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From the Subprogram Leader

Planning for the 2nd FRDC Aquatic Animal Health Subprogram Scientific Conference to be held in Cairns on 26-28 July 2005 is almost complete. The draft program is included in this newsletter. Please let me know immediately if you believe that there is an error in the draft program such as typographical errors or omissions.

In addition, the Subprogram R&D Plan has been reviewed and up-dated. The latest version is also included in this newsletter. Most of you will be aware by now that new research preproposals for submission to the FRDC Aquatic Animal Health Subprogram (AAHS) should align with this plan and be submitted by 5 August 2005. It is important that research proposals have strong support from industry and the relevant State(s) FRAB(s). Thus research providers are urged to obtain letters of support from industry and the relevant FRAB for any new proposal. The preproposals will be reviewed by the AAHS Steering and Scientific Advisory committees at their next meeting scheduled in August.

AAHS Steering Committee

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AAHS Scientific Advisory Committee

The Scientific Advisory Committee includes the following core members with other researchers included, as needed:

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Current Activities

Apart from completing arrangements for the Cairns event, the Subprogram is very keen to finalise projects remaining from the 2001-2004 Subprogram period. Please cooperate with FRDC to ensure that these projects are finalised as soon as possible.

STC and SAC Meeting

The next Steering Committee and Scientific Advisory Committee will be held in Melbourne on 24 August 2005. At this meeting the committees will discuss research preproposals submitted to AAHS and make recommendations on the submitted applications which will be forwarded to the Principal Investigators by the end of August. The next important date is the **deadline for submission of draft full proposals which is 23 September.**

These will be reviewed early in October and comments returned to PIs in time for ***submission to FRDC by 1 November 2005. Please note that the date for submission to FRDC has been brought forward from 1 December to 1 November.***

Health Subprogram Website

Our website is located of the FRDC site and can be accessed directly under:

<http://www.frdc.com.au/research/programs/aah/index.htm>

There you can view this issue and all previous issues of Health Highlights.

Announcements

All final reports are available through the FRDC at a cost. Go to www.frdc.com.au to purchase a copy.

Conferences/Workshops

The Fisheries Research and Development Corporation (FRDC) Aquatic Animal Health Subprogram Scientific Conference

Date: 26-28 July, 2005

Venue: Cairns, QLD

The Fisheries Research and Development Corporation (FRDC) Aquatic Animal Health Subprogram is holding a Scientific Conference at Rydges Esplanade Resort Cairns on 26-28 July 2005. The Draft Conference Program is included in this newsletter.

Newsletter submissions

The Aquatic Animal Health Subprogram welcomes contributions to *Health Highlights* on all aquatic animal health R&D news and events – both within and outside the FRDC. We aim to assist the widespread exchange of information by including any of the following in each quarterly edition: project updates, milestone reports, final reports, research papers, project communication and extension outputs, info sheets, and letters to the editor. Announcements of conferences, workshops, meetings, etc are also welcome.

**Please forward contributions to the next edition of *Health Highlights*
to Joanne Slater before 31 August 2005**

Mailing list

Health Highlights is distributed quarterly to stakeholders via hard copy and email as well as being posted on the FRDC website at: <http://www.frdc.com.au>. To be included on the *Health Highlights* mailing list, contact:

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Summary of Active Projects

FRDC Project No.	Project Title	Principal Investigator
2002/043	Aquatic Animal Health Subprogram: the production of nodavirus-free fish fry and the nodaviruses natural distribution <i>Associated species:</i> Barramundi and other marine finfish species	Dr Ian Anderson Department of Primary Industries, Queensland Phone: 07 4722 2610 Email: ian.anderson@dpi.qld.gov.au
2002/044	Aquatic Animal Health Subprogram: pilchard herpes virus infection in wild pilchards <i>Associated species:</i> Pilchards	Dr Brian Jones Department of Fisheries, WA Phone: 08 9368 3649 Email: bjones@acric.wa.gov.au
2003/620	Aquatic Animal Health Subprogram: establishment of diagnostic expertise for detection and identification of red sea bream iridovirus (RSIV) <i>Associated species:</i> finfish	Dr Mark Crane CSIRO Livestock Industries AAHL Fish Diseases Laboratory Phone: 03 5227 5118 Email: mark.crane@csiro.au
2002/653	Aquatic Animal Health Subprogram: Aquavet aquatic disease disinfection manual	Dr Kevin Ellard DPIWE Tasmania
2001/628	Aquatic Animal Health Subprogram: vibrios of aquatic animals: development of a national standard diagnostic technology	Dr Jeremy Carson DPIWE Tasmania

2003/645	Aquatic Animal Health Subprogram: the development of media tools to increase the awareness of aquatic animal diseases	Mr Wayne Tindall
2003/649	Aquatic Animal Health Subprogram: industry's emergency preparedness and response to mass mortality of yellowtail kingfish <i>Seriola lalandi</i> : development of plans and protocols	Mr Mark Sheppard
2001/214	Aquatic Animal Health Subprogram: development of a disease zoning policy for marteiliosis to support sustainable production, health certification and trade in the Sydney rock oyster	Dr Robert Adlard
2001/621	Aquatic Animal Health Subprogram: molecular diagnostic tests to detect epizootic ulcerative syndrome (<i>Aphanomyces invadens</i>), and crayfish plague (<i>Aphanomyces astaci</i>)	Ms Nicky Buller
2004/079	Aquatic Animal Health Subprogram: Strategic planning, project management and adoption	Dr Mark Crane

Subprogram Contact Details

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The Second FRDC Aquatic Animal Health Subprogram Scientific Conference

The Rydges Esplanade Resort, Cairns
26-28 July 2005

CONFERENCE PROGRAM (DRAFT)

DAY 1 Tuesday 26 July

8.30 Registration

9:00 Welcome Mark Crane

9.15 Mollusc Health. Chair: Judith Handler & Serge Corbeil

9.20 Diseases of commercially exploited abalone species – findings from a national survey. J. Handler, R. Callinan, J. Creeper, M. Forsyth, M. Landos, R. Loh, M. Lancaster, P. Phillips, S. Pyecroft & F. Stephens.

9.40 Real time TaqMan PCR assay for the detection of mollusc parasites. S. Corbeil, I. Arzul, B. Diggles, M. Heasman, B. Chollet, FCJ. Berthe & MStJ. Crane.

10.00 QX disease – distribution, biology and management. RD. Adlard.

10:20 *Tea Break*

10:50 Crustacean Health. Chair: Brian Jones & Leigh Owens

11.00 Refining our understanding of the gill-associated virus and Mourilyan virus in eastern Australian prawns. JA. Cowley, Rajendran KV, RJ. McCulloch & PJ. Walker.

11.20 The use of different tissues and preservation methods to determine the presence of SP70 in salinity-stressed tiger prawn (*Penaeus monodon* Fab). C. Kokarkin Soetrisno & L. Owens.

11.40 Characterisation of hepatopancreatic parvovirus (HPV) isolated from Australian *Penaeus merguensis*. K. La Fauce, J. Elliman & L. Owens.

12.00 The effect of gill-associated virus on the production of *Penaeus monodon* and a comparison of alternative tests for detection. J. Munro & L. Owens.

12.20 Effects of coastal pollutants on western king prawns (*Melicertus latisulcatus*) in South Australia. S. Roberts.

12:40 *Lunch*

1:30 Bacteriology. Chair: Richard Whittington & Mark Crane

1.40 Tropical aquatic micro-organisms. A. Thomas.

2.00 Bacterial pathogens of temperate aquatic animals. N. Buller.

2.20 Epitheliocystis - villain or bystander? B. Nowak.

2.40 Information Workshop. Chair: Patrick Hone & Mark Crane

2.45 Introduction to Information workshop – M. Crane.

2:50 AAHS and DAFF Funding. P. Hone.

3:10 FRDC Aquatic Animal Health Subprogram: Establishment of a national aquatic animal health diagnostic network. M. Landos.

3.30 *Tea Break*

3.50 FRDC AAH Subprogram: Current and future needs for aquatic animal health training and systems for merit-based accreditation and competency assessments. M. Landos.

4.10 Aquafin CRC health program. B. Nowak.

4.30 NAAH TWG. B. Jones.

4.50 ARC funding processes. A. Johnson.

5:15 *Happy Hour*

DAY 2 Wednesday 27 July

9:00 Keynote Lecture I. Recent advances in elucidating the cytokine network of fish. Chris Secombes

10:00 *Tea Break*

10:30 AGD. Chair: Chris Prideaux & Barbara Nowak

10.40 An introduction to amoebic gill disease of Atlantic salmon (*Salmo salar* L.). M. Adams, P. Crosbie, R. Morrison & B. Nowak

11.00 Oral mucolytic drugs and their protective effects against amoebic gill disease in salmonids. M. Powell, S. Roberts, R. Duijf, J. Burgess & M. Barney.

11.20 Examination of the efficacy and toxicity of bithionol as a bath treatment for Atlantic salmon *Salmo salar* L. and rainbow trout *Oncorhynchus mykiss* affected by amoebic gill disease. RL. Florent & MD. Powell.

11.40 Identification of differentially expressed genes in amoebic gill disease (AGD) affected Atlantic salmon (*Salmo salar* L.). R. N. Morrison, A. R. Bridle, G. A. Cooper, B. Koop, B. F. Nowak

12.00 Are certain MH alleles associated with resistance to AGD? JW. Wynne, MT. Cook, BF. Nowak & NG. Elliott.

12.20 Using expression library immunization (ELI) to identify candidates for DNA vaccination of fish. MT. Cook, JG. Patil, NG. Elliott & C. Prideaux.

12.40 *Lunch*

1:30 Finfish Parasites. Chair: Barbara Nowak & Robert Adlard

- 1.40 Metazoan parasites on the gills of Southern bluefin tuna (*Thunnus maccoyii*) do not rapidly proliferate after transfer to culture cages. C. Hayward, H. Aiken & B. Nowak.
- 2.00 Development of real-time PCR assays to detect pathogens of southern bluefin tuna, *Thunnus maccoyii* in environmental and net samples. NJ. Bott & K. Ophel-Keller.
- 2.20 Myxozoan parasites of fish – patterns of infection and relatedness. RD. Adlard.
- 3.40 Toward efficient management of monogenean parasites in sea cage aquaculture: parasite management strategies for established and emerging industries. I. Ernst, C. Chambers & I. Whittington.

3:00 *Tea Break*

3:30 Keynote Lecture II. Functional genomic approaches to study host-pathogen interactions. Chris Secombes

4.30 Pathophysiology of fish diseases. Chair: Mark Powell & Matthew Jones

- 4.40 The pathophysiology of gill diseases. MD. Powell.
- 5.00 Metabolic scope of Atlantic salmon is reduced by disease. MA. Jones, MD. Powell & CG.Carter.
- 5.20 *Close Day 2*
- 7:00 *Conference Dinner – BBQ poolside*

DAY 3 Thursday 28 July

9:00 Keynote Lecture III. Antibacterial Peptides in Fish. Chris Secombes

10:20 *Tea Break*

10:50 Finfish Viruses 1. Chair: Nick Moody & Ken McColl

- 11.00 Investigations of viral nervous necrosis: the Australian bass outbreak. J. Frances, D. Ogburn, S. Fielder & P. Kirkland.
- 11.20 Aquatic Animal Health Subprogram: The production of nodavirus-free fish fry and the nodavirus' natural distribution (FRDC Project 2002/043). I. Anderson, J. Oakey, N. Levy & A. Fisk.
- 11.40 Detection and preliminary characterisation of a nodavirus from Australian bass (*Macquaria novemaculeata*). KA. McColl, JG. Young, NJ. Moody, KR. Davies, S. Fielder & MStJ. Crane.
- 12.00 Phylogenetic analysis of endemic nodavirus isolates. N. Moody, P. Horwood, J. Oakey & N. Levy.

12:20 *Lunch*

1:20 Finfish Viruses 2. Chair: Nick Moody & Ken McColl

- 1.30 Pilchard herpesvirus in wild pilchards. JB. Jones, M. Crockford, M. Crane, R. Whittington & G. Wilcox.
- 1.50 Establishment of diagnostic capabilities in Australia for the detection and identification of red sea bream iridovirus. KR. Davies, KA. McColl, JM. Slater, M. Yu, & MStJ. Crane.
- 2.10 Molecular epidemiology of iridovirus infection in Murray cod and ornamental fish. J. Go, M. Lancaster, K. Deece, O. Dhungyel & R. Whittington.
- 2.30 Molecular diagnosis and aquatic animal pathogens: Current issues. J. Oakey.

3:00 *Tea Break*

3:30 Aquatic Animal Health Resources Chair: Mark Crane

- 3.40 FRDC Aquatic Animal Health Subprogram: Development of diagnostic and reference reagents for epizootic haematopoietic necrosis virus of finfish (FRDC Project 2003/621). R. Whittington & K. Deece
- 4.00 Development of fish cell lines and their application to fish virology. L. M. Williams and M. St. J. Crane
- 4.20 The Australian aquatic animal pathogen and disease database. I. Ernst.
- 4.40 Aquatic animal diseases significant to Australia: Identification field guide. A. Herfort.
- 5.00 Conference Close



Aquatic Animal Health Subprogram Research and Development Plan 2002 – 2008 (updated June 2005)



Prepared by:

FRDC Aquatic Animal Health Subprogram

Edited by:

Dr Mark Crane, Aquatic Animal Health Subprogram Leader

Joanne Slater, Aquatic Animal Health Subprogram Coordinator

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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 'working document'. It has been developed for a six-year period (2002-2008) after which a full review will be conducted.

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

The Plan:

- Outlines the background to the establishment of the Subprogram;
- Describes the Subprogram including its role, objectives, structure and funding basis;
- 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 animal health project applications;
- Lists current R&D issues; and
- Will be reviewed annually with wide stakeholder consultation.

2 Background

Australia's fisheries and aquaculture are the fastest growing sectors of our primary industries in terms of both job creation and average growth in production, currently running at 13% pa. Their 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 our 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, which is becoming of increasing importance and concern to our export trade. Examples include the internationally reportable gill associated virus (GAV) and spawner-isolated mortality virus in prawns, and QX disease (*Marteilia sydneyi*) in oysters. 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 aquatic animals being farmed is increasing which, in turn, increases the need for further research on aquatic animal health issues. Research on all types of aquatic animals 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 led to the cooperation between industry and government 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* has been developed on the basis of stakeholder prioritisation of more specific issues that our aquatic industries are facing over the next five years; 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 aquaculture industries. During the *AQUAPLAN 1998-2003* tenure, responsibility for strategic research was transferred to the Aquatic Animal Health Subprogram. *AQUAPLAN 2005-2010* continues with this arrangement in mind.

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 and links within FRDC

The scope of the Subprogram is 'health' with a focus on infectious diseases. The Subprogram is responsible for coordinating research projects funded under the following 2 separate components:

3.5.1 FRDC R&D projects

The Subprogram adopts a special responsibility for health-related project 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 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.

¹ Eg Abalone Aquaculture, Atlantic Salmon Aquaculture, Rock Lobster Enhancement and Aquaculture, Southern Bluefin Tuna Aquaculture

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 subprogram¹ who 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.
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.

3.5.2 Australian Government initiative “Securing the Future – Protecting our Industries from Biological, Chemical and Physical Risk”

Under this initiative, the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) provides funds to the FRDC in support of the FRDC's mission to increase economic and social benefits for the fishing industry and the people of Australia through planned investment in research and development in an ecologically sustainable framework. DAFF and the FRDC have established a project management framework for this purpose, with projects managed by this Subprogram on behalf of the FRDC. The initiative runs over the four fiscal years 2004-05 to 2007-08.

3.6 Scope and links with other bodies

The Subprogram consults on health R&D priorities and strategies with the Aquatic Animal Health Committee (AAHC) which was established in late 2002 as Australia's primary industry/government interface for policy, communication and awareness related to aquatic animal health. Consultation is primarily through AAHC's technical and scientific support body, the National Aquatic Animal Health Technical Working Group – NAAH-TWG.

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 with key performance measures and timeframes. This should be regularly reviewed.
- 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:* Simon Bennison² (chair)
Pheroze Jungalwalla³
Brian Jeffriess⁴
- *Government Members:* Eva-Maria Bernoth⁵
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 that may co-opt additional scientists as needed. The SAC members were chosen so that a veterinary perspective as well as a State laboratory perspective is obtained and a formal linkage to the Health Program in the 'CRC for Sustainable Aquaculture of Finfish' (AQUAFIN CRC) is guaranteed.

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.
- 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 Moody⁹
- Barbara Nowak¹⁰

Thus within the current Steering Committee and Scientific Advisory Committee structure many of the major stakeholders are represented.

² National Aquaculture Council

³ Tasmanian Salmonid Growers Association

⁴ Tuna Boat Owners Association

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

⁶ NAAH-TWG, Fish Pathologist, Department of Fisheries, Government of Western Australia

⁷ CSIRO Livestock Industries, Australian Animal Health Laboratory, Geelong

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

⁹ Oonoonba Veterinary Laboratory, Queensland Department of Primary Industries

¹⁰ Aquafin CRC, University of Tasmania

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):

- Aquatic Animal Health Committee (AAHC)
- Australian Seafood Industry Council
- 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 Budget

The Subprogram will be funded jointly by DAFF and FRDC over the four fiscal years 2004-05 to 2007-08.

6 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
- 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.

6.1 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.

6.2 "Securing the Future" projects

For these projects, the Subprogram has developed its own operating procedures in line with relevant corporate governance and business rules. The Subprogram may invite nominations of stakeholder priorities, shortlist such nominations, develop project specifications, invite submissions for researchers or other project providers on the short listed topics, and evaluate applications against specifications, budgets, and their individual merits. The applications together with the Subprogram's evaluation are then submitted to the FRDC Board for decision.

6.3 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 AAHC and NAAH-TWG as a result of *AQUAPLAN 2005-2010*)
- Arising from the "Securing the Future" initiative

C) *Assessment of applications*

- Determine whether application fits criteria¹¹ (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)

¹¹ See 7.1 below

H) Linkages

- Establish strategic alliances

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

- Establish current R&D issues in consultation with stakeholders, eg through the annual workshops of NAAH-TWG
- 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
- Website
- Provide scientific advice and communication to other subprograms and FRABs regarding aquatic animal health research pre-proposals, applications, projects and results
- Databases

7 Research and Development

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

7.1 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 (eg 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 "Securing the Future – Protecting our Industries from Biological, Chemical and Physical Risk" initiative

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- Addresses R&D needs identified in *AQUAPLAN 2005-2010*

7.2 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. Discrete R&D issues for the next years are listed under pertinent areas.

7.2.1 Nature of disease and host-pathogen interaction

- Improved knowledge of the biology of disease agents (including epizootiology, taxonomy of pathogens, morphology, pathophysiology, histology, toxicology, etc)
- Improved knowledge on the host response to disease agents (aquatic animal immunology and immunomodulators)
- R&D to underpin knowledge about new and emerging diseases of significance
- R&D to underpin knowledge about disease risk associated with ornamental fish and recreational fishing.

CURRENT ISSUES

- Viral infections of crustaceans
- Herpesvirus and iridovirus infections in ornamental fish
- Nodavirus infections of finfish
- Parasitic infections of molluscs
- Parasitic infections of finfish
- Aquatic vertebrate immunology
- Immunology of aquatic invertebrates
- Evaluate host-pathogen interactions for intractable diseases and identify risk factors to develop disease minimisation strategies

7.2.2 Aquatic animal health management

- R&D to underpin 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 emergency aquatic animal disease outbreaks in Australia
- Methods of aquatic animal product treatments to prevent spread of disease (sterilisation, disinfection and decontamination)
- Vaccine development for aquatic animals

CURRENT ISSUES

- Risk assessment on the escape of live pathogens from abalone farms
- Risk assessment on the escape of live pathogens from ornamental fish to farmed and wild fish
- Impact of micro- and macro-nutrition on immune health and expression of disease

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- Immunomodulators to enhance vaccine efficacy
 - Targets for vaccine development to include *Streptococcus iniae* and *Vibrio harveyi*
 - Development of probiotics for the control of disease or improved health of hatchery and farmed aquatic animals
 - Development of templates for on-farm health management systems
 - Identify and assess stress factors in molluscs to develop health management strategies for on-farm and post-harvest stock

7.2.3 Endemic and exotic aquatic animal disease diagnostics

- Review and assessment of existing screening and diagnostic tests, and those under development
- 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

CURRENT ISSUES

- Initiation of an aquatic animal component of the National Registry of Domestic Animal Pathology (or equivalent)
- Diagnostics for endemic iridovirus (tropivirus group – ornamental and farmed fish) (Epizootic haematopoietic necrosis reference laboratory)
- Development of diagnostic tests for economically important diseases of ornamental fish, both enzootic and exotic
- Development of improved diagnostic reagents and procedures for the detection and identification of nodaviruses
- Evaluation of Flavobacteria as pathogens of aquatic animals and development of a practical diagnostic system for their identification

7.2.4 Surveillance and monitoring

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

CURRENT ISSUES

- Distribution and impact of iridoviruses in wild stocks of native fish and introduced redfin perch
- Distribution of iridovirus (Epizootic haematopoietic necrosis virus) in farmed salmonids in New South Wales, Victoria and Western Australia
- Random/structured surveillance of ornamental fish on release from quarantine
- Development of base-line data of blood/haemolymph parameters and common diseases for all endemic Australian species under culture

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- Development of tools for immune status monitoring as a means of implementing health management strategies
 - Evaluation of causes leading to apparent increased virulence of disease agents
 - Development of a national guidelines/strategy framework to ensure effective passive surveillance of aquatic animals, especially those under culture
 - Development of a capacity to detect and identify aquatic animal parasites
 - Development of cell culture systems for the isolation of viruses from tropical marine finfish
 - Application of diagnostic tools for disease forecasting for improved health management strategies.

7.2.5 Best practice/national and international quality assurance

- Quality assurance (QA) and proficiency testing (e.g. white spot, EHNV, nodavirus)
- R&D to underpin development of QA standards
- Facilitate the establishment of laboratory proficiency testing in detecting infectious diseases

CURRENT ISSUES

- Continue ring testing for whitespot virus
- Ring testing for viral encephalopathy and retinopathy, epizootic haematopoietic necrosis, and crayfish plague
- Identification of key factors for the development of Regional codes of best practice for health *i.e.* biosecurity for feed boats, dive teams, disposal of blood water etc.
- Development of interpretation guidelines for antibiotic sensitivity testing for bacterial pathogens of aquatic animals in Australia
- Evaluation (efficacy testing, including bioavailability, and residue testing) of chemotherapeutic treatments for specific aquatic animal use and development of treatment best practices

7.2.6 Training and capacity building

- Human capital development – including training and capacity building for aquatic animal health specialists/veterinarians.
- 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 ISSUES

- Assessment of national capacity in aquatic animal health
- Development of resources for undergraduate education in aquatic animal health at Australian veterinary schools
- A continued focus on organised, continuing education with particular reference to aquatic animal health and aquatic animal pathology for veterinarians at undergraduate, post graduate and specialist levels

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- Specialist training programs for microbiologists providing diagnostic services for aquatic animal health
 - Consolidation of knowledge and capability for parasitology of aquatic animals
 - Development and maintenance of databases and related resources for diseases and pathology of aquatic animals in Australia
 - Promote inclusion of aquatic animal health as components in aquaculture courses

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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