



Australian Government
Fisheries Research and
Development Corporation



Aquatic Animal Health Subprogram Research and Development Plan 2009 – 2012 (2009 ver 1.0)

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1 Introduction

This strategic R&D plan ('the Plan') of the Fisheries Research and Development Corporation's Aquatic Animal Health Subprogram ('the Subprogram') will guide the Subprogram to fulfill its objectives to provide leadership, direction and focus for aquatic animal health research and development (R&D) and other related non R&D activities. The Plan will assist the Subprogram in assessing aquatic animal health project applications. A compilation of current R&D issues is included.

This strategic R&D plan is a revision of the 2002-2008 Plan and is a 'working document'. It has been developed for a four-year period (2009-2012) after which a full review will be conducted.

However, the Plan will also be reviewed annually and amended accordingly.

The Plan:

- Describes the Subprogram including its role, objectives and structure;
- Describes criteria used in defining a project under the Subprogram;
- Outlines the key research areas;
- Will be used by the Subprogram to assist in assessing aquatic animal health project applications;
- Lists current R&D priorities; and
- Will be reviewed annually with wide stakeholder consultation.

2 Background

Australia's fisheries/aquaculture continues to be a major sector of our primary industries in terms of both job creation and value of production. The sector's capacity to contribute through export earnings and job creation especially in regional Australia is a vital part of our future prosperity. Australia is fortunate to have an aquatic animal sector free from many diseases that cause significant economic impact elsewhere in the world.

It is vital for Australia to maintain this relative disease-free status, not only to enhance our competitiveness but also to protect Australia's natural resources. However, Australia also has a unique and poorly understood range of endemic pathogens including local strain variations of pathogens of international concern, which is becoming increasingly important and of significance to our export trade. Examples include gill associated virus (GAV) in prawns, infectious hypodermal and haematopoietic necrosis virus (IHHNV) in prawns, *Bonamia* sp. in edible oysters, oedema oyster disease in pearl oysters, and abalone viral ganglioneuritis. This concern over endemic diseases and the lack of surveillance and diagnostic services has already compromised attempts to export live shellfish to the European Union. Such trade barriers, based on our lack of understanding of our own diseases, will continue to be imposed and provide an incentive to Australia to not only improve basic research knowledge on endemic disease agents but also, and more critically, to improve the quality control and thus international acceptance of our diagnostic and surveillance capacity. Furthermore, as aquaculture expands, the range of native aquatic animals being farmed is increasing which, in turn, increases the need for further research on aquatic animal health issues. In Australia there are about 70 aquatic species under aquaculture development of which 40 are farmed commercially. Research on all types of aquatic animals (finfish, crustaceans, molluscs and amphibians) from all types of environments i.e. tropical or temperate, marine, brackish or freshwater environments is required.

Industry and government have recognised the importance of an integrated and planned approach to aquatic animal health. This recognition led to an industry/government cooperative effort in developing *AQUAPLAN 1998-2003*, Australia's first five-year National Strategic Plan for Aquatic Animal Health, and its successor *AQUAPLAN 2005-2010*. *AQUAPLAN 1998-2003* was a comprehensive document describing initiatives ranging from border controls and import certification through to enhanced veterinary education and improved capacity to manage incursions of exotic diseases. The eight programs described in that plan represented a world first in proactive management of aquatic animal health. *AQUAPLAN 2005-2010* was developed on the basis of stakeholder prioritisation of more specific issues that our aquatic industries were to face during that five year period; it consists of seven discrete strategies:

- Enhanced Integration and Scope of Aquatic Animal Health Surveillance in Australia
- Harmonisation of Approaches to Aquatic Animal Health in Australia
- Enhancement of Aquatic Animal Emergency Disease Preparedness and Response Framework
- Education and Training in the Aquatic Animal Health Sector
- Welfare Standards for Aquaculture
- Appropriate Use of Therapeutics for Aquatic Animal Health Management
- Aquatic Animal Health Management as Part of Ecologically Sustainable Development

Whilst *AQUAPLAN 2005-2010* features seven discrete strategies, there are several themes that are common to all of them, including the recognition of the need for research and the adaptability of the plan to include emerging aquaculture industries. Compared to the terrestrial animal industries, the state of knowledge of aquatic animal health management is limited. Research has a critical role in expanding this knowledge and enhancing management practices to prevent disease or limit its impact on the expanding fisheries/aquaculture sector, including recreational fisheries and natural resources. During the *AQUAPLAN 1998-2003* and *2005-2010* tenures, responsibility for strategic research was embedded within the Aquatic Animal Health Subprogram.

3 Aquatic Animal Health Subprogram

The Subprogram was established by the Fisheries Research and Development Corporation (FRDC) in mid 2001 to provide a cohesive and national approach to aquatic animal health research and development in Australia, and in particular to address *AQUAPLAN 1998-2003* Program 6: Research and Development. The Subprogram has a national focus, consistent with international obligations.

3.1 Mission

“To provide leadership to aquatic animal health R&D and its adoption in Australia”.

3.2 Objectives

The Subprogram's key objectives are to:

1. Provide leadership, coordination, management and planning for aquatic animal health R&D;
2. Set and review national priorities of aquatic animal health research; and
3. Oversee the communication, extension and adoption of results of aquatic animal health research projects

3.3 Role

The role of the Subprogram is to:

- Implement the Subprogram strategic R&D Plan;
- Set R&D priorities to maximise investment in aquatic animal health, avoid duplication and achieve the greatest potential return;
- Invite R&D applications to address those priorities;
- Maximise collaboration between researchers, and between researchers, fisheries managers and fishing industry interests;
- Attract other R&D funding and influence the way in which other funding entities apply their investments in that field;
- Standardise on the best scientific methods;
- Communicate regularly with potential beneficiaries; and
- Influence the adoption of R&D results.

3.4 Outcomes

The Subprogram's activities will contribute to:

1. Reduced risk of a major disease impact on Australia's fisheries resources
2. Improved productivity and profitability of the fishing and aquaculture sectors
3. Market access/biosecurity/meeting international obligations
4. Improved standard/productivity of research and analysis
5. Cost-effective research and analysis
6. Increased awareness of aquatic animal health issues

3.5 Scope within FRDC

The scope of the Subprogram is 'health' with a focus on infectious diseases of aquatic animals. Thus the Subprogram is responsible for coordinating research projects that are funded by FRDC, that are aimed at addressing priorities within the field of aquatic animal health, and exclude issues concerning food safety or toxicology.

The Subprogram adopts a special responsibility for health-related research applications originating in industry sectors for which there is no other specific subprogram. In particular the Subprogram manages health-related projects on new or emerging aquatic animal species ('orphan species') for aquaculture.

In situations where a species-specific aquaculture subprogram exists¹, these subprograms are responsible for the prioritisation and management of any health related projects involving those specific species. The Subprogram provides advice on these health related projects where necessary.

The preferred process for submission and assessment of such applications is as follows:

1. The pre-proposal or full application is submitted to the species-specific subprogram which assesses its need and priority.
2. If supported by the species-specific subprogram, the pre-proposal or full application is forwarded to the Subprogram for advice on technical feasibility and merit.

¹E.g. Atlantic Salmon Aquaculture, Rock Lobster Propagation, Australian Southern Bluefin Tuna Industry Association

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3. The full application should gain support from both subprograms before submission to the FRDC Board for final assessment.
 4. If approved, the project is then managed by the species-specific subprogram; the Subprogram provides advice on milestone reports and the final report as required.

3.6 Scope and links with other bodies

The Subprogram consults on aquatic animal health R&D priorities and strategies with Animal Health Committee (AHC) - Australia's primary government advisory committee for policy, communication and awareness related to animal health. Consultation is primarily through AHC's Sub-committee on Aquatic Animal Health (SCAAH) and the National Industry Reference Group for Aquatic Animal Health (NAAHIRG).

3.7 Steering Committee

The Steering Committee (STC) comprises both government and industry representatives.

Amongst the key tasks of the STC are:

- To develop a Strategic R&D Plan which is reviewed on a regular basis.
- To ensure that research objectives are commercially focused and outcome driven.
- To coordinate industry and research provider involvement to maximise usage of available resources.
- To facilitate industry extension and technology transfer.

STC members

- *Industry members:* Justin Fromm²
Pheroze Jungalwalla³
Jonas Bryce Woolford⁴
- *Government Members:* Ingo Ernst⁵
Brian Jones⁶
- *FRDC member:* Crispian Ashby
- *Subprogram Leader:* Mark Crane⁷
- *Subprogram Coordinator:* Joanne Slater⁷

3.8 Scientific Advisory Committee

The Scientific Advisory Committee (SAC) consists of a small core group of specialists that may co-opt additional expert scientists as needed. The SAC members were chosen so that a veterinary perspective, an aquaculture perspective, as well as a government laboratory perspective is obtained.

Amongst the key tasks of the SAC are:

- To scientifically assess new research proposals, *inter alia* to ensure that the research proposed is scientifically feasible, and to advise the STC on new funding applications.

² National Aquaculture Council

³ Tasmanian Salmonid Growers Association

⁴ Wild catch fisheries South Australia

⁵ Aquatic Animal Health Unit, Australian Government Department of Agriculture, Fisheries and Forestry

⁶ SCAAH representative, Fish Pathologist, Department of Fisheries, Government of Western Australia

⁷ CSIRO Livestock Industries, Australian Animal Health Laboratory, Geelong

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- To advise on scientific problems with project progress as well as identify remedial action, to ensure scientific objectives and milestones are met.
 - To foster and develop collaboration amongst researchers.
 - To facilitate research extension and technology transfer.
 - To co-opt, as required, additional aquatic animal health experts to assist in the provision of advice.

SAC members

- Richard Whittington⁸
- Nick Moody⁷
- Barbara Nowak⁹

Thus, while full representation is not possible, within the current Steering Committee and Scientific Advisory Committee structure many of the major stakeholders are represented.

4 Stakeholders

The key stakeholders in the Subprogram, i.e. those beneficiaries that have the greatest stake in the success of the Subprogram and with whom the Subprogram consults to identify aquatic animal health R&D needs, are (in alphabetical order):

- Animal Health Committee (AHC)
- Australian Government Department of Agriculture, Fisheries and Forestry
- FRDC
- Major aquaculture industries (salmon, tuna, edible oysters, pearls, prawns)
- National Aquaculture Council
- RecFish Australia
- Research providers
- State/Territory Departments of Fisheries/Natural Resources/Agriculture

It is acknowledged that the list of beneficiaries is much longer, including e.g. the post-harvest industry, the ornamental fish industry, conservation interests, indigenous groups, pharmaceutical companies, research investors, extension services, consumers of seafood, and the public at large.

5 Methods

The Subprogram fulfils its role by:

- Being accountable for actions outlined in this strategic plan;
- Adopting a proactive approach to aquatic animal health;
- Adopting a holistic approach to aquatic animal health;
- Adopting clear directions and processes;
- Providing a focal point for research;
- Promoting a collaborative/cooperative R&D environment;
- Advocating the importance of aquatic animal health; and

⁸ Department of Farm Animal Health, Faculty of Veterinary Science, University of Sydney

⁹ National Centre for Marine Conservation and Resource Sustainability, University of Tasmania

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- Communicating with Fisheries Research Advisory Bodies (FRABs) and other FRDC subprograms on:
 - ⇒ Research pre-proposals and full project applications received by the Subprogram – informing and seeking comment by FRABs/subprograms;
 - ⇒ Subprogram assessment of research pre-proposals and full applications; and
 - ⇒ Advice sought on health related pre-proposals and full applications submitted to FRABs or other subprograms.

The STC and SAC assist the Subprogram in fulfilling its role and managing its projects.

5.1 FRDC R&D projects

The Subprogram follows the FRDC's standard operating procedures for project approval and management, especially regarding communication with other subprograms and FRABs.

5.2 Meeting Objectives

The Subprogram achieves its three key objectives through the following methods:

Objective 1: Provide leadership, coordination, management and planning for aquatic animal health R&D

A) Planning

- Establishment and annual review of strategic R&D plan (update; identify gaps)

B) Development of applications

Project applications submitted to the Subprogram:

- Commissioned, unsolicited or forwarded (by FRDC, FRABs or other subprograms, or by AHC and SCAAH as a result of *AQUAPLAN 2005-2010*)

C) Assessment of applications

- Determine whether application fits criteria¹⁰ (if not, provide advice/expertise/leadership)
- Evaluate need
- Evaluate feasibility
- Determine overall priority (against other applications)

D) Application funding

- Identify appropriate funding body/ies

E) Project management facilitation

- Assessment and execution of projects
- Communication/extension of results
- Encourage/facilitate adoption of results

F) Governance

- Reporting/accountability (FRDC)
- Structure (STC; SAC – expertise based)

H) Linkages

- Establish strategic alliances

¹⁰ See 6.1 below

Objective 2: Set and review national priorities of aquatic animal health research

- Establish current R&D issues in consultation with stakeholders, e.g. through the annual meetings of SCAAH
- Annual update of strategic R&D plan
- Full review of strategic R&D plan every 5 years

Objective 3: Oversee the communication, extension and adoption of results of aquatic animal health research projects

Develop a communication strategy that may include:

- *Health Highlights* (Subprogram newsletter)
- Scientific workshops (there have been several of these, convened to prioritise and facilitate a national approach to specific R&D problems); in addition the subprogram has sponsored four biennial National FRDC Aquatic Animal Health Conferences at which researchers have been able to present their work.
- Website
- Provide scientific advice and communication to other subprograms and FRABs regarding aquatic animal health research pre-proposals, applications, projects and results
- Databases

6 Research and Development

This section outlines the criteria used to determine whether a project falls within the Subprogram. Key research areas for the Subprogram are listed as a guide for applicants in developing projects for funding under the Subprogram.

6.1 Criteria

The following criteria are used to define a project under the Subprogram:

- Exotic or endemic aquatic animal disease of potential infectious aetiology, with potential or existing significant impact on Australian fisheries and aquaculture (includes also capture fisheries, recreational fisheries, indigenous fisheries and/or aquatic ecosystems)
- Emergency disease of national significance (e.g. based on Australia's *National List of Reportable Diseases of Aquatic Animals*)
- Addresses gaps in existing aquatic animal health research and contributes to the future understanding of aquatic animal diseases and their control (including diseases of new or potential species for aquaculture)
- Leads to increased productivity and/or profitability the Australian fisheries and aquaculture by improving the health status of target aquatic animals
- Facilitates collaborative research to avoid duplication or gaps
- Facilitates capability and capacity development within Australia
- Identified as a stakeholder priority (including industry, government and research stakeholders)
- Addresses R&D needs identified in *AQUAPLAN 2005-2010* or a successor strategy

6.2 Key research areas

When developing project applications for funding through the Subprogram, the outcomes of the project should address at least one of these key research areas. Current priorities for AAHS in the next funding cycle are listed under pertinent areas.

6.2.1 Nature of disease and host-pathogen interaction

SCOPE

- Improved knowledge of the biology of disease agents (including epizootiology, taxonomy of pathogens, pathophysiology, histology, etc)
- Improved knowledge on the host response to disease agents (aquatic animal immunology and immunomodulators)
- Knowledge about new and emerging infectious diseases
- Knowledge about disease translocation risk factors.

CURRENT PRIORITIES

- *Perkinsus* – How many species are in Australia? Do they all grow in thioglycolate medium?
- *Streptococcus spp.* – epizootiology
- Risk assessment of domestic bait translocation
- Immunology of aquatic invertebrates

6.2.2 Aquatic animal health management

SCOPE

- R&D to inform risk analyses (including disease risk minimisation procedures for exported and imported aquatic animals and products)
- R&D to facilitate inter-jurisdictional harmonisation of domestic and international approaches (common tests, common protocols (e.g. translocation), common certification)
- Development of protocols, methods and operational instruments to manage routine biosecurity and also emergency aquatic animal disease outbreaks
- Methods of aquatic animal product treatments to prevent spread of disease (sterilisation, disinfection and decontamination)

CURRENT PRIORITIES

- Research on safety of imported species/products
- R&D to support proficiency testing
- Development of guidelines for minimum biosecurity requirements in closed, semi-closed, semi-open and open systems

6.2.3 Endemic and exotic aquatic animal disease diagnostics

SCOPE

- Review and assessment of existing screening and diagnostic tests, and those under development
- Development of sampling methodology to detect sub-clinical infections at low levels of prevalence

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- Development of case definitions and diagnostic criteria
 - Development and validation of screening tests and diagnostic tests
 - Facilitate transfer of knowledge and technology in aquatic animal diagnostics
 - R&D to support QA for diagnostic services

CURRENT PRIORITIES

- Effects of sample pooling, processing, nucleic acid extraction, presence of non-target nucleic acid on test results
- Diagnostics for agents of national/international significance

6.2.4 Surveillance and monitoring

SCOPE

- Support projects to enhance existing surveillance and monitoring programs and those under development
- Research into aquatic animal disease surveillance methodology
- Strategic R&D to inform disease control programs, translocation, zoning, surveillance and monitoring, and risk analyses in relation to disease organisms

CURRENT PRIORITIES

- Iridoviruses/ranaviruses
- Development of a national guidelines/strategy framework to ensure effective passive surveillance of aquatic animals, especially those under culture
- Development/establishment of cell culture systems for the isolation of viruses from tropical marine finfish

6.2.5 Aquatic animal disease therapy and prophylaxis

SCOPE

- Vaccine development for aquatic animals
- Improved use of veterinary medicines for aquatic animal health management
- Alternative therapies

CURRENT PRIORITIES

- Research to support the development of commercial vaccines for significant production diseases
- Delivery of therapeutics

6.2.6 Training and capacity building

SCOPE

- Human capital development
- Facilitate the development of training and extension tools
- Sustain and further develop technical skill-base in aquatic animal health
- Facilitate R&D knowledge transfer in aquatic animal health

CURRENT PRIORITIES

- Support continuing education with particular reference to practising aquatic animal health professionals
- Support development of national information systems with training functionality (e.g. ABIN), including by capturing and training materials in digital form with appropriate instructional design

6.3 The application process

A general guide to developing research proposals for submission to FRDC is provided on the FRDC Website (<http://www.frdc.com.au/research/applying-for-funding>) and should be followed. The following guide is specific for submissions directed at the FRDC Aquatic Animal Health Subprogram during the normal funding cycle (and not the Tactical Research Funding proposals). In addition, PIs may contact any of the AAHS committee members to obtain advice of the relevance of any project idea to the AAHS.

In the sections that require text, it may be useful to draft these using your normal word-processor (e.g. MS Word) so that you can use tools such as spell-check and word-count and then copy and paste the final text into the on-line application. Thus poor presentation will not distract reviewers from the proposal content.

The AAHS has made slight modifications to the process by which it invites and evaluates research applications. With these modifications it is anticipated that there will be improved communication between research providers and the Subprogram which should facilitate preparation of high quality project applications that meet national priorities. This modified process is summarised below.

6.3.1 The time-line

The project development and review process for new proposals will normally take up to 12 months, according to the following schedule:

By February: AAHS R&D Plan 2009-2012 and call for preproposals sent out to research providers.

March: Preproposals submitted to AAHS for review and comment. AAHS teleconference to consider preproposals.

April: AAHS feedback on preproposals forwarded to PIs.

June: First draft full proposals submitted by PIs to AAHS for review and comment.

July: AAHS face-to-face meeting to consider draft full proposals. AAHS feedback on draft full proposals forwarded to PIs.

August: Second draft full proposals that address AAHS comments submitted by PIs to AAHS for review and comment.

September: AAHS teleconference to consider second draft full proposals. AAHS feedback on draft full proposals forwarded to PIs.

By 1 November: PIs to submit finalised full proposals to FRDC (hard-copies and on-line using FishNET).

December: AAHS face-to-face meeting to prioritise research proposals and provide FRDC Board with evaluations.

Projects would normally commence at the start of the next financial year unless approval for an early start has been obtained.

1. Research Preproposals

A call for research preproposals is forwarded by the AAHS Leader to research providers in the first half of the year preceding the commencement year of the proposed project. For example, in February 2010 a call for research preproposals for projects to commence in 2011 (usually after 1 July 2011) will be sent out by the Aquatic Animal Health Subprogram. In this notice, research providers will be instructed to submit the preproposal using FishNET (<http://www.frdc.com.au/research/fishnet-for-applicants>) by a specific closing date. A copy of the current AAHS R&D Plan will also be provided. The preproposal is approximately two pages in length in its printed form and provides the following details:

Project Title

To clarify that the project is to be considered within the AAHS, the project title should begin with “Aquatic Animal Health Subprogram:” followed by a concise title, for example: “Aquatic Animal Health Subprogram: Establishment of Diagnostic Expertise for Detection and Identification of Red Sea Bream Iridovirus (RSIV)”

Principle Investigator details

Name, affiliation and current contact details

Start and Finish Date

The start date of projects is usually no earlier than 1 July (i.e. start of the following financial year). Please note that it does take some time for contract preparation and this needs to be taken into consideration in the planning stage. If an early start is required/desirable, this needs to be justified (e.g. availability of aquatic animals of a specific age that are required for the project).

Project Budget (indicative)

This needs to be a realistic indicative budget noting that one of the evaluation criteria for project proposals is “value for money”.

Challenge

The Principal Investigator (PI) identifies the FRDC challenge to be addressed from a drop-down menu.

Need

The project needs to be a high priority, will usually have a national focus and a means of funding other than FRDC AAHS may not be available. The AAHS R&D Plan provides a guide to the high priority areas in aquatic animal health. Project proposals outside the scope of the AAHS R&D Plan are likely not to be considered.

Objectives

For a three-year project, usually up to 6 objectives describing in a single phrase/sentence what (not how or why) will be achieved are included here, e.g. objectives beginning with either “Determine”, “Assess” or “Develop” usually provide a good description of what is to be achieved.

Consultation

Evidence of consultation with the end-users or beneficiaries (e.g. industry sectors, government departments) is required demonstrating their involvement in the development of the project proposal. Letters of support will be required either at this stage or at the full proposal stage. Indication that beneficiaries will provide in-kind and, even better, cash contributions are examples of strong support of a project.

Planned Outcomes and Benefits

These are not the outputs (such as a diagnostic procedure) but are the outcomes and benefits that follow on (from, for example, having the diagnostic procedure established).

Methods

This is an important section by which the AAHS assesses the scientific basis and feasibility of the project. While there is limited space for detailed methodology in the preproposal, the AAHS needs to be able to determine from this section how the objectives are to be achieved.

Related Projects and Research Capability

The PI needs to demonstrate that he/she is familiar with this field of research such that the proposed project does not replicate previous or currently active research funded by FRDC or by any other source(s). The PI needs to demonstrate that the research team has the expertise and resources to carry out the research. Collaborative projects taking advantage of expertise/resources residing in more than one organisation are encouraged.

Flow of Benefits

The fishery(ies) and sector(s) benefiting from the proposed research are identified in this section.

Preproposal evaluation and comments to PIs

The preproposals will be reviewed and evaluated by AAHS committee members in March and letters will be forwarded to the PIs as soon as possible following AAHS review. The letter will contain AAHS' comments and, in particular, whether the project idea is or is not considered a priority within the current AAHS R&D Plan. It is understood that preparation of a full proposal is onerous and time-consuming and the PI should consider whether a full proposal is justified if the AAHS has clearly stated that it does not consider the project a high priority.

If the AAHS does consider the project a priority it will be clearly stated in the letter together with feedback to assist the PI in preparing a full proposal. In addition, the date of the AAHS meeting at which the draft full proposals will be reviewed will be provided to the PIs in the letter. The AAHS may wish to contact the PI by telephone during this meeting to discuss the proposal; thus, following receipt of the letter, the PI should inform the Subprogram Coordinator of the PI's availability and contact telephone number on that date.

2. First Draft Full Proposal

As stated previously, in the sections that require text, it may be useful to draft these using your normal word-processor (e.g. MS Word) so that you can use tools such as spell-check and word-count and then copy and paste the final text into the on-line application. Thus poor presentation will not distract reviewers from the proposal content.

The first draft full proposals will need to be completed (on-line using FishNET) BUT NOT FINALISED by the end of June so that the AAHS members can review them at the July meeting of AAHS. It is in the draft full proposal where the PI can expand the project detail and include a fully justified project budget. Strong support (in-kind and/or cash contributions are indicators of strong support) from end-users/beneficiaries is required and is detailed in the ***consultation*** section.

The ***background*** and ***need*** sections of the proposal should demonstrate the significance of the project and should include references to the scientific literature. For example:

- ◆ The PI needs to show that the proposal is within the scope of the AAHS R&D Plan
- ◆ The longer term or strategic impacts of the project are documented
- ◆ It needs to be clearly stated that the project is of national significance

Thus the proposed *objectives* must fit the need and the detailed *methods* need to address the objectives and should include references to the scientific literature. There should be sufficient detail to allow scientific assessment of the methodology. It is acknowledged that some good projects will be difficult/ambitious, may not be 100% successful but are nevertheless worthwhile funding due to the potential benefit/outcomes.

In the *related projects and research capacity* section the PI needs to demonstrate that he/she is familiar with this field of research such that the proposed project does not replicate previous or currently active research funded by FRDC or by any other source(s). The PI needs to demonstrate that the research team has the expertise and resources to carry out the research. The publication record of individual/team, including reference to any previous FRDC projects undertaken by the team, would be useful to include here. Collaborative projects taking advantage of expertise/resources residing in more than one organisation are encouraged.

When developing the budget this should be as accurate as possible and fully justified, for example \$30,000.00 for molecular reagents or \$10,000.00 for travel is not sufficient justification. Rounding to the nearest \$1000 is not appropriate. Justification of travel, for example, needs to include what type of travel, to where and for what purpose. Both in-kind and cash contributions need to be detailed. PIs should note the special section on cash contributions (this is cash *per se* - not in-kind contributions). It is also acknowledged that sometimes methods can be expensive and, while budgets can sometimes be considered too high, there may be instances when the budget is under-estimated for the objectives/methods. Thus the budget is not an estimate but is well-developed and as accurate as possible.

Milestones need to be assessable with respect to real scientific progress – not merely progression along a time-line – and should be set accordingly i.e. milestone dates should be set for when real scientific progress is made and not, for example, 6-monthly which may be convenient for accounting purposes.

As indicated above, the PI may be contacted during the AAHS July meeting to discuss the proposal and to provide the PI an opportunity to clarify any issues raised by AAHS.

Draft full proposal evaluation and comments to PIs

The draft full proposals will be reviewed and evaluated by AAHS committee members in July and letters will be forwarded to the PIs as soon as possible following AAHS review. The letter will contain AAHS' comments with respect to the proposals strengths and weaknesses including recommendations for specific revisions to be addressed by the PI in a second draft full proposal. Special conditions relating to methodology or objectives may also be included.

3. Second Draft Full Proposal

As indicated above, the evaluation letter may include specific recommendations to improve the proposal and it is expected that the PI will address these in a second draft full proposal to be submitted (by revision of the first draft full proposal in FishNET) BUT NOT FINALISED. A second version of the draft full proposal, which should address the committee's comments on the first draft, should be submitted to AAHS by 1st September for further review and comment. It is anticipated that most issues will have been addressed and this final review of the draft full proposal is to fine-tune the proposal for submission to the FRDC by 1st November.

Draft full proposal evaluation and comments to PIs

The second draft full proposals will be reviewed and evaluated by AAHS committee members in September and letters will be forwarded to the PIs as soon as possible following AAHS review. The letter will contain AAHS' comments with respect to previous

recommendations/specific revisions that should have been addressed by the PI, and any final remarks.

4. Final Full Proposal

The final full proposal should be submitted to FRDC according to the guidelines found on the FRDC website (<http://www.frdc.com.au/research/applying-for-funding>) and now finalised as directed. All aquatic animal health related full proposals will be prioritised by AAHS at a meeting in December and recommendations submitted to FRDC.

There are four main criteria used to assess applications at this stage:

1. The significance of the project and whether it is of local or national priority
2. The track record of the research team
3. The likelihood of the project achieving the objectives
4. Value for money

While these criteria are used for prioritising the full proposals, the PIs should keep these criteria in mind when preparing even the preproposals since they do have this significance at the prioritising stage.

7 Current and completed projects within the Aquatic Animal Health Subprogram

Projects are listed according to the most relevant key research areas and as such some projects may be listed more than once because they are relevant to more than one key research area.

7.1 Nature of disease and host-pathogen interaction

2002/043: The production of nodavirus-free fish fry and the nodaviruses natural distribution (Ian Anderson, QDPI&F) Sep 2008.

2002/044: Pilchard herpesvirus infection in wild pilchards (Brian Jones, Fisheries WA) Oct 2006.

2004/084: Investigating and managing the *Perkinsus*-related mortality of blacklip abalone in NSW Phase 1 (Geoff Liggins, NSW DPI) TBA.

2006/062: Identification of host interactions in the life-cycle of QX disease (Rob Adlard, Qld Museum) May 2008

2007/225: Metazoan parasite survey of selected macro-inshore fish of southeastern Australia, including species of commercial interest (Kate Hutson, U. Adelaide) TBA.

2008/031: Investigation of Chlamydiales-like organisms in pearl oysters, *Pinctada maxima* (Brian Jones, Fisheries WA) TBA.

2008/041: Tools for investigation of the nodavirus carrier state in marine, euryhaline and freshwater fish and control of NNV through integrated management (Richard Whittington, U. Sydney) TBA.

7.2 Aquatic animal health management

2001/214: Development of a disease zoning policy for marteiliosis to support sustainable production, health certification and trade in Sydney rock oyster (Rob Adlard, Qld Museum) Nov 2005.

2001/660: Enhancement of Emergency Disease Management Capability in the Queensland Department of Primary Industries and the Redclaw Crayfish (*Cherax quadricarinatus*) industry (Iain East, DAFF) Mar 2002.

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- 2002/600: Facilitating the establishment of the Aquatic Animal Health Consultative Committee (AAHCC) as the primary industry/government interface for aquatic animal health (Eva-Maria Bernoth, DAFF) Jun 2004.
- 2002/640: Viral Haemorrhagic Septicaemia (VHS) – A Disease Strategy Manual (Paul Hardy-Smith, Panaquatic Health Solutions) Jun 2004.
- 2002/641: Crayfish plague - disease strategy manual (Fran Stephens, Aquatila Healthcare) Mar 2004.
- 2002/643: Viral encephalopathy and retinopathy – disease strategy manual (Barry Munday, IDEXX) Dec 2003.
- 2002/647: Development of the AQUAVETPLAN disease strategy manual for white spot disease of prawns (Chris Baldock, AusVet Services) Mar 2004.
- 2002/651: Whirling Disease – A Disease Strategy Manual (Paul Hardy-Smith, Panaquatic Health Solutions) Jun 2004.
- 2002/652: Victoria’s arrangements for the management of aquatic animal disease emergencies (Anthony Forster, DPI Vic) Dec 2003.
- 2002/653: AQUAVETPLAN aquatic disease disinfection manual (Kevin Ellard, Livestock & Aquaculture Veterinary Consulting Services) Mar 2006.
- 2002/661: Enhancing the emergency disease response capability of NSW and Qld Government agencies and industry bodies associated with oyster culture (Matt Landos, NSW Fisheries) Mar 2004.
- 2002/665: Enhancement of the emergency disease management capability in Victoria – adapting Victoria’s arrangements for the management of aquatic animal disease emergencies (Anthony Forster, Fisheries Victoria) Jun 2004.
- 2002/668: Enhancing the emergency disease response capability of the Western Australian Department of Fisheries and industry bodies associated with non-maxima oyster culture (Brian Jones, Fisheries WA) Mar 2004.
- 2003/216: Detection and management of yellowtail kingfish (*Seriola lalandi*) health issues (Mark Shepperd, Sakana Vet Services) Oct 2005.
- 2003/640: Subprogram conference “emergency disease response planning and management” (Mark Crane, AFDL, CSIRO LI) May 2004.
- 2003/641: Development of the Control Centres Manual for managing aquatic animal disease emergencies in Queensland (Tiina Hawkesford, QDPI&F) Jan 2004.
- 2003/644: NSW aquatic animal diseases Control Centres Manual (Damian Ogburn, NSW Fisheries) Jun 2004.
- 2003/648: The revision of the Tasmanian fish health plan and incorporation into the Tasmanian control centre manual (Mary Lou Conway, DPIWE Tas) Mar 2004.
- 2003/649: Industry’s emergency preparedness and response to mass mortality of yellowtail kingfish *Seriola lalandi*: development of plans and protocols (Mark Shepperd, Sakana Vet Services) TBA.
- 2003/650: Update of the AQUAVETPLAN Enterprise Manual (semi-open systems) (Jo Sadler) Dec 2003.
- 2003/670: Emergency response microalgal identification for the finfish aquaculture industry (Judith-Anne Marshall, U. Tasmania) May 2004.
- 2003/671: Enhancing the emergency disease response capability of the Western Australian Department of Fisheries and industry bodies associated with freshwater crayfish (Fran Stephens, Fisheries WA) May 2004.

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- 2004/080: Development of a national translocation policy using abalone and prawns as templates for other aquatic species (Brian Jones, Fisheries WA) Oct 2006.
- 2005/620: Development of national investigation and reporting protocols for fish kills in recreational and capture fisheries (Barbara Nowak, U. Tasmania) Jun 2005.
- 2005/640: Technical guidelines for the translocation of live aquatic animals (Brian Jones, Fisheries WA) Dec 2005.
- 2006/243: Development of management strategies for herpes-like virus infection of abalone (Mehdi Doroudi, DPI Victoria) May 2009.

7.3 Endemic and exotic aquatic animal disease diagnostics

- 1999/226: Generation of diagnostic reagents for pilchard herpes virus (Bryan Eaton, AAHL, CSIRO) Jun 2002.
- 2001/620: Development of improved procedures for the identification of aquatic birnaviruses (Mark Crane, AFDL, CSIRO LI) Apr 2004.
- 2001/621: Molecular diagnostic tests to detect epizootic ulcerative syndrome (*Aphanomyces invadans*) and crayfish plague (*Aphanomyces astaci*) (Nicky Buller, Agriculture WA) Jun 2004.
- 2001/624: Development of diagnostic procedures for the detection and identification of *Piscirickettsia salmonis* (Mark Crane (AFDL, CSIRO LI) Apr 2004.
- 2001/625: Development of diagnostic capability for priority aquatic animal diseases of national significance: Spawner-isolated mortality virus (Leigh Owens, JCU) Apr 2004.
- 2001/626: Development of diagnostic tests for the detection of nodavirus (Nick Moody, QDPI&F) Aug 2004.
- 2001/628: Vibrios of aquatic animals: Development of a national standard diagnostic technology (Jeremy Carson, DPIWE Tas) Dec 2006.
- 2001/630: Validation of DNA-based (PCR) diagnostic tests suitable for use in surveillance programs for QX disease of Sydney rock oysters (*Saccostrea glomerata*) in Australia (Rob Adlard, Qld Museum) Jun 2003.
- 2003/620: Establishment of diagnostic expertise for detection and identification of red sea bream iridovirus (RSIV) (Mark Crane, AFDL, CSIRO LI) Jun 2006.
- 2003/621: Development of diagnostic and reference reagents for epizootic haematopoietic necrosis virus of finfish (Richard Whittington, U. Sydney) Jun 2004.
- 2003/622: Development of molecular diagnostic expertise for the mollusc pathogen *Bonamia* sp. (Serge Corbeil, AFDL, CSIRO LI) Jun 2004.
- 2004/091: Further research and laboratory trials for diagnostic tests for the detection of *A. invadans* (EUS) and *A. astaci* (crayfish plague) (Nicky Buller, Agriculture WA) Jun 2007.
- 2006/064: Development of diagnostic tests to assess the impact of *Haplosporidium* infections in pearl oysters (Philip Nicholls, Murdoch U.) Nov 2009.
- 2007/006: Development of molecular diagnostic procedures for the detection and identification of herpes-like virus of abalone (*Haliotis* spp.) (Mark Crane, AFDL, CSIRO LI) Nov 2009.
- 2007/007: Validation of PCR tests for diagnosis of megalocytivirus (gourami iridovirus) (Richard Whittington, U. Sydney) May 2009.
- 2008/030: Development of a DNA microarray to identify markers of disease in pearl oysters (*Pinctada maxima*) and to assess overall oyster health (Brian Jones, Fisheries WA) TBA.

7.4 Surveillance and monitoring

- 2001/630: Validation of DNA-based (PCR) diagnostic tests suitable for use in surveillance programs for QX disease of Sydney rock oysters (*Saccostrea glomerata*) in Australia (Rob Adlard, Qld Museum) Jun 2003.
- 2003/622: Development of molecular diagnostic expertise for the mollusc pathogen *Bonamia* sp. (Serge Corbeil, AFDL, CSIRO LI) Jun 2004.
- 2006/064: Development of diagnostic tests to assess the impact of *Haplosporidium* infections in pearl oysters (Philip Nicholls, Murdoch U.) Nov 2009.
- 2007/225: Metazoan parasite survey of selected macro-inshore fish of southeastern Australia, including species of commercial interest (Kate Hutson, U. Adelaide) TBA.
- 2008/031: Investigation of Chlamydiales-like organisms in pearl oysters, *Pinctada maxima* (Brian Jones, Fisheries WA) TBA.
- 2008/030: Development of a DNA microarray to identify markers of disease in pearl oysters (*Pinctada maxima*) and to assess overall oyster health (Brian Jones, Fisheries WA) TBA.

7.5 Aquatic animal disease therapy and prophylaxis

- 2007/226: Rapid strain identification of the bacterial fish pathogen *Streptococcus iniae* and development of an effective polyvalent vaccine for Australian barramundi (Andy Barnes, U. Queensland) TBA.

7.6 Training and capacity building

- 2001/093: Strategic planning, project management and adoption (Eva-Maria Bernoth, DAFF) Jun 2004.
- 2002/645: Aquatic animal health exotic diseases training manual (Shane Raidal, Murdoch U.) Jun 2004.
- 2002/654: Development of a training course on exotic diseases of aquatic animals (Ken McColl, AFDL, CSIRO LI) Jun 2004.
- 2002/655: Design and organisation of a multi-state disease emergency simulation exercise (Iain East, DAFF) Jan 2004.
- 2002/660: Enhancement of emergency disease management through the education and training of the CCEAD participants on the CCEAD process (Lynda Walker, DAFF) Feb 2004.
- 2002/664: Aquatic animal health emergency management training and incident simulation (Melanie Ryan, Seafood Training SA) Jun 2004.
- 2002/666: Training course on exotic diseases of aquatic animals (Mark Crane, AFDL, CSIRO LI) Jun 2004.
- 2003/642: Revision and expansion of the *Australian Aquatic Animal Disease Identification Field Guide* for publishing to CD-Rom (Alistair Herfort, DAFF) Nov 2004.
- 2003/645: The development of media tools to increase the awareness of aquatic animal diseases (Wayne Tindall, Big Time Solutions) Aug 2005.
- 2003/646: Database of diseases and pathogens of Australian aquatic animals (Gustad Boman, F1 Solutions) Jul 2004.
- 2003/647: Development of a database for Australian laboratory diagnostic expertise for diseases of aquatic organisms (Iain East, DAFF) Mar 2004.
- 2003/669: Conduct of a multi-jurisdictional simulation exercise focused on health management in Australian aquaculture (Iain East, DAFF) Apr 2004.

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- 2004/079: Strategic planning, project management and adoption (Mark Crane, AFDL, CSIRO LI) Nov 2008.
- 2005/621: Establishment of a national aquatic animal health diagnostic network (Richard Whittington, U. Sydney) Dec 2006.
- 2005/641: Current and future needs for aquatic animal health training and for systems for merit-based accreditation and competency assessments (Brian Jones, Fisheries WA) Mar 2007.
- 2008/039: Strategic planning, project management and adoption (Mark Crane, AFDL, CSIRO LI) TBA.
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8 Further information

- **Aquatic Animal Health Subprogram website:**

Go to the FRDC website www.frdc.com.au and follow the links:

Research and Development/Subprograms/Aquatic Animal Health Subprogram

- **Department of Agriculture, Fisheries and Forestry website:**

www.daff.gov.au/aquaticanimalhealth

- **Contact Aquatic Animal Health Subprogram:**

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