

CHAPTER 5

Aquatic animal health

The health management of finfish, crustaceans and molluscs is an essential element of maintaining aquaculture productivity, fisheries resources and biodiversity in Australia.

This chapter provides details on the status of aquatic animal health in Australia, including details about national aquatic animal health policy and programs, aquatic animal disease emergency preparedness, disease events in 2015, research and development, and regional initiatives on aquatic animal health.

5.1 STATUS OF AQUATIC ANIMAL HEALTH IN AUSTRALIA

Australia has a reporting system for aquatic animal diseases of national significance. All the diseases currently reportable to the World Organisation for Animal Health (OIE) and other aquatic animal diseases of national significance are included on Australia's National List of Reportable Diseases of Aquatic Animals.⁹²

In 2015, 10 fish diseases, 7 mollusc diseases, 8 crustacean diseases and 2 amphibian diseases were reportable to the OIE. Australia is free from most of these diseases. Australia's status for each OIE-listed aquatic animal disease in 2015 is shown in Table 5.1. The distribution of OIE-listed aquatic animal diseases that are present in Australia, based on reporting by states and territories, is shown in Figure 5.1.

Other aquatic animal diseases of national significance to Australia, and their status in 2015, are listed in Table 5.2.

Table 5.1 Australia's status for OIE-listed diseases of aquatic animals, 2015

Disease or agent	Status
Finfish diseases	
Epizootic haematopoietic necrosis disease	Locally present
Infection with <i>Aphanomyces invadans</i> (epizootic ulcerative syndrome)	Locally present
Infection with <i>Gyrodactylus salaris</i>	Never reported
Infection with HPR-deleted or HPR0 infectious salmon anaemia virus	Never reported
Infection with salmonid alphavirus	Never reported
Infectious haematopoietic necrosis	Never reported
Koi herpesvirus disease	Never reported
Red sea bream iridoviral disease	Never reported
Spring viraemia of carp	Never reported
Viral haemorrhagic septicaemia	Never reported
Mollusc diseases	
Infection with abalone herpesvirus	Locally present
Infection with <i>Bonamia exitiosa</i>	Never reported
Infection with <i>Bonamia ostreae</i>	Never reported
Infection with <i>Marteilia refringens</i>	Never reported
Infection with <i>Perkinsus marinus</i>	Never reported
Infection with <i>Perkinsus olseni</i>	Locally present
Infection with <i>Xenohalictis californiensis</i>	Never reported
Crustacean diseases	
Crayfish plague (<i>Aphanomyces astaci</i>)	Never reported
Infection with yellowhead virus	Never reported
Infectious hypodermal and haematopoietic necrosis	Locally present
Infectious myonecrosis	Never reported

⁹² www.agriculture.gov.au/animal-plant-health/aquatic/reporting

Table 5.1 Australia's status for OIE-listed diseases of aquatic animals, 2015 *continued*

Disease or agent	Status
Crustacean diseases <i>continued</i>	
Necrotising hepatopancreatitis	Never reported
Taura syndrome	Never reported
White spot disease	Never reported
White tail disease	Locally present
Amphibian diseases	
Infection with <i>Batrachochytrium dendrobatidis</i>	Locally present
Infection with ranavirus	Locally present

OIE = World Organisation for Animal Health

Note: Aquatic animal diseases that were reportable to the OIE in 2015 are those listed in the 2015 OIE *Aquatic animal health code*.



Image credit: FRDC

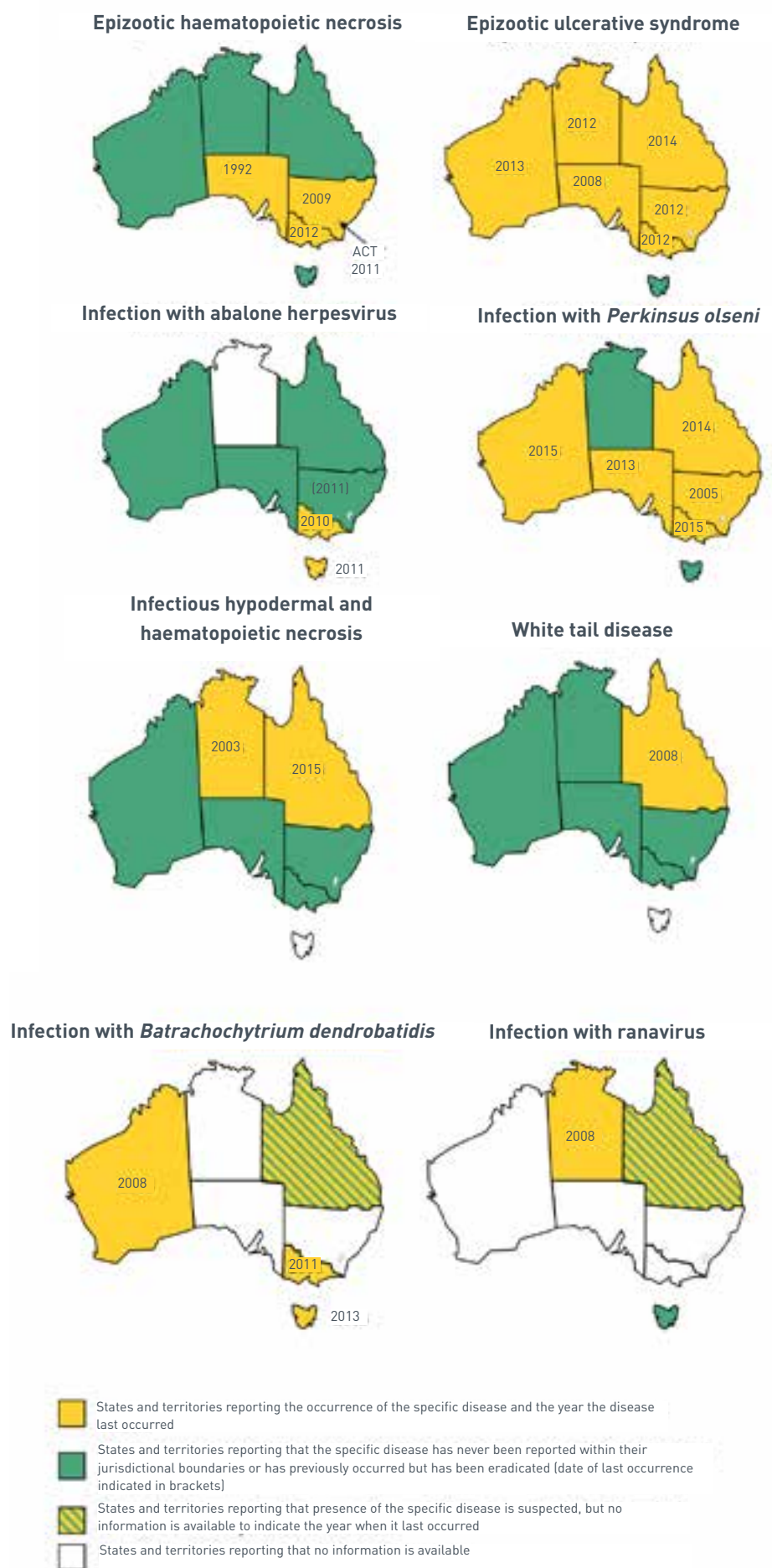


Figure 5.1 Distribution of OIE-listed aquatic diseases in Australia

Table 5.2 Australia's status for other significant diseases of aquatic animals, 2015

Disease or agent	Status
Finfish diseases	
<i>Aeromonas salmonicida</i> – atypical strains	Locally present
Bacterial kidney disease (<i>Renibacterium salmoninarum</i>)	Never reported
Channel catfish virus disease	Never reported
Enteric redmouth disease (<i>Yersinia ruckeri</i> – Hagerman strain)	Never reported
Enteric septicaemia of catfish (<i>Edwardsiella ictaluri</i>)	Reported from wild native catfish in one river in 2014
Epizootic haematopoietic necrosis – European catfish virus/European sheatfish virus	Never reported
Furunculosis (<i>Aeromonas salmonicida</i> subsp. <i>salmonicida</i>)	Never reported
Grouper iridoviral disease	Never reported
Infectious spleen and kidney necrosis virus (ISKNV)–like viruses	Never detected in wild fish populations. Detected in imported aquarium fish
Infectious pancreatic necrosis	Never reported
Piscirickettsiosis (<i>Piscirickettsia salmonis</i>)	Never reported
Viral encephalopathy and retinopathy	Locally present
Whirling disease (<i>Myxobolus cerebralis</i>)	Never reported
Mollusc diseases	
Infection with <i>Bonamia</i> species	Locally present
Infection with <i>Marteilia sydneyi</i>	Locally present
Infection with <i>Marteilioides chungmuensis</i>	Never reported
Infection with <i>Mikrocytos mackini</i>	Never reported
Infection with ostreid herpesvirus 1 microvariant	Locally present
Iridoviroses	Never reported
Crustacean diseases	
Acute hepatopancreatic necrosis disease	Never reported
Gill-associated virus	Locally present
<i>Monodon</i> slow growth syndrome	Never reported

5.2 NATIONAL AQUATIC ANIMAL HEALTH POLICY AND PROGRAMS

Australia's Animal Health Committee (AHC) is responsible for public policy and government technical decision making on aquatic animal health. The Sub-Committee on Aquatic Animal Health (SCAAH) supports AHC in its policy deliberations by providing robust scientific and technical advice on aquatic animal health issues. Subcommittee members represent the Australian Government, the state and Northern Territory governments, the New Zealand Government, the Commonwealth Scientific and Industrial Research Organisation Australian Animal Health Laboratory (CSIRO-AAHL) and Australian universities (one representative). AHC reports to the National Biosecurity Committee for high-level endorsement of decisions and policy. (See Figure 1.1 in Chapter 1 for the structure of animal health management organisations and committees).

5.2.1 AQUAPLAN

*AQUAPLAN 2014–2019*⁹³ is Australia's third national strategic plan for aquatic animal health. It outlines the priorities to strengthen Australia's arrangements for managing aquatic animal health, and to support sustainability, productivity, market access and, ultimately, the profitability of Australia's aquatic animal industries. AQUAPLAN is a collaborative initiative that is developed and implemented by the Australian, state and territory governments, and aquatic animal industries. The Australian Government Department of Agriculture and Water Resources coordinates AQUAPLAN programs. AHC and SCAAH, in close collaboration with industry, oversee national implementation of AQUAPLAN activities and projects.

AQUAPLAN 2014–2019 has five objectives:

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

- improving availability of appropriate veterinary medicines
- improving education, training and awareness.

Each objective is supported by activities to address specific aquatic animal health management issues associated with infectious diseases of finfish, molluscs and crustaceans.

The plan covers aquatic animal health issues relevant to aquaculture, commercial fisheries, recreational fisheries, the ornamental fish industry, the tourism industry and the environment.

In May 2015, AHC endorsed the AQUAPLAN communication strategy. The communication strategy will be reviewed annually by SCAAH to ensure that it remains appropriate and continues to meet stakeholder needs.

Significant achievements in 2015 included:

- development of a model aquaculture enterprise health accreditation scheme, using abalone aquaculture as an example (Activity 1.3)
- consideration of aquatic animal production issues to inform development of the National Antimicrobial Resistance Strategy 2015–2019.

5.2.2 New quarantine requirements for ornamental finfish – domestic approach

In 2015, the Department of Agriculture and Water Resources continued to focus on managing the biosecurity risks associated with imports of live ornamental fish. Consistent with recommendations from the import risk analysis for ornamental finfish with respect to gourami iridovirus and related viruses,⁹⁴ new import conditions will require aquatic animal health authorities of exporting countries to ensure that all fish belonging to the gourami, cichlid and poeciliid families are sourced from populations free from megalocytiviruses, or, alternatively, are batch tested and found to be free from the viruses before export. These changes to quarantine requirements will come into effect on 1 March 2016. The department worked closely with the aquatic animal health authorities of exporting countries during 2015 to ensure implementation of the new conditions with the least possible disruption to trade.

SCAAH members are developing a national policy that will describe a common national approach to surveillance and

⁹³ www.agriculture.gov.au/animal-plant-health/aquatic/aquaplan

⁹⁴ www.agriculture.gov.au/biosecurity/risk-analysis/ira/final-animal/ornamental-finish

emergency response for megalocytiviruses that is consistent with the new quarantine measures.

5.2.3 National laboratory proficiency testing program

The Australian Laboratory Proficiency Testing Program for Aquatic Animal Diseases, established in 2010, has provided Australian laboratories with an opportunity to assess their capabilities to correctly detect priority aquatic animal diseases using molecular (polymerase chain reaction) methods. The program is funded by the Department of Agriculture and Water Resources. It is implemented by CSIRO-AAHL and the Australian National Quality Assurance Program, both of which are accredited by the National Association of Testing Authorities as proficiency testing providers.

Under the program, Australian laboratories can participate in proficiency testing for the following seven aquatic animal diseases:

- infection with ostreid herpesvirus 1 (OsHV-1) microvariant
- white spot disease of prawns
- abalone viral ganglioneuritis
- viral encephalopathy and retinopathy
- yellowhead disease
- gill-associated virus
- megalocytivirus (infectious spleen and kidney necrosis virus [ISKNV]-like viruses).

Program results for 2015 confirmed that Australia continues to have strong diagnostic capabilities for these seven diseases. The program was reviewed at the end of 2015 to describe elements that contribute to its success and to identify areas that could be improved to increase the program's cost effectiveness.

5.2.4 National guidelines for translocation of domestic bait and berley

SCAAH has produced *National policy guidelines for translocation of domestic bait and berley*.⁹⁵ The guidelines aim to guide development of nationally consistent state and territory policies on bait translocation, particularly as they

apply to managing the risk of disease transmission within and between jurisdictions. The guidelines were published on the Department of Agriculture and Water Resources website in May 2015.

5.2.5 National policy guidelines for translocation of live aquatic animals

Aquatic animals are translocated for aquaculture breeding or grow-out, restocking of recreational fisheries or conservation purposes. Translocation can present risks of disease transmission, environmental impacts or issues from mixing different genetic stocks. These risks need to be managed in a way that allows translocations to occur after consideration and development of appropriate management measures. The *National policy guidelines for translocation of live aquatic organisms* (1999) are being revised to assist the development and revision of translocation policies across all states and territories. A cross-sectoral group, led by SCAAH, is considering the risks and potential impacts of translocation. The policy guidelines aim to increase national consistency in approaches to risk assessments associated with translocations, and provide clear guidelines on the assessment of proposed translocations.

5.2.6 Development of a biosecurity plan template

Activity 1.1 of *AQUAPLAN 2014–2019* involves development of a generic enterprise-level biosecurity plan template and guidance documents. The aim is to increase access to guidance on best-practice biosecurity planning, tailored to the needs of aquaculture and fisheries sectors. The generic document will be used to develop sector-specific biosecurity plans.

SCAAH has developed a generic biosecurity plan template, which was 'road tested' with selected aquaculture producers in 2015. The template is being revised to incorporate feedback from the road-testing activities, and will then be presented to industry and governments for endorsement.

⁹⁵ www.agriculture.gov.au/animal/aquatic/guidelines-and-resources

5.3 AQUATIC ANIMAL DISEASE EMERGENCY PREPAREDNESS

Australia's national system for preparing for, and responding to, aquatic emergency animal diseases (EADs) encompasses all activities relating to disease surveillance, planning, monitoring and response. These activities are carried out by the Australian Government, state and territory governments, aquatic animal industries, universities, CSIRO, private veterinarians and laboratories.

The Aquatic Consultative Committee on Emergency Animal Diseases (Aquatic CCEAD) coordinates the national response to aquatic animal disease emergencies, which helps to ensure that the most effective technical response is implemented. The Aquatic CCEAD comprises:

- the Australian Chief Veterinary Officer
- representatives from the Department of Agriculture and Water Resources
- the chief veterinary officer (or the director of the fisheries department) in each state and territory government
- the head of CSIRO-AAHL.

Technical representatives from industry may also be invited to participate.

The Aquatic CCEAD met twice in 2015, to review the response to a disease in prawns, and to confirm diagnosis of infection with *Perkinsus olseni* in a new host species (native flat oysters – *Ostrea angasi*). These disease events are discussed in Section 5.4.

As with terrestrial animal disease emergencies, operational responsibility for the response to an aquatic EAD in an Australian state or territory primarily lies with the relevant jurisdiction. Each state and territory government will bring together a broad range of resources to help fisheries, aquaculture and aquatic animal health authorities address disease incidents. Experts from other jurisdictions may be called in to assist in the response, if required.

5.3.1 Development of aquatic animal disease response arrangements

Emergency response agreements outline how emergency responses to pest and disease outbreaks should be managed and paid for. Three emergency response agreements have been agreed in Australia: for animal diseases, for plant pests, and for pest and disease emergencies with predominantly environmental impacts. These are formal agreements between governments and – in the case of the animal disease



Image credit: Patricia Thornhill

and plant pest agreements – the industries that could potentially be affected by diseases or pests. Each agreement details the roles and responsibilities of participants, including who should contribute and what the contributions should be (according to agreed formulas).

Aquatic animal industries and governments have agreed on a work plan to develop formal industry–government arrangements for responses to aquatic EADs. The project, which is funded by the Department of Agriculture and Water Resources, and managed by Animal Health Australia, commenced in October 2014.

One work plan activity is to develop a set of principles and methodological approaches to apportion the public and private benefits of responses to aquatic EADs. The principles will reflect the unique risks and benefits in the aquatic animal sectors (aquaculture, commercial fisheries, recreational fisheries and environment), as well as the policy approaches used in existing agreements. The outputs of this activity will provide the basis for developing cost-sharing arrangements in a formal industry–government agreement.

5.3.2 AQUAVETPLAN

The Australian Aquatic Veterinary Emergency Plan (AQUAVETPLAN) is a series of technical response plans that describe the proposed Australian approach to an aquatic EAD event. The plans provide technical information and preferred policy approaches to guide responses to a disease outbreak in Australia. AQUAVETPLAN aligns with the Australian Veterinary Emergency Plan (AUSVETPLAN), which is for terrestrial animal disease responses. Disease strategy manuals provide guidance for animal health professionals to respond appropriately to outbreaks of specific EADs in Australia. Operational manuals address important procedural issues (e.g. destruction, disposal, decontamination) and complement the disease strategy manuals.

In April 2015, a new AQUAVETPLAN disease strategy manual for OsHV-1 microvariant was published online. The revised *Enterprise manual*, which provides brief information on industry practices and structures, and outlines approaches to be considered in the face of an aquatic EAD, was published in June 2015.

Manuals are considered for revision every five years or in the event of significant new developments. Revisions of four disease strategies commenced in 2015: viral encephalopathy and retinopathy, whirling disease, withering syndrome of abalone, and crayfish plague. In 2015, SCAAH agreed that

revision of the infectious salmon anaemia disease strategy was warranted, given recent developments in scientific understanding of the disease.

AQUAVETPLAN manuals can be downloaded from the Department of Agriculture and Water Resources website.⁹⁶

5.3.3 Surveillance

Each state and territory in Australia is responsible for surveillance activities within its borders. Passive surveillance includes regular health monitoring, investigating unusual fish mortality events, and reporting and investigating diseases listed on Australia's National List of Reportable Diseases of Aquatic Animals. Active surveillance is conducted for specific purposes – for example, export certification for particular industries or specific diseases of importance to Australia. Approaches to surveillance follow OIE standards, or the methods necessary to meet export market requirements or internal requirements for movement of animals in aquaculture or restocking (for fishery enhancement or conservation). Quarterly surveillance results are reported through the OIE Regional Representation for Asia and the Pacific, and the Network of Aquaculture Centres in Asia–Pacific (NACA).⁹⁷

5.4 DISEASE EVENTS IN 2015

Perkinsus olseni is considered endemic to Australia, and has been reported from abalone and other molluscs. Annual surveillance in Victoria found histological evidence of *Perkinsus* infection in specimens of native flat oysters (*Ostrea angasi*). The oysters were in poor condition as a result of inadequate nutrition. Subsequent testing by a quantitative polymerase chain reaction (qPCR) screening test for *P. olseni* produced 3 positive results from 22 samples. The OIE *P. olseni*-specific PCR test produced one positive result from the three qPCR-positive samples. Sequencing of the amplicon showed that its similarity to *P. olseni* was greater than 99.3%. This was the first confirmed detection of *P. olseni* in native flat oysters and was reported to the OIE as an immediate notification on 30 April 2015.

⁹⁶ www.agriculture.gov.au/animal-plant-health/aquatic/aquavetplan

⁹⁷ www.enaca.org/modules/library/publication.php?tag_id=279&label_type=1&title=quarterly-aquatic-animal-disease-report

A syndrome of chronic mortalities of farmed prawns (*Penaeus monodon*) was investigated by Queensland authorities and CSIRO-AAHL. Affected prawns had septic hepatopancreatitis, but some prawns showed an unusual hepatopancreatic tubule degeneration in the absence of detectable pathogens. Extensive testing excluded acute hepatopancreatic necrosis disease (AHPND) as the cause of the mortalities, and the disease did not satisfy the case definition in the draft AHPND chapter of the OIE *Manual of diagnostic tests for aquatic animals*. Research is ongoing to establish the cause of the mortalities.

Pacific oyster mortality syndrome (POMS) was first reported from the Georges River, New South Wales, in late 2010, when a syndrome of increased mortality in farmed triploid Pacific oysters (*Crassostrea gigas*) was observed. The syndrome was also detected in Port Jackson (Parramatta River, New South Wales) in early 2011 in wild Pacific oysters. OsHV-1 microvariant was found in association with the mortalities. The disease was detected in the Hawkesbury River in January 2013 and caused extensive mortalities in oyster farms in the region. Testing has confirmed seasonal occurrence of the virus in research populations of Pacific oysters in subsequent years, most recently in the Georges River estuary in February 2015.

The ongoing response objective for POMS is containment of the disease to affected estuaries. Controls remain on movement of farmed oysters, oyster farming infrastructure and equipment from the Georges and Hawkesbury rivers, and Brisbane Water. There is also a total ban on recreational fishers taking oysters from the Georges River, Botany Bay, the Hawkesbury River and Port Jackson.

OsHV-1 microvariant was not detected elsewhere in Australia in 2015.

As part of the strategic approach to management and containment of POMS, projects to inform response to, and management of, the disease are under way. Information on these projects is available in the *Health Highlights* newsletter on the Fisheries Research and Development Corporation (FRDC) website.⁹⁸

5.5 RESEARCH AND DEVELOPMENT

Australia's aquatic animal health research community includes personnel in government agencies, universities and industry. It has a strong reputation for delivering high-quality research outcomes.

The Aquatic Animal Health Subprogram of the FRDC was established to provide a cohesive and national approach to aquatic animal health research and development in Australia. The subprogram's objectives are to:

- coordinate research projects (e.g. project applications, project management, communication)
- set strategic directions for aquatic animal health research and development in Australia
- facilitate the dissemination of information on, and results from, aquatic animal health research and development.

Projects approved in 2015 included:

- investigation of bonamiasis
- development of mollusc cell culture lines for oysters
- investigation of YHV/GAV (yellowhead virus and gill-associated virus) variants, and validation of sensitive and specific tests for YHV-1.

In July 2015, the third FRDC Australasian Scientific Conference on Aquatic Animal Health was held in Cairns. Key themes of the conference were diseases in ornamental fish and molluscs, finfish and mollusc viruses, parasitology, and emergency disease response.

Information on the subprogram, including current projects and final reports of projects funded by the FRDC, are available on the FRDC website.⁹⁹

98 http://frdc.com.au/research/aquatic_animal_health/Pages/default.aspx

99 http://frdc.com.au/research/aquatic_animal_health/Pages/default.aspx

5.6 REGIONAL AQUATIC ANIMAL HEALTH INITIATIVES

Australia collaborates with many countries – particularly its neighbours in the Asia–Pacific region – to help improve the health of their aquatic animals. Cooperation occurs through Australia’s membership of NACA, the Food and Agriculture Organization of the United Nations (FAO), the Secretariat of the Pacific Community, the Association of Southeast Asian Nations and the Asia–Pacific Economic Cooperation forum. Participation in these forums ensures that Australia is actively engaged in projects that address aquatic animal disease threats to the region.

5.6.1 Network of Aquaculture Centres in Asia–Pacific

The Asia Regional Advisory Group on aquatic animal health was established under the auspices of NACA to provide advice to member countries on aquatic animal health management. Members of the advisory group include aquatic animal disease experts, the OIE, the FAO and collaborating regional organisations. An Australian Government officer participated in the group’s 14th meeting in Bangkok, Thailand, in November 2015. At this meeting, the group reviewed the disease situation in Asia, considered the recent changes to OIE global standards, revised the list of diseases in the regional Quarterly Aquatic Animal Disease reporting system, and developed recommendations and action points for consideration by the NACA Secretariat and member governments. Further information is available on the NACA website.¹⁰⁰

5.6.2 Regional Proficiency Testing Program for Aquatic Animal Disease Laboratories

The Regional Proficiency Testing Program for Aquatic Animal Disease Laboratories concluded in late 2014. A final report, which detailed aspects of the program’s implementation, reviewed the program and provided recommendations for future programs, was published on the website of the Department of Agriculture and Water Resources in August

2015.¹⁰¹ The program achieved its aim to strengthen regional capability to diagnose important aquatic animal diseases that could affect trade, industry sustainability or productivity. More than 40 laboratories in 12 NACA member countries in the region participated in the program, which assessed laboratory testing for 10 pathogens of significance. Data from the program demonstrated that diagnostic performance (proportion of correctly reported test results) improved for all 10 aquatic animal pathogens.

5.6.3 International standards

Australia continues to contribute strongly to the development of international aquatic animal health standards by the OIE. The Department of Agriculture and Water Resources seeks comment from a network of Australian experts on draft standards proposed by the OIE Aquatic Animal Health Standards Commission (Aquatic Animals Commission). Australia’s official responses to the OIE are provided through Australia’s delegate, the Australian Chief Veterinary Officer.

In 2015, the Australian member of the OIE Aquatic Animals Commission was elected President of the commission at the OIE General Session in May. He participated in the two meetings of the commission in 2015 (February–March and October), and represented the OIE at the Third Global Conference on Aquatic Animal Health and an OIE aquatic focal point meeting in Ho Chi Minh City, Vietnam, in January. Representing the OIE Aquatic Animals Commission, he delivered a keynote address on the factors needed for success in managing emerging aquatic animal diseases at the 29th conference of the OIE Regional Commission for Asia, the Far East and Oceania in Ulaanbaatar, Mongolia, in September.

100 www.enaca.org (under ‘Publications’ on the right-hand bar, then ‘Health’)

101 www.agriculture.gov.au/animal/aquatic/international_activities

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101 www.agriculture.gov.au/animal/aquatic/international_activities