (for example, epinephrine).

This activity was supported by the in-kind contributions of NAC and the SCAAH aquatic veterinary medicines working group.

Status

Complete.

Follow-on activities

An aquatic veterinary medicine working group will be reformed to support ongoing coordination of minor use permit applications and projects.

Activity 4.4 Strategically consider long-term regulatory conditions to address market failure for aquatic veterinary medicines

Expected outcomes

Approval processes for aquatic veterinary medicines that support industry productivity by ensuring safe and appropriate use in the least restrictive manner.

Outcomes

This activity was supported by the in-kind contributions of the National Aquaculture Council (NAC). The NAC, in consultation with its members, agreed to hold chemical and veterinary permits on behalf of aquaculture industries. NAC worked with the department's AgVet Chemicals Reform group and the APVMA to understand and address the particular needs of aquaculture in the overall AgVet reform process.

Status

Complete.

Activity 4.5 Develop guidance documentation to improve industry understanding of regulations and risks of inappropriate veterinary medicine and chemical use

Expected outcomes

Improved understanding by industry of requirements for safe and appropriate veterinary medicine use.

Outcomes

This activity was supported by the in-kind contributions of the SCAAH aquatic veterinary medicines working group. The working group provided assistance to SafeFish to develop a pamphlet for industry on the appropriate use of the aquatic anaesthetic Aqui-S. The pamphlet was distributed to fisheries and aquaculture sectors across Australia. The working group later developed a generic pamphlet which provides guidance on good practice and responsible use of veterinary medicines.

Status

Complete.

Objective 5. Improving education, training and awareness

Activity 5.1 Review the Aquatic Animal Health Training Scheme (2013-2014)

Expected outcomes

Review of the scheme informs decision on continuation and on the nature of any future scheme.

Outcomes

This activity was supported by a single project to review the Aquatic Animal Health (AAH) training scheme (2013-2014). The review found that the AAH Training Scheme strongly met its stated aim to "improve the knowledge and skills in aquatic animal health management to support Australia's fishing and aquaculture industry, including the aquarium sector". The scheme's competitive, merit-based approach ensured that projects addressed user needs and provided training in a variety of disciplines critical to the management of aquatic animal health in Australia. The scheme's flexibility allowed specialist individual training and more generic group training to be provided. The scheme benefited aquatic animal health sector professionals from industry, government, research and educational organisations.

Status

Complete.

Follow-on activities

The AAH training scheme has been funded until 2022.

Activity 5.2 Assess requirements for a national aquatic animal health curriculum that can be adapted for end-users ranging from vocational training to higher education

Expected outcomes

Aquatic animal health curriculum end users, competency areas and supporting resource material needs are identified.

Outcomes

This activity was supported by two projects.

Project 1 ([FRDC project 2013/414](#)) aimed to develop a comprehensive catalogue of vocational institutes providing courses in aquatic animal health, outline past and present courses in aquatic animal health and outline the specific topics and/species covered in the learning materials of vocational training institutions. The project also assessed the content, performance criteria, and critical skills and knowledge covered across training institutes at each vocational level.

Project 2 ([FRDC project 2014/403](#)) aimed to review the need, scope and end user market for a national curriculum in aquatic animal health and understand the current content and provision of aquatic animal health education within the tertiary sector of Australia. Through consultation with stakeholders, the project identified key attributes of an aquatic animal health curriculum and possible approaches to developing a curriculum.

Status

Complete.

Activity 5.3 Develop national aquatic animal health curriculums for veterinary and vocational education

Expected outcomes

National aquatic animal health curriculums for veterinary and vocational training meet end-user needs, include a package of resources and are freely available (and can be adopted by providers at no cost).

Outcomes

This activity was intended to develop an aquatic animal health curriculum for veterinary and vocational training pending the outcomes of activity 5.2. While activity 5.2 identified the attributes of a curriculum and possible approaches to develop it, continuation of the activity would require leadership from education and training providers. There has been no indication from stakeholders that further investment in this activity is a priority. SCAAH recommended that this activity be discontinued.

Status

Discontinued.

Activity 5.4 Develop short-course training material for industry on management of aquatic animal disease incidents (including reporting procedures, collecting samples for laboratory diagnostics and record keeping)

Expected outcomes

Generic short-course training material that individual jurisdictions can adapt to support industry to identify disease issues and to support disease investigation activities.

Outcomes

This activity was supported by the in-kind contributions of the SCAAH educational materials working group. A spreadsheet summarising the range of materials available to industry on the management of aquatic animal disease incidents was developed. The development of short course training materials was addressed, in part, through some sector-specific training workshops. However, standard generic training materials were not developed.

Status

Discontinued.

Activity 5.5 Develop an AQUAPLAN 2014–2019 communication strategy

Expected outcomes

Improved awareness of AQUAPLAN 2014–2019 and progress toward achieving objectives.

Outcomes

An AQUAPLAN 2014–2019 Communication Strategy was endorsed in 2014. The plan was reviewed annually and updated as required.

Status

Complete.

Appendix B: History of AQUAPLAN

Australia's three national strategic plans for aquatic animal health



Note: only the front cover of each plan is shown. From left to right, AQUAPLAN 1998-2003, AQUAPLAN 2005-2010 and AQUAPLAN 2014-2019.

AQUAPLAN 1998-2003

AQUAPLAN 1998-2003 was developed in the wake of mass mortality vents of wild pilchards across southern Australia in 1995 and 1998. Following these events, the need for a cross-border approach to aquatic animal health, in particular to disease response, was formally recognised (Jones 1996).

The Nairn and Higgins reports of 1996 further highlighted the need for a national approach to fish health. The reports highlighted the risks from exotic and unknown diseases, suggested ways to manage risks of introduction or spread of disease and suggested ways to manage diseases risks when they occur. In response to these reports, the Australian Government recognised that a national approach to aquatic animal health should be jointly developed by governments and industry.

In 1997, the Australian Government committed \$2.7 million to the then Australian Government Department of Primary Industries and Energy to develop a comprehensive aquatic animal health plan for Australia and address management procedures for aquatic animal disease emergencies. The Fish Health Management Committee, a joint industry and government body, was appointed as an interim committee with oversight of the development of Australia's national strategic plan for aquatic animal health – AQUAPLAN 1998-2003. In May 2000, the Australian Government announced the 'Building of a National Approach to Animal and Plant Health' program, within which \$3 million was allocated over 4 years to ensure that specific projects within AQUAPLAN 1998-2003 were adequately resourced.

AQUAPLAN 1998-2003 represented a world first in industry-government cooperation to develop a national strategic approach to aquatic animal health. As documented in the 2002 review of the plan (Department of Agriculture, Fisheries and Forestry, 2002), AQUAPLAN 1998-2003 made considerable progress under its eight programs in establishing Australia's systems for managing aquatic animal health. Highlights of AQUAPLAN 1998-2003 include:

- establishing Australia's National List of Reportable Diseases of Aquatic Animals and mechanisms to alter the list

- establishing Australia's aquatic animal disease reporting and data management system
- establishing emergency disease response arrangements, such as the Australian Aquatic Veterinary Emergency Plan (AQUAVETPLAN) and the Aquatic Consultative Committee on Emergency Animal Diseases (Aquatic CCEAD)
- establishing the Aquatic Animal Health Subprogram of the Fisheries Research and Development Corporation to coordinate and lead aquatic animal health research and development
- raising awareness of aquatic animal health issues through a range of educational and awareness material, such as the Aquatic Animal Diseases Significant to Australia: Identification Field Guide

The review also found that a continued integrated approach was required and that several priority areas remained to be addressed. The need to develop a successor strategy was clearly identified.

AQUAPLAN 2005-2010

The Aquatic Animal Health Committee (AAHC), a joint industry and government committee, was established in 2003 and tasked with developing a successor strategy to AQUAPLAN 1998-2003. Membership of AAHC included representatives from the Commonwealth, state and the Northern Territory governments, the National Aquaculture Council (NAC), representatives of all major aquaculture industries, capture fisheries, recreational fisheries and the ornamental fish industry.

Stakeholders identified priority issues and responsibilities for progressing projects through three workshops held in 2003 and 2004. The workshops were held with representatives from AAHC, the National Aquatic Animal Health Technical Working Group, the then Department of Agriculture, Fisheries and Forestry, the then Department of Environment, the Murray-Darling Basin Commission, the NAC and representatives from commercial and recreational fisheries.

AQUAPLAN 2005-2010 was endorsed by the Primary Industries Ministerial Council in 2005 and focused on the health of fish, molluscs and crustaceans in aquaculture (including ornamental fish), and the role of health in recreational and commercial fishing. Implementation of the plan was overseen by AAHC, with advice from the National Aquatic Animal Health Technical Working Group, until AAHC disbanded in June 2009. Animal Health Committee (AHC) assumed responsibility for aquatic animal health policy, including implementation of AQUAPLAN 2005-2010, until the plan concluded in June 2010.

As documented in the review of the plan (Department of Agriculture, 2014), AQUAPLAN 2005-2010 made considerable progress under its seven strategies, with many of the plan's activities leading to ongoing or progressive activities. Highlights of AQUAPLAN 2005-2010 include:

- developing national protocols for fish kill investigation
- establishing the interlaboratory diagnostic proficiency testing program
- maintaining the scientific and technical accuracy of AQUAVETPLAN
- establishing the national Aquatic Animal Health Training Scheme
- progressing the development of an emergency aquatic animal disease response agreement
- improving the availability and safe use of therapeutics for use in farmed aquatic animals.

Industry and government stakeholders agreed that there was an ongoing need for a nationally coordinated approach to aquatic animal health in Australia. Again, the need to develop a successor strategy was clearly identified.

Appendix C: Acronyms and abbreviations

Table 5 Acronyms and abbreviations used in this review

Acronym or abbreviation	Meaning
AAHC	Aquatic Animal Health Committee (disbanded)
AHC	Animal Health Committee
ANZSDPs	Australian and New Zealand Standard Diagnostic Procedures
APVMA	Australian Pest and Veterinary Medicines Association
AQUAPLAN	Australia's national strategic plan for aquatic animal health
Aquatic CCEAD	Aquatic Consultative Committee on Emergency Animal Diseases
AQUAVETPLAN	Australian Aquatic Veterinary Emergency Plan
CSIRO-ACDP	CSIRO Australian Centre for Disease Preparedness (formerly the CSIRO Australian Animal Health Laboratory)
FRDC	Fisheries Research and Development Corporation
NAC	National Aquaculture Council (disbanded)
SCAAH	Sub-Committee on Aquatic Animal Health
SCAHLs	Sub-Committee on Animal Health Laboratory Standards