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Review of AQUAPLAN 2005–2010 —Australia's second national strategic plan for aquatic animal health

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Photo on contents page: Barramundi eggs under a microscope, ***Northern Territory Government***

Foreword

Australia's fisheries and aquaculture industries contribute significantly to local and regional economies. They contribute to export earnings, create employment opportunities and provide Australia with high-quality seafood products.

Australia is free from many of the diseases that have impacted aquatic animal production and aquatic environments elsewhere. To ensure continued sustainability of Australian fisheries and aquaculture industries, Australia needs to develop and maintain its ability to manage the threat of new and emerging diseases.

AQUAPLAN 1998–2003, Australia's first national strategic plan for aquatic animal health, made considerable progress in establishing Australia's systems for managing aquatic animal health. The plan's achievements include establishing Australia's current emergency aquatic animal disease preparedness and response arrangements, national disease reporting systems, and arrangements for research and development coordination.

Following review of the 1998–2003 plan, AQUAPLAN 2005–2010 was developed using a collaborative industry–government approach to set priorities. The 2005–2010 plan focused on the health of fish, molluscs and crustaceans in aquaculture (including ornamental fish), recreational fishing and the role of health in commercial (harvest) fisheries.

This review of AQUAPLAN 2005–2010 has drawn on stakeholder input to assess the plan's development, implementation processes and achievements, and considerations for future activities in aquatic animal health, including the need for a possible successor strategy.

The review showed that, through its seven strategies, AQUAPLAN 2005–2010 made substantial progress in strengthening Australia's aquatic animal health systems. Key achievements include the development of national fish kill investigation protocols, the establishment of interlaboratory diagnostic proficiency testing, maintenance of the scientific and technical accuracy of AQUAVETPLAN, progress in aquatic animal health education and training, progress towards development of an emergency aquatic animal disease response agreement, and improvements in the availability and safe use of therapeutics in farmed aquatic animals.

AQUAPLAN 2005–2010 was also successful in focusing and attracting available resources to agreed national strategic priorities. This resulted in improved impact of the limited resources available for aquatic animal health initiatives. Although it was clearly successful in attracting funding, stakeholders believe that a component of dedicated funds could have improved implementation of AQUAPLAN 2005–2010 by assisting forward planning, and strengthening stakeholder confidence and engagement.

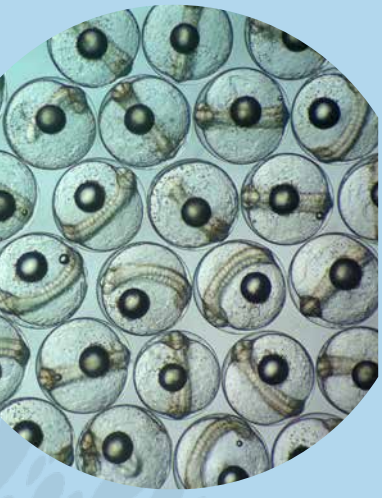
The review also confirmed that there is an ongoing need for a nationally coordinated approach to aquatic animal health management in Australia. There is a relative lack of resources available to individual sectors or governments to pursue aquatic animal health initiatives. While the interests of different industry sectors and governments may vary, there are many areas where common principles apply. A national, cooperative approach is necessary to further develop and maintain aquatic animal health management arrangements in Australia.

A dedicated strategic approach to aquatic animal health is warranted to ensure that the specific development requirements for aquatic animal health arrangements are addressed appropriately. Alignment and integration of aquatic animal health with national terrestrial animal systems should be managed carefully, and should be an ongoing objective of any new strategic plan.

Stakeholders identified a range of issues that should be considered in the formulation of any new strategic approach to aquatic animal health in Australia. These included:

- strengthening aquatic animal health surveillance systems and data management
- improving diagnostic services, including regional services
- developing joint industry–government emergency aquatic animal disease response arrangements
- strengthening emergency preparedness arrangements, including contingency planning, training and system testing
- strengthening enterprise-level biosecurity and awareness
- improving access to safe and appropriate veterinary medicines
- improving education and training.

Continued emphasis on the strategic issues identified through this review is warranted and consistent with broad reforms to Australia's quarantine and biosecurity arrangements currently under way. A new, dedicated strategic approach to aquatic animal health in Australia would drive those reforms relevant to aquatic animal health management.



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Introduction

Australia's fisheries and aquaculture industries have significant economic importance, particularly for local and regional economies. They contribute to export earnings and provide employment opportunities along the value chain. In 2009–10, fisheries and aquaculture products produced in Australia were valued at $2.18 billion, with $1.2 billion of this representing the total value of exports of fisheries and aquaculture products.[1] Aquaculture provides an increasing proportion of Australia's total fisheries production value, increasing from 30% to 40% in the past 10 years. Globally, the trade in fisheries products has grown rapidly in importance and value to an estimated US$96 billion in 2009, from less than US$53 billion in 1999.[2]

Barramundi broodstock
Northern Territory Government

1 Australian Bureau of Agricultural and Resource Economics and Sciences, *Australian fisheries statistics 2010*, ABARES, Canberra, 2011.
2 Food and Agriculture Organization of the United Nations, *Fishery and aquaculture statistics 2008*, FAO yearbook, FAO, Rome, 2010.

Australia's fisheries and aquaculture industries catch or produce numerous species of fish, crustaceans and molluscs. The production figures for Australia's major aquaculture and fisheries sectors are shown in Table 1.

TABLE 1 Fisheries and aquaculture production statistics in Australia, 2009–10

Major sector	Industry type	Volume (tonnes)	Value (A$ millions)
Abalone	Fisheries	4 525	158
Abalone	Aquaculture	456	15
Edible oysters	Aquaculture	14 804	99
Pearls	Aquaculture	na	104
Prawns	Fisheries	21 653	247
Prawns	Aquaculture	5 381	77
Rock lobster	Fisheries	9 628	369
Salmonids	Aquaculture	31 915	369
Tuna	Fisheries	10 957	125
Tuna	Aquaculture	7 284	102
Total aquaculture		73 542	870
Total fisheries		171 512	1 308
Total production		241 123	2 178

na not available. Total figures include other sectors not listed above.
Source: Australian Bureau of Agricultural and Resource Economics and Sciences 2011, *Australian fisheries statistics 2010*, ABARES, Canberra.

In addition to supplying products for domestic consumption and export, Australia's aquatic animals are important for the aquatic ecosystems they inhabit and shape. These ecosystems are increasingly recognised as critical to environmental values, social amenity, recreational activities (e.g. recreational fishing) and the related economic activity they support (e.g. tourism at iconic attractions such as the Great Barrier Reef).

Shared resources and environments are a feature of aquatic animal industries. These industries are often epidemiologically linked through shared water bodies; consequently, disease risks are shared, and the likelihood of disease transmission from wild populations to farmed animals, and vice versa, is increased. The fluid nature of disease transmission in water exacerbates the difficulties inherent in aquatic disease management. In a disease outbreak, affected species may extend beyond those that are commercially exploited, with implications for broader environmental impacts.

Compared with terrestrial animals, many aspects of aquatic animal diseases are poorly understood. World fisheries and aquaculture production encompasses hundreds of aquatic animal species across many phyla, and most aquatic industries target native, local species, resulting in industries that are strongly regionalised. The aquaculture of many aquatic animal species has only commenced recently, and generally these species cannot be considered 'domesticated'. In comparison to

terrestrial animal biology, fish biology is poorly understood, and basic biological data for many invertebrates are absent. Many diseases observed in aquatic species are new to science and may be caused by undescribed pathogens. The most serious recent aquatic animal diseases in Australia were previously unknown, which limits the usefulness of international knowledge and expertise, and requires considerable research to develop diagnostic tools and a basic understanding of the new diseases.

Aquatic animal diseases can seriously damage fisheries and aquaculture production, with potential ramifications for resource sustainability and industry profitability. Numerous examples of disease outbreaks overseas, such as the prawn disease epidemics that spread through Asia and the Americas in the 1990s, and the continued emergence of serious diseases of salmon, demonstrate that aquatic animal diseases have significant and lasting socioeconomic impact.

Australia is fortunate to be free from many aquatic animal diseases found elsewhere in the world, providing advantages for trade, productivity and environmental sustainability. However, maintaining Australia's enviable aquatic animal health status requires ongoing attention to build and maintain systems that can mitigate risks and manage disease threats when they occur.

Pacific oysters
South Australian Oyster Growers Association

Background

Pilchard mass mortality events in southern Australian waters in 1995 and 1998 prompted several reviews that made recommendations for Australia's national response to fisheries and aquaculture emergencies,[3] Australia's quarantine arrangements (including aquatic animal quarantine)[4] and management of incursions of invasive species.[5] 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 disease events when they occur. The Australian Government's response to two of the reports—the Nairn and Higgins reports (see footnote 4)—recognised that 'there should be a national approach [to fish health] jointly developed by the Commonwealth, states and industry that includes quarantine, research and education and public awareness as key components'.

AQUAPLAN 1998–2003

In 1997, the Australian Government committed $2.7 million to the then Commonwealth Department of Primary Industries and Energy to develop a comprehensive aquatic animal health plan for Australia, and to address management procedures for aquatic animal disease emergencies. The Australian Government committed additional funds in 2000 and 2001 to ensure that specific programs within AQUAPLAN 1998–2003 were adequately resourced.

3 R Jones, *Managing the national response to fisheries and aquaculture emergencies*, report of a study prepared for the Department of Primary Industries and Energy by TEM Consultants, 1996.

4 ME Nairn, PG Allen, AR Inglis & AC Tanner, *Australian quarantine: a shared responsibility*, Department of Primary Industries and Energy, Canberra, 1996.
MJ Nunn, *Aquatic animal quarantine in Australia: report of the Scientific Working Party on Aquatic Animal Quarantine*, Bureau of Resource Sciences, Canberra, 1995.
RA Higgins (chair), *Report of the National Task Force on Imported Fish and Fish Products*, Department of Primary Industries and Energy, Canberra, 1996.

5 SCARM, *Report of the Standing Committee on Agriculture and Resource Management's task force into managing incursions of aquatic pests, weeds and diseases*, Department of Primary Industries and Energy, Canberra, 1997.

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,[6] 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 (AqCCEAD)
- establishing the Aquatic Animal Health Subprogram of the Fisheries Research and Development Corporation (FRDC) 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 *Aquatic animal diseases significant to Australia: identification field guide*.

AQUAPLAN 2005–2010

Despite the considerable progress made by AQUAPLAN 1998–2003, the 2002 review identified several remaining challenges. The Aquatic Animal Health Committee (AAHC), a joint industry and government committee,[7] was established in 2003 to develop a successor strategy to AQUAPLAN 1998–2003. Stakeholders identified priority issues and responsibilities for progressing projects through three workshops held in 2003 and 2004. Stakeholders represented at the workshops included AAHC, the National Aquatic Animal Health Technical Working Group (NAAH-TWG), the Department of Agriculture (formerly the Australian Government Department of Agriculture, Fisheries and Forestry), the Department of the Environment (formerly the Australian Government Department of the Environment and Heritage), the Murray–Darling Basin Commission, the National Aquaculture Council (NAC), and representatives from harvest and recreational fisheries. Through these meetings, stakeholders agreed on 7 strategies and 21 priority objectives that formed Australia's second national strategic plan for aquatic animal health: AQUAPLAN 2005–2010.

AQUAPLAN 2005–2010 focused on the health of fish, molluscs and crustaceans in aquaculture (including ornamental fish), recreational fishing and the role of health in commercial (harvest) fisheries. The seven strategies of AQUAPLAN 2005–2010 were:

1. enhanced integration and scope of aquatic animal health surveillance in Australia
2. harmonisation of approaches to aquatic animal health in Australia
3. enhancement of the aquatic animal emergency disease preparedness and response framework
4. education and training in the aquatic animal health sector
5. welfare standards for aquaculture
6. appropriate use of therapeutics for aquatic animal health management
7. aquatic animal health management as part of ecologically sustainable development.

6 Australian Government Department of Agriculture, Fisheries and Forestry Australia, *AQUAPLAN: a five-year review*, DAFF, Canberra, 2002.

7 Membership of AAHC included representatives from the Australian Government (three members), state governments, the Northern Territory Government, the National Aquaculture Council, finfish aquaculture (two representatives), mollusc aquaculture, crustacean aquaculture, capture fisheries, recreational fisheries and the ornamental fish industry.

The Primary Industries Ministerial Council endorsed AQUAPLAN 2005–2010 in April 2005. AAHC oversaw implementation of the plan, and received advice from NAAH-TWG on technical issues. AAHC was disbanded in June 2009, and the Animal Health Committee (AHC) assumed responsibility for aquatic animal health public policy, including continued implementation of AQUAPLAN 2005–2010 until it concluded in June 2010.

The review process

AHC agreed that AQUAPLAN 2005–2010 should be reviewed to inform future activities in aquatic animal health, including whether any successor plan should be in the same format or whether aquatic animal health should become part of the National Animal Health System Strategic Framework[8]—considering a general move towards cross-sectoral approaches to biosecurity.

AHC requested its Sub-Committee on Aquatic Animal Health (SCAAH) to conduct the review, with industry engagement through the National Aquatic Animal Health Industry Reference Group (NAAH-IRG) and secretariat support from the department. The review was to include plan development, implementation processes, achievements and considerations for development of a successor strategy.

Aquatic animal industry representatives (including NAC and NAAH-IRG), government (including SCAAH and AHC members) and other interested parties (researchers and other aquatic animal health professionals) were asked to complete a detailed questionnaire that covered a range of issues within the review's scope.

Atlantic salmon sea cages
Richard Jupe

8 Animal Health Australia, *National animal health system: strategic framework for 2007–2012*, AHA, Canberra, 2007.

More than 20 responses were received, including from all state and territory governments, the Australian Government, major aquaculture industries (including NAC), some capture fisheries sectors and a number of independent aquatic animal health professionals. Many respondents were interviewed to discuss and clarify their responses.

The outcomes and achievements of AQUAPLAN 2005–2010 were identified from project status reports and further information received from stakeholders during the review (Appendix 1).

Farmed prawns being harvested
Australian Prawn Farmers Association

AQUAPLAN 2005–2010 in review

This section provides a summary of stakeholders' views on the four areas considered under the review:

- development of AQUAPLAN 2005–2010
- implementation of AQUAPLAN 2005–2010
- outcomes and achievements
- future approaches to aquatic animal health.

Consensus views are presented, as well as significant minority views where they were provided.

Development of AQUAPLAN 2005–2010

Primary responsibility for developing AQUAPLAN 2005–2010 was vested in AAHC. AAHC developed AQUAPLAN 2005–2010 through active consultation with government, industry and other stakeholder representatives. The collaborative approach to considering and setting priorities for AQUAPLAN 2005–2010 was necessary, appropriate and assisted by the broad representative nature of AAHC. This approach helped to coordinate and harness national expertise, which is concentrated geographically and jurisdictionally.

Aquatic animal industries are diverse in size and nature, resulting in different priorities and varying abilities to engage in national forums. This is particularly the case for small, regionally based industry groups that might not have the resources to participate fully in national initiatives. Stakeholders suggested that, although the process for developing AQUAPLAN 2005–2010 worked well, a better approach may have been to initially define the scope of AQUAPLAN more clearly (perhaps through broad consultation), and then match subsequent consultation and participation to the intended scope. An added benefit might be a smaller, more decisive group.

During the planning stages, an attempt was made to anticipate future needs and priorities using foresight techniques. This approach was beneficial in developing a strategic plan rather than a tactical plan; however, retaining flexibility for the plan to change in response to new and emerging issues remained important.

Endorsement of AQUAPLAN 2005–2010 by the Primary Industries Ministerial Council was seen as an important step in underpinning the importance of AQUAPLAN as a nationally agreed plan. For some government agencies, it was also important to provide the necessary authority to allocate resources to the plan's implementation and, as one respondent described, 'give the process more grunt'. Benefits to industries would have been indirect because ministerial endorsement could only influence the allocation of government resources to implementing the plan.

Implementation of AQUAPLAN 2005–2010

Roles and responsibilities

Government and industry cooperation—through AAHC—was essential for implementing AQUAPLAN. AAHC was responsible for developing and overseeing the plan, and was supported by a permanent working group (NAAH-TWG), which provided technical advice. This arrangement was appropriate and encouraged some individuals to commit to leadership roles for particular activities. However, some stakeholders believed that a lack of dedicated resources limited AAHC's effectiveness, and caused delays in initiating projects while funds were sought.

Aquatic animal industries are diverse and include commercial fisheries, recreational fisheries, aquaculture and ornamental fish; they are often also regionally concentrated. Although the AAHC consultative model was appropriate, there were some limitations to how well the committee could represent diverse stakeholder interests—for example, across all capture fisheries sectors.

The change in responsibility for aquatic animal health public policy from AAHC to AHC in June 2009 meant that industries were no longer directly engaged in policy development or in the implementation of AQUAPLAN 2005–2010. SCAAH took over the role of providing technical advice, and NAAH-IRG was established to provide the major pathway for consultation between industry and governments on aquatic animal health.

Responsibilities for implementing projects within the seven strategies of AQUAPLAN 2005–2010 were agreed by industries and governments, and were clearly documented in the plan. Although responsibilities were generally understood, funding constraints meant that this understanding did not always translate to strong commitment or action to implement some projects.

Monitoring and prioritisation

AAHC monitored progress of AQUAPLAN 2005–2010 projects primarily through an implementation update table, and discussed project progress at annual committee meetings, where the table was updated and then posted to the AQUAPLAN area of the department's website.

The committee also reviewed AQUAPLAN priorities each year to ensure that the plan continued to serve stakeholder needs. This was a sound approach that ensured that limited resources were applied to priority projects, but inevitably meant that some projects—perhaps those of interest to a minority of stakeholders—did not progress as intended. Changed circumstances or other new initiatives resulted in AAHC reprioritising projects during the course of AQUAPLAN 2005–2010. For example, the establishment of the Australian Animal Welfare Strategy (AAWS) in 2005 meant that welfare projects were to be progressed (and funded) through that initiative.

Some possible improvements to the implementation of AQUAPLAN 2005–2010 proposed by stakeholders included providing a dedicated project manager, live internet-based updates of project progress, better focus on communication of outcomes and more appropriately targeted communications to a broader range of industry stakeholders—including engaging directly with separate industry sectors. Although clearly desirable, any expansion of project management and communications activities would have required additional resources.

In 2006, a broad range of stakeholders were invited to attend a workshop to help steer progress and prioritise activities for AQUAPLAN 2005–2010. In subsequent years, monitoring and prioritisation were discussed during AAHC meetings. Both approaches were beneficial. Workshops provided a means for broader stakeholder engagement and ensured that AQUAPLAN implementation was the sole focus of those meetings; however, this approach was resource intensive. Monitoring by a committee such as AAHC was useful in limiting demands on stakeholders, while also ensuring that regular monitoring and prioritising occurred.

Resourcing

AQUAPLAN 2005–2010 was intended to provide a joint industry–government approach to resourcing national aquatic animal health programs. Unlike AQUAPLAN 1998–2003, it was implemented without dedicated, direct resources—that is, there were no discretionary funds committed that could be applied flexibly and as required to meet objectives. Instead, AQUAPLAN 2005–2010 focused on attracting available resources (including considerable in-kind contributions) to agreed national strategic priorities. This approach resulted in improved impact of available resources and achieved significant outcomes. In this respect, AQUAPLAN 2005–2010 succeeded—the actual direct funding attracted to AQUAPLAN projects was greater than $1.2 million, which is more than double the expected budget.

Farmed abalone
Steve Wortley

In 2004, industry and governments participated in a funding workshop to determine resource requirements and their allocation. The workshop approach was effective; however, the commitments made were on an individual project basis—rather than to the plan more broadly. The review found that stakeholders believed that the approach was appropriate but that funding commitments made by separate parties were not fully met. The workshop also led to agreement on a detailed statement of stakeholder's in-kind contributions, which was useful to clarify expected commitments.

Funds came from separate sources, and often from individual parties with an interest in a particular project. The two principal funding sources were the Australian Government's Securing the Future—Protecting our Industries from Biological, Chemical and Physical Risk initiative and the FRDC's Aquatic Animal Health Subprogram. Although these two funding sources contributed considerably to AQUAPLAN projects, the funds were sometimes subject to competitive application processes. This situation affected forward planning, delayed the implementation of some AQUAPLAN projects, and probably resulted in some loss of stakeholder confidence and engagement.

Considerable in-kind support of many stakeholders greatly contributed to the successes of AQUAPLAN 2005–2010. AAHC (including industry and government members) and NAAH-TWG contributed significantly to a range of projects, including the *National investigation and reporting protocol for fish kills*, AQUAVETPLAN manuals, diagnostic standards, establishment of a national training scheme, and progress towards the development of joint industry–government emergency aquatic animal disease response arrangements.

In considering the relative success of AQUAPLAN 1998–2003 and AQUAPLAN 2005–2010, stakeholders—perhaps inevitably—considered that a component of dedicated funding, combined with the authority to use it, would have been highly beneficial. Dedicated funding may have contributed to more timely or complete implementation of aspects of AQUAPLAN 2005–2010, and underpinned stakeholder confidence.

Atlantic salmon
Richard Jupe

Communication

The progress of AQUAPLAN 2005–2010 projects was reported through a range of mechanisms. This mixed approach was beneficial because of the different needs of stakeholders. For example, some industry stakeholders preferred written updates that could be 'absorbed in their own time', while others could engage directly through committees such as AAHC. The communication mechanisms considered most useful were:

- the AQUAPLAN newsletter
- AQUAPLAN workshops
- the implementation update table
- reports at AAHC and SCAAH meetings
- reports at conferences.

However, because of the wide variety of AQUAPLAN stakeholders—ranging from senior government decision-makers to the general public—audience-targeted communications may have provided more impact. Such an approach would offer communications tailored to the needs of a particular stakeholder group and could provide closer engagement of certain audiences, such as regionally based industry groups. However, such an approach would have required additional dedicated resources.

Outcomes and achievements

The outcomes of each of the seven strategies and their respective objectives are summarised in Appendix 1.

Stakeholders nominated numerous projects as the most significant achievements of AQUAPLAN 2005–2010, including:

- development of the national fish kill investigation protocols (Strategy 1, objective 4)
- establishment of interlaboratory diagnostic proficiency testing (Strategy 1, objective 5)
- maintenance of the scientific and technical accuracy of AQUAVETPLAN (Strategy 3, objective 2)
- progress in aquatic animal health education and training, including establishment of a national training scheme (Strategy 4)
- progress towards development of an emergency aquatic animal disease response agreement (Strategy 3, objective 1)
- improvement in the availability and safe use of therapeutics for use in farmed aquatic animals (Strategy 6).

Most stakeholders recognised that many of the AQUAPLAN 2005–2010 projects were ongoing or progressive, with one project activity leading into another. As such, several topics were identified as requiring further work, not necessarily because of shortcomings, but because of the incremental or long-term nature of the work. These topics included:

- surveillance approaches and systems
- harmonisation of translocation policies
- emergency disease preparedness and response, including development of an emergency response agreement
- education and training for aquatic animal health professionals
- improvement in the availability and safe use of therapeutics.

Future approaches to aquatic animal health

Industry and government stakeholders agree 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 because of the varied nature of aquatic animal health interests (e.g. capture fisheries, recreational fisheries, aquaculture, ornamental fish, the environment) and a relatively limited amount of resources available to individual sectors. By taking a national strategic approach, resources can be allocated to common priorities to strengthen Australia's aquatic animal health management arrangements in a consistent and efficient manner.

AQUAPLAN 2005–2010 provided an appropriate joint industry–government approach to aquatic animal health; however, any successor strategy should be more clearly targeted and aim to provide a strong return on investment, including the investment of in-kind resources. Stakeholders proposed several areas where a successor strategy might be improved, including:

- more clearly identifying the beneficiaries of projects, particularly where benefits may be both public and private
- ensuring that projects are ultimately focused on outcomes rather than outputs
- targeting projects that build ongoing systems and programs, including continuing progress towards appropriate alignment or integration with terrestrial animal health systems
- ensuring that objectives are adequately resourced and that some dedicated funds are available to provide momentum and underpin stakeholder confidence
- targeting engagement primarily to direct beneficiaries, with broader communication to other stakeholders and the general community.

Integration of aquatic animal health into existing terrestrial animal health strategic frameworks (e.g. the National Animal Health System Strategic Framework), rather than having a separate aquatic animal health strategy, has potential benefits, but also some risks. The potential benefits include using a larger pool of expertise and resources through aligning with existing structures and frameworks. At its fullest extent, this integration would include aquatic animal industries becoming members of Animal Health Australia (AHA), which would give them access to a wide range of livestock industry programs that are co-funded by governments and livestock industries. However, no aquatic animal industries were full members of AHA at the time this review was prepared.

Ongoing integration of aquatic animal health into the national animal health systems is a desirable goal, but needs to be managed carefully over an extended period. A dedicated focus on aquatic animal health would ensure that the different level of development of aquatic animal health arrangements (and the associated needs) is recognised, addressed appropriately and not 'lost' in the broader strategic requirements of the terrestrial animal health system. For example, a dedicated focus is required to develop joint industry–government emergency aquatic animal disease response arrangements. Such arrangements must be appropriate to the circumstances of aquatic environments where risks and benefits are shared across production industries (e.g. aquaculture), public resources (e.g. fisheries) and the

environment. This is a different situation from livestock industries where production is focused on a small number of non-native species. Additional differences include the diversity of aquatic animal taxa, the strong regionalisation of different sectors, a different epidemiological environment and a far smaller knowledge base than for terrestrial animal diseases.

With changes to Australia's institutional arrangements for aquatic animal health, there is no longer a joint industry–government body to manage the development or implementation of a national strategic plan. NAAH-IRG is an appropriate forum to represent industry and to engage with governments on future strategic objectives for aquatic animal health. AHC is responsible for strategic oversight, public policy and decision-making on aquatic animal health matters. Cooperation between these two groups, with the assistance of SCAAH, would be the most logical avenue for industry and government cooperation on strategic aquatic animal health issues.

Stakeholders identified a range of issues for consideration when developing a new strategic approach to aquatic animal health in Australia. These included:

- strengthening aquatic animal health surveillance systems and data management
- improving diagnostic services, including regional services
- developing joint industry–government emergency aquatic animal disease response arrangements
- strengthening emergency preparedness arrangements, including contingency planning, training and system testing
- strengthening enterprise-level biosecurity and awareness
- improving access to safe and appropriate veterinary medicines
- improving aquatic animal health education and training.

Aerial photograph of an oyster farm
South Australian Oyster Growers Association

The way forward

Aquatic animal diseases, including new and emerging diseases, will continue to threaten industry productivity and aquatic environments. During AQUAPLAN 2005–2010, several serious disease incidents occurred in Australia and variously affected aquaculture industries and fisheries resources. These incidents demonstrate that aquatic animal disease threats are real and current, and have potentially serious consequences. Trends in trade and aquatic animal production indicate that Australia will require increasingly strong and resilient systems and programs to ensure that aquatic animal disease risks can be managed effectively. AQUAPLAN 2005–2010 made considerable progress in strengthening Australia's aquatic animal health systems; however, several priority areas require ongoing and concerted effort to ensure that future needs are met.

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 that can protect industry productivity and the environment. Although individual sector and government interests may differ, there are many areas where common principles apply and a national cooperative approach is warranted. A common approach is also essential to ensure that limited resources are applied in the most efficient and effective manner.

A dedicated approach to aquatic animal health is warranted—but alignment and integration with terrestrial animal health systems should be an objective

This review has found that a dedicated approach to aquatic animal health remains relevant and warranted. A dedicated focus is needed to ensure that the different level of development of aquatic animal health arrangements (and the associated needs) is recognised and addressed appropriately. Several priorities for strengthening aquatic animal health management remain; these will require a dedicated strategic focus and

appropriate investment of resources. Ongoing alignment and integration of aquatic animal health with the national terrestrial animal health systems may be beneficial, but should be managed carefully over an extended period—it should be a broad objective of any new strategic plan.

The findings of this review align with broader reforms to Australia's quarantine and biosecurity arrangements that are being pursued. A new, dedicated strategic approach to aquatic animal health in Australia would drive these and other reforms relevant to aquatic animal health management.

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

This review found that AQUAPLAN 2005–2010 provided an appropriate joint industry–government approach to aquatic animal health and strategic focus for investment in aquatic animal health. A successor strategy would benefit from a component of dedicated resources to provide momentum and ensure stakeholder confidence in the plan. The beneficiaries (and therefore investors) of projects should be identified to determine the flow of benefits—public and/or private.

Any new national strategic plan should aim to build ongoing systems and programs

The most valuable activities of AQUAPLAN 2005–2010 were those that delivered systems or programs that continue to provide services or outcomes over time. Some examples are laboratory proficiency testing, an aquatic animal health training scheme and national fish kill investigation protocols. Any new national strategic plan will provide the strongest benefits where projects deliver ongoing outcomes at the conclusion of the plan.

A different approach to industry–government cooperation is required

Changes to Australia's institutional arrangements for aquatic animal health mean that there is no longer a joint industry–government body to manage the development or implementation of a national strategic plan. Cooperation between NAAH-IRG and AHC (supported by SCAAH) would be the most logical avenue for industry and government cooperation on strategic aquatic animal health issues. This review found that engagement and communication should focus on direct beneficiaries, particularly for decision-making on the plan's objectives and associated resourcing.

Appendix 1: Achievements of AQUAPLAN 2005–2010

AQUAPLAN 2005–2010 comprised seven strategies. Each strategy aimed to achieve a number of objectives through supporting project activities. The achievements of AQUAPLAN 2005–2010 are considered against these original objectives.

Strategy 1: Enhanced integration and scope of aquatic animal health surveillance in Australia

Objective 1—To identify needs and gaps with respect to surveillance requirements for specific industry sectors

Outcomes: This objective was supported by a single project to identify surveillance requirements for states and territories, and within specific industry sectors. A consolidated report describing surveillance activities, gaps and future needs was prepared through a Securing the Future—Protecting our Industries from Biological, Chemical and Physical Risk–funded project that was completed in 2006. The report detailed surveillance capabilities within each jurisdiction and discussed the surveillance needs of five major aquaculture sectors: edible oysters, pearl oysters, prawns, salmonids and tuna. It informed a national workshop, held in 2006, at which the surveillance requirements of the five aquaculture industry sectors were discussed further. **(Status: complete)**

Objective 2—To develop cost-effective surveillance systems tailored to address the identified gaps and needs

Outcomes: This objective was supported by a single project to develop cost-effective surveillance systems tailored to address the needs identified through the project outlined in objective 1. Implementation of surveillance programs is the responsibility of the relevant sectors and responsible jurisdictions. Surveillance activities initially described through objective 1 were updated annually by AAHC to monitor active and passive surveillance activity, and to facilitate nationally consistent approaches. **(Status: ongoing)**

Follow-on activities: SCAAH continues to monitor surveillance activities within each jurisdiction to provide a national view of surveillance effort and to facilitate consistent approaches, where appropriate.

Objective 3—To have a surveillance information system that addresses the deficiencies found in objectives 1 and 2, which is organised and readily accessible at a national level

Outcomes: This objective was supported by two projects.

Project 1 aimed to deliver a national surveillance information system. Surveillance information for diseases listed on the National List of Reportable Diseases of Aquatic Animals is collected and recorded at the national level through the Quarterly Aquatic Animal Disease Reporting System. State and territory jurisdictions have developed information systems to service their specific aquatic animal disease surveillance requirements. A national software system, BioSIRT (Biosecurity Surveillance, Incident, Response and Tracing), was also developed for use across Australia to better manage information and resources that are used to manage animal or plant diseases or pests, and emergency responses to incursions. Development of an additional national system was not considered an efficient use of available resources, so this project was deferred. **(Status: deferred)**

Project 2 involved the development of an internet-accessible national aquatic animal pathogen and disease database. The database was developed and populated with pre-existing datasets, and supplemented with additional data entries to encompass all published records of aquatic animal pathogens and diseases in Australia. The database will form the basis of an Australian Biosecurity Intelligence Network (ABIN) project. In addition to the presentation of case records, the new system will feature mapping, digital microscopy and other functionalities. **(Status: ongoing)**

Follow-on activities: The ABIN project will provide a national platform to facilitate access to aquatic animal disease information, and will build on significant activities under this objective. Continued monitoring of surveillance activities by SCAAH, as part of its core business, ensures a national view of surveillance effort and facilitates consistent approaches.

Objective 4—To improve investigation and reporting of major (wild) fish kills

Outcomes: This objective was supported by a single project that aimed to improve investigation and reporting of major fish kills by developing a national protocol, conducting training workshops and implementing routine reporting. The *National investigation and reporting protocol for fish kills*[9] was endorsed by jurisdictions through the Primary Industries and Natural Resource Management Standing Committees in 2006. The protocol, published in 2007, sets out standards and methodologies for fish kill investigations. It also provides a means for determining the roles and responsibilities of separate government agencies. Jurisdictions provide fish kill investigation training to meet their specific requirements. Jurisdictions have agreed to use the Quarterly Aquatic Animal Disease Reporting System for routine reporting of fish kills. **(Status: ongoing)**

9 *National investigation and reporting protocol for fish kills*, Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, 2007.

Follow-on activities: Although significant progress was made towards this objective, some activities are ongoing and will require persistent effort (e.g. training of field staff) to maintain and improve the quality of fish kill investigations.

Objective 5—To create a consistent system of aquatic animal disease laboratory diagnosis and reporting across Australia

Outcomes: This objective was supported by a single project that aimed to develop a national laboratory network for the consistent diagnosis of aquatic animal disease across Australia. An FRDC project on the establishment of a national aquatic animal health diagnostic network was completed, and reported to NAAH-TWG and AAHC in 2007. NAAH-TWG considered that a network existed but should be formalised. Elements of the network include a 'slide of the quarter' program (where histopathological slides of aquatic animals are circulated to laboratories on a quarterly basis to provide laboratories with training and reference resources), a national database of laboratory capability and a national proficiency testing program. Laboratory proficiency testing for six aquatic animal pathogens was established under the Australian National Quality Assurance Program (ANQAP) through a Securing the Future–funded project. Australian and New Zealand standard diagnostic procedures (ANZSDPs) were developed for 10 aquatic animal diseases to permit consistent diagnostic approaches (see Strategy 3, objective 2). **(Status: ongoing)**

Follow-on activities: Although significant progress was made towards this objective, some activities are ongoing and will require persistent effort. The ANQAP proficiency testing program will continue to be fully funded until the end of 2012, and will be reviewed on completion.[10] ANZSDPs continue to be developed by the Sub-Committee on Animal Health Laboratory Standards (SCAHLS), with input from SCAAH.

Summary for Strategy 1

Most activities in Strategy 1 have been completed, providing considerable progress towards achieving the objectives of this strategy. The status of several objectives is listed as 'ongoing', recognising the need for ongoing effort to maintain and improve capabilities in these areas. Significant achievements include the completion of the *National investigation and reporting protocol for fish kills*, establishment of a national program for laboratory proficiency testing and significant efforts to establish a national information system, with ongoing activity to be pursued through an ABIN project.

Strategy 2: Harmonisation of approaches to aquatic animal health in Australia

Objective 1—To harmonise the framework for aquatic animal emergency disease management in Australia

Outcomes: This objective was supported by two projects.

10 The program was reviewed by the Department of Agriculture in 2013. The department has funded program continuation from 2013 to 2015, with proficiency testing for 10 aquatic pathogens offered under the program.

Project 1 aimed to implement the recommendations arising from Exercise Tethys. The recommendations were implemented over several years, with many incorporated into jurisdictions' standard operating procedures. AAHC endorsed a final report on the implementation of recommendations in 2009. **(Status: complete)**

Project 2 aimed to further harmonise emergency disease management through additional simulation exercises. A number of simulation exercises were held for specific jurisdictions or sectors, which aimed to test and improve systems, and to train staff. AAHC recognised that simulation exercises are only one aspect of emergency response preparedness and training. Emergency preparedness training activities were collated by AAHC as a means of providing a view of national effort and to provide interjurisdictional training opportunities (see Strategy 4, objective 4). **(Status: ongoing)**

Follow-on activities: Emergency preparedness training and system testing are activities requiring ongoing and sustained effort.

Objective 2—To implement a common approach to zoning for disease control and market access

Outcomes: This objective was supported by a single project that aimed to review and update (if required) the AQUAPLAN zoning policy guidelines. This project was deferred, and resources were allocated to higher priority activities. **(Status: deferred)**

Follow-on activities: This activity remains to be addressed.

Southern bluefin tuna feeding
Australian Southern Bluefin Tuna Industry Association

Objective 3—To implement a common approach for managing pathogens associated with the translocation of live aquatic animals across Australia

Outcomes: This objective was supported by three projects.

Project 1 required the creation and adoption of national technical guidelines for the translocation of live aquatic animals with respect to pathogens. Several projects investigated technical issues regarding the translocation of live abalone, prawns and barramundi as potential models. Through these projects, it was determined that generic national technical guidelines would have limited practicality or utility. **(Status: complete)**

Project 2 aimed to develop, implement and record specific translocation policies for live aquatic animals. NAAH-TWG collated information on live aquatic animal translocation policies developed by jurisdictions, and held a translocation workshop in 2007 to discuss the development of common approaches to translocating live aquatic animals. An outcome of this work was progress towards a more consistent approach to translocating barramundi between jurisdictions. **(Status: ongoing)**

Project 3 aimed to develop policy guidelines for translocating bait and berley within Australia. An AAHC working group identified the need for a scientific assessment of the risks associated with bait translocation to inform the development of any policy guidelines. A comprehensive risk assessment for the translocation of domestic bait and berley was commissioned and completed through a Securing the Future–FRDC–funded project. This risk assessment will provide the scientific basis for development of bait translocation policy guidelines by SCAAH. **(Status: ongoing)**

Follow-on activities: SCAAH and the Aquaculture Sub-Committee of the Australian Fisheries Management Forum continue to cooperate to harmonise translocation requirements. The *National policy guidelines for translocation of live aquatic organisms* have been identified as requiring revision. SCAAH is to consider the need for, and approach of, bait translocation policy guidelines, based on the risks identified in the comprehensive risk assessment.

Southern bluefin tuna sea cage
Australian Southern Bluefin Tuna Industry Association

Objective 4—To harmonise any new legislative, code of practice or quality assurance approaches as they are initiated in aquaculture

Outcomes: This objective was supported by two projects.

Project 1 aimed to share information on legislation, codes of practice and quality assurance programs. This has become a routine activity of SCAAH. Consultation between the Aquaculture Sub-Committee and SCAAH is achieved through cross-attendance at meetings by executive officers and local members. Consultation with NAAH-IRG is achieved through attendance of the chair of NAAH-IRG at SCAAH annual meetings. **(Status: ongoing)**

Project 2 aimed to develop or collate existing biosecurity principles for use by the wider aquaculture community. This activity was to be undertaken through the NAC website, but there was a lack of resources to update the website. **(Status: deferred)**

Follow-on activities: Sharing information on legislation, codes of practice and quality assurance programs is a core activity of SCAAH and NAC.

Summary for Strategy 2

Most project activities for Strategy 2 have been completed. Several objectives are identified as 'ongoing', demonstrating the need for ongoing and sustained effort in these areas. Recommendations arising from Exercise Tethys were implemented, and a final report was endorsed by AAHC in 2009. Several activities addressed translocation, and, although significant progress was made, ongoing efforts are required in this area to ensure the least restrictive safe trade of live aquatic animals and to address new risks as they emerge. The completion of a comprehensive risk assessment for translocation of domestic bait and berley is a significant achievement that will inform the need for, and nature of, national bait translocation policy guidelines.

Strategy 3: Enhancement of aquatic animal emergency disease preparedness and response framework

Objective 1—To agree on an approach to the establishment of an aquatic emergency animal disease response agreement for Australian aquaculture industries

Outcomes: This objective was supported by three projects.

Project 1 required development of an issues paper on the principles of cost-sharing agreements. A paper was prepared that outlined approaches used for livestock and plant industry agreements, and identified issues regarding the use of similar approaches for aquatic animal disease responses. The paper was considered by AAHC in 2005. **(Status: complete)**

Project 2 required the provision of formal responses from industry and government on their willingness to proceed with discussions regarding establishment of a response agreement. Governments (through the Primary Industries Health Committee) agreed that preparatory work was sufficient for the matter to be pursued further. Industry responses were presented to AAHC in 2005. **(Status: complete)**

Project 3 required that a stakeholder workshop be held to agree on the most appropriate approach to establishing a cost-sharing agreement. An alternative, and more comprehensive, approach to this project was taken. An AAHC working group with industry and government membership undertook detailed analysis of terrestrial animal and plant industry agreements and, using the abalone aquaculture and fisheries industries as a model, considered appropriate approaches and obstacles for establishing suitable response arrangements for aquatic industries. The working group provided its report to AHC in 2010. Although significant progress has been made through this project, the work is ongoing. **(Status: ongoing)**

Follow-on activities: The AAHC working group identified a number of issues that need to be resolved before the establishment of any formal joint industry–government response arrangements for aquatic animal industries. These issues form the basis of a proposed work plan of activities.

Objective 2—To ensure the scientific and technical accuracy of AQUAVETPLAN

Outcomes: This objective was supported by a single project that aimed to review and validate AQUAVETPLAN manuals to ensure that they are accurate and appropriate for use in an emergency response. In 2006, AAHC agreed on a process for prioritising the preparation of new manuals or revision of existing manuals. The National Biosecurity Committee (NBC) agreed to a revised endorsement procedure for AQUAVETPLAN manuals in 2010. **(Status: ongoing)**

New AQUAVETPLAN manuals include:

- *Disease strategy—withering syndrome of abalone* (2006)
- *Operational procedures manual—decontamination* (2008)
- *Disease strategy—infectious salmon anaemia* (2009)
- *Disease strategy—abalone viral ganglioneuritis* (draft in endorsement process)
- *Disease strategy—piscirickettsiosis* (draft in endorsement process).

Revised AQUAVETPLAN manuals include:

- *Disease strategy—furunculosis* (Aeromonas salmonicida *subsp.* salmonicida) (2009)
- *Operational procedures manual—destruction* (2009)
- *Operational procedures manual—disposal* (2009)
- *Disease strategy—white spot disease* (revised manual in endorsement process)
- *Enterprise manual* (revised manual in endorsement process).

New or revised diagnostic resources include *Aquatic animal diseases significant to Australia: identification field guide* (third edition, published 2008) and the following ANZSDPs:

- Betanodavirus *infections of finfish* (2008)
- *Bonamiasis in Australian* Ostrea angasi (2009)
- *Aquatic birnavirus infections of finfish* (2009)
- *Identification of Vibrionaceae from Australian aquatic animals using phenotypic and PCR procedures* (2009)
- *Yersiniosis in fish* (2009)
- Piscirickettsia salmonis (2009)
- *White spot disease* (2008)

- *Crayfish plague* (2008)
- *Viruses of salmonids: virus isolation in fish cell lines* (2008)
- *Collection and submission of samples for investigation of diseases of fin fish* (2008).

Follow-on activities: Maintenance of AQUAVETPLAN resources requires ongoing effort to ensure that appropriate resources are developed and maintained to support emergency responses. These activities are now a part of core business for the responsible bodies: SCAAH is responsible for overseeing the technical review of AQUAVETPLAN manuals, AHC and NBC are responsible for endorsing AQUAVETPLAN manuals, SCAHLS is responsible for aquatic ANZSDPs, and the department maintains and revises the identification field guide to ensure that it continues to reflect the national list and incorporates recent scientific knowledge.

Summary for Strategy 3

Significant progress has been made towards the development of emergency response arrangements for aquatic animal industries, particularly by using the abalone aquaculture and fisheries industries as a model. Further work will be required to resolve issues that are unique to aquatic industries, such as complexities surrounding the flow of risks and benefits—including for shared resources. Six AQUAVETPLAN manuals have been developed or revised and published on the department's website.[11] Another four manuals have been drafted or revised and are within the agreed endorsement procedure. Twelve aquatic ANZSDPs have been published,[12] and the third edition of *Aquatic animal diseases significant to Australia: identification field guide* was published in 2008.[13]

Prawn farm aerators
Australian Prawn Farmers Association

11 www.daff.gov.au
12 ANZSDPs can be downloaded from the SCAHLS website (www.scahls.org.au).
13 *Aquatic animal diseases significant to Australia: identification field guide*, 4th edition, was published in 2012 and is available for download from the Department of Agriculture website (www.daff.gov.au).

Strategy 4: Education and training in the aquatic animal health sectors

Objective 1—To clearly define the current and future needs for aquatic animal health support among Australia's aquaculture industries (established and emerging)

Outcomes: This objective was supported by two projects.

Project 1 aimed to identify current resources within the aquatic animal health service industry, with thought given to possible succession strategies. This was addressed through a project that assessed current and future needs for aquatic animal health training, and systems for merit-based accreditation and competency assessment. The project report was considered at a national workshop of government, industry, research and education representatives in 2008. Outcomes of the workshop are presented under objective 2. **(Status: complete)**

Project 2 aimed to identify and collate existing continuing education opportunities into a training register. The training register was prepared by a SCAAH working group and is available through FRDC. **(Status: complete)**

Objective 2—If required, to modify the current education and training structures to ensure the needs of objective 1 are met

Outcomes: This objective was supported by a single project that aimed to develop and implement strategies to address identified gaps (from objective 1), including provision of on-the-job training and scholarship support. The 2008 national education and training workshop identified two priority needs: to provide practising professionals with opportunities to improve their skill and knowledge at a range of levels (technical education to postgraduate), and to provide graduates and early career professionals with opportunities for on-the-job and specialist training.

For practising professionals, the National Aquatic Animal Health Training Scheme was established and jointly funded by the department and FRDC. The training scheme aims to improve knowledge and skills in aquatic animal health management to support Australia's fishing and aquaculture industry, including the ornamental fish sector. Funding is available on a competitive basis to support individuals to undertake short, focused training activities in Australia or overseas. SCAAH developed selection and eligibility criteria that FRDC uses to assess applications. The first scholarships were offered in July 2010. **(Status: complete)**

For graduates and early career researchers, it was agreed that aquatic animal health should be included in the scope of the National Animal Health Laboratory Strategy's Australian Animal Diagnostic Disease Training Initiative. The initiative was developed by a consortium of universities in Australia to provide postgraduate-level specialist training in a range of skills relevant to animal disease diagnosis. Funding for the initiative has not yet been secured. **(Status: pending)**

Follow-on activities: The National Aquatic Animal Health Training Scheme was funded for three years, ending in 2012–13. A review of the training scheme will inform its possible continuation.[14] Implementation of the training scheme is pending resolution of resourcing issues.

14 The Aquatic Animal Health Training Scheme has been continued for a further two years (2013–14). See the FRDC website for more information about the training scheme (www.frdc.com.au).

Sydney rock oysters
Steve Wortley

Objective 3—To develop an accreditation and competency scheme for aquatic animal health service providers

Outcomes: This objective was supported by two projects.

Project 1 aimed to identify the current mechanisms for accreditation and competency assessment of animal health professionals, and determine the suitability of these schemes for accreditation of aquatic animal health professionals. This project did not begin. **(Status: not commenced)**

Project 2 aimed to develop new accreditation systems where current schemes are deemed not to meet the specific needs of aquatic animal health professionals. This project did not begin. **(Status: not commenced)**

Objective 4—To provide training in the framework and operational aspects of aquatic animal disease emergency management

Outcomes: This objective was supported by four projects.

Project 1 aimed to document the training exercises conducted by state and territory governments and the Australian Government, including industry involvement and training. AAHC collated emergency preparedness training activities to provide a view of national training activity and interjurisdictional training opportunities. Communication of emergency response training activities and interjurisdictional cooperation continue to be facilitated through SCAAH. SCAAH held a workshop on emergency disease preparedness (including training) in 2009. **(Status: ongoing)**

Project 2 aimed to train AqCCEAD members and AqCCEAD working group members on the operations of AqCCEAD. Training has been provided by the AqCCEAD Secretariat on an as-needs basis. Operations of AqCCEAD have been supported by the establishment of an online forum for secure and more efficient distribution of committee and working group papers. **(Status: ongoing)**

Project 3 aimed to develop emergency response reference material targeted at the on-farm/industry level to raise awareness about the application of biosecurity at these levels. Numerous activities have been undertaken to meet the needs of individual jurisdictions and sectors to address specific risks (e.g. awareness material about abalone viral ganglioneuritis). A project to develop on-farm training materials, standard operating procedures and guidance for on-farm simulation exercises was developed in 2007 through an industry-led project. Awareness material for ornamental fish diseases and nodavirus (identified as a need at a national workshop on nodavirus) were produced and distributed in 2008. **(Status: ongoing)**

Project 4 aimed to ensure that existing resources for emergency animal disease training are available to the aquatic animal health sector. Most resources are publicly available on the internet (e.g. AQUAVETPLAN manuals, the *Aquatic animal diseases significant to Australia: identification field guide*, ANZSDPs, awareness materials). **(Status: ongoing)**

Follow-on activities: Although significant progress has been made towards this objective, training for aquatic animal disease emergency management requires ongoing and sustained effort. For this reason, many of the activities are marked as ongoing.

Summary for Strategy 4

Significant achievements were made through Strategy 4. Current and future training needs were identified, and the Aquatic Animal Health Training Scheme was established to address one of two priority needs—training for existing aquatic animal health professionals. A range of training activities occurred to support emergency disease management, but by their nature these activities require ongoing effort. No progress was made in developing an accreditation or competency scheme for aquatic animal health service providers; however, some professionals have sought accreditation from overseas bodies through awards under the Aquatic Animal Health Training Scheme.

Atlantic salmon feed pellets
Richard Jupe

Strategy 5: Welfare standards for aquaculture

Objective 1—To develop a scientifically based and harmonised approach to aquatic animal welfare policies across Australia

Outcomes: This objective was supported by four projects. Activities of the AAWS 2005–2010 superseded some of these activities.

Project 1 aimed to review existing welfare policies applied in aquatic animal industries in Australia. AAHC agreed to prioritise the welfare of finfish, and the AAWS completed a review of welfare arrangements for finfish. **(Status: complete)**

Project 2 required AAHC to develop and adopt a position statement on aquatic animal welfare. AAHC agreed to defer this project pending progress by the AAWS Aquatic Animals Working Group. This activity has been superseded by AAWS activities and changes in responsibilities for aquatic animal welfare. The National Consultative Committee on Animal Welfare (NCCAW) developed a position statement on aquatic animal welfare, which is available on the department's website. **(Status: redundant)**

Project 3 required that advice on aquatic animal welfare issues be provided through AAHC representation on NCCAW. This activity became redundant because of a changed membership structure of NCCAW. Aquatic animal welfare advice was provided through alternative means, such as the AAWS Aquatic Animals Working Group. **(Status: redundant)**

Project 4 required that advice be provided on the implementation of specific projects under the AAWS. This activity was completed through the significant cross-representation between AAHC and the AAWS Aquatic Animals Working Group. **(Status: complete)**

Objective 2—To increase awareness of aquatic animal welfare issues within industry

Outcomes: This objective was supported by a single project that aimed to promote industry codes of practice through improved access to relevant information. The AAWS pursued the project by holding workshops for aquatic animal sectors (e.g. aquaculture, recreational fishing, capture fisheries), and reviewing and developing codes of practice. **(Status: ongoing)**

Follow-on activities: Activities are continuing under phase two of the AAWS (2010–14).

Objective 3—To assist international standard-setting bodies in developing welfare guidelines and standards that are scientifically based

Outcomes: This objective was supported by a single project that aimed to assist the development of international aquatic animal welfare standards that are underpinned by science. The Aquatic Animal Health Program of the department coordinates Australia's response to draft international aquatic animal health and welfare standards, and seeks stakeholder contributions to their review. **(Status: ongoing)**

Follow-on activities: This is a core activity of the department's Aquatic Animal Health Program.

Summary for Strategy 5

Many of the activities in this strategy were pursued under the AAWS 2005–2010. A review of the strategy is available on the department's website. The AAWS has entered its second phase, which is described in the *Australian Animal Welfare Strategy and National Implementation Plan 2010–14*.[15]

Strategy 6: Appropriate use of therapeutics for aquatic animal health management

Objective 1—To ensure the availability and safe use of therapeutics for cultured aquatic animals in Australia

Outcomes: This objective was supported by six projects.

Project 1 aimed to update existing lists of products required for use by aquatic animal industries. An AAHC working group consulted with industry sectors to determine priorities and completed a revised list of priorities in late 2006. **(Status: complete)**

Project 2 required the formation of a working group to liaise with the Australian Pesticides and Veterinary Medicines Authority (APVMA), prepare issues papers and identify funding sources. AAHC formed a Veterinary Medicines in Aquaculture working group that included members from industry, government and APVMA. Liaison with APVMA on aquatic issues was further strengthened through aquatic representation on APVMA's Registration Liaison Committee. The working group was successful in reaching industry agreement on priority requirements and a cooperative funding model for preparation of minor use permit (MUP) applications. The working group completed its tasks. **(Status: complete)**

Project 3 required the registration of up to 40 products for use by aquatic animal industries—with consideration given to the different mechanisms available for registration. Following consultation with pharmaceutical manufacturers and APVMA, MUPs were considered to be the most efficient means of improving the availability and safe use of veterinary medicines in aquaculture. MUPs for a number of priority veterinary medicines were pursued, and permits were held by NAC on behalf of the aquaculture industry. **(Status: ongoing)**

Project 4 required the identification and registration of veterinary chemicals using the former category 40 system, which provided for recognition of international data. APVMA's *Manual of requirements and guidelines* was revised and no longer includes the category 40 system. **(Status: redundant)**

Project 5 aimed to encourage responsible bodies such as NAC to obtain MUPs for a range of veterinary medicines. This project was consistent with NAC's approach to project 3. **(Status: complete)**

Project 6 required the conduct of sector-specific farm-level training courses for the safe and appropriate use of chemicals used in aquaculture. This project did not begin. **(Status: not commenced)**

Follow-on activities: MUPs remain the primary means of providing safe and effective use of veterinary medicines for the aquaculture industry. Ongoing efforts are required to prepare MUP applications, meet permit requirements for data collection

15 *Australian Animal Welfare Strategy and National Implementation Plan 2010–14*, Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, 2011.

and reporting, and renew permits when required. The Council of Australian Governments has agreed on a program of reform for agricultural and veterinary chemical regulation that aims to streamline regulatory processes for agricultural and veterinary chemicals. This initiative may provide opportunities for the availability of safe veterinary medicines in the aquaculture industry.

Summary for Strategy 6

Strategy 6 made progress in improving the availability of veterinary medicines for the aquaculture industry. The activities under this strategy resulted in industry prioritising its requirements, the collaborative development of a number of MUP applications, granting of several MUPs by APVMA and a role for NAC to hold permits on behalf of industry. Despite this progress, the coordination of MUP applications could be improved. Coordination could be further effected by a NAC decision in 2010 not to hold MUP applications on behalf of the broader aquaculture industry.

Strategy 7: Aquatic animal health management as part of ecologically sustainable development

Objective 1—To ensure that market opportunities are not lost due to the use of suboptimal health management practices in aquaculture

Outcomes: This objective was supported by a single project that aimed to encourage research in basic immunology and modulation of immune function in aquatic animals. The FRDC Aquatic Animal Health Subprogram has a research and development (R&D) plan that includes a key research area—'Aquatic animal disease therapy and prophylaxis' (version 2009). Through the subprogram, FRDC has funded several projects on immunology of aquatic animals, particularly for fish and molluscs. 'Research to support the development of commercial vaccines for significant production diseases' was listed as a priority in the 2009 R&D plan. The subprogram also sponsored international keynote presentations on immunology at the 2005 and 2007 FRDC Aquatic Animal Health Subprogram scientific conferences. **(Status: ongoing)**

Cooked prawns ready for market
Australian Prawn Farmers Association

Follow-on activities: The FRDC Aquatic Animal Health Subprogram has a role to set and review national priorities for aquatic animal health research, including for aquatic animal immunology.

Objective 2—To raise awareness about disease issues associated with imported live aquatic animals

Outcomes: This objective was supported by a single project that aimed to produce and disseminate information on disease risks associated with ornamental fish. Awareness material on disease risks associated with ornamental fish was prepared with the assistance of the Pet Industry Association of Australia. The material was distributed to registered pet stores, and to veterinarians through the Australian Veterinary Association. **(Status: complete)**

Follow-on activities: The activities under this objective were completed; however, raising awareness of disease risks requires ongoing and coordinated effort.

Summary for Strategy 7

Several research projects on aquatic animal immunology were pursued through the FRDC Aquatic Animal Health Subprogram. Outcomes from this research were applied to improve health management practices at the industry level. A considerable volume of awareness material on the disease risks associated with ornamental fish was prepared and distributed with the cooperation of industry. The impact of this material in raising awareness was not measured.

Southern bluefin tuna harvesting
Australian Southern Bluefin Tuna Industry Association

Acronyms and abbreviations

AAHC	Aquatic Animal Health Committee
AAWS	Australian Animal Welfare Strategy
ABIN	Australian Biosecurity Intelligence Network
AHA	Animal Health Australia
AHC	Animal Health Committee
ANZSDP	Australian and New Zealand standard diagnostic procedure
AqCCEAD	Aquatic Consultative Committee on Emergency Animal Diseases
AQUAPLAN	Australia's National Strategic Plan for Aquatic Animal Health
AQUAVETPLAN	Australian Aquatic Veterinary Emergency Plan
FRDC	Fisheries Research and Development Corporation
NAAH-IRG	National Aquatic Animal Health Industry Reference Group
NAAH-TWG	National Aquatic Animal Health Technical Working Group
NAC	National Aquaculture Council
SCAAH	Sub-Committee on Aquatic Animal Health
SCAHLS	Sub-Committee on Animal Health Laboratory Standards