

# FINAL REPORT



**Aquatic Animal Health Subprogram:  
revision and expansion of the  
*Australian Aquatic Animal Disease  
Identification Field Guide* for  
publishing to CD ROM.**

**A. Herfort**

**November 2004**

**FRDC Project No. 2003/642**



Australian Government  
Department of Agriculture,  
Fisheries and Forestry



Australian Government  
Fisheries Research and  
Development Corporation



A. Herfort

Revision and expansion of the *Australian Aquatic Animal Disease Identification Field Guide* for publishing to CD rom.

© Australian Government-Department of Agriculture, Fisheries and Forestry & Fisheries Research and Development Corporation

This work is copyright. Except as permitted under the Copyright Act 1968 (Cth), no part of this publication may be reproduced by any process, electronic or otherwise, without the specific written permission of the copyright owners. Neither may information be stored electronically in any form whatsoever without such permission.

The Fisheries Research and Development Corporation plans, invests in and manages fisheries research and development throughout Australia. It is a federal statutory authority jointly funded by the Australian Government and the fishing industry.

Printed by Australian Government-Department of Agriculture, Fisheries and Forestry, Canberra, Australia. 2004



**Aquatic Animal Health Subprogram: revision and expansion  
of the *Australian Aquatic Animal Disease Identification Field  
Guide* for publishing to CD ROM.**

**A. Herfort**

**November 2004**

**FRDC Project No. 2003/642**

**ISBN: 0 9751859 6 9**



Australian Government  
Department of Agriculture,  
Fisheries and Forestry



Australian Government  
Fisheries Research and  
Development Corporation

## **TABLE OF CONTENTS**

<b>NON-TECHNICAL SUMMARY .....</b>	<b>5</b>
<b>ACKNOWLEDGEMENTS.....</b>	<b>7</b>
<b>BACKGROUND.....</b>	<b>8</b>
<b>NEED .....</b>	<b>8</b>
<b>OBJECTIVES.....</b>	<b>8</b>
<b>METHODS.....</b>	<b>9</b>
<b>RESULTS/DISCUSSION .....</b>	<b>9</b>
<b>BENEFITS AND ADOPTION.....</b>	<b>10</b>
<b>FURTHER DEVELOPMENT .....</b>	<b>10</b>
<b>PLANNED OUTCOMES .....</b>	<b>10</b>
<b>CONCLUSION.....</b>	<b>10</b>
<b>REFERENCES .....</b>	<b>11</b>
<b>Appendix 1 -INTELLECTUAL PROPERTY .....</b>	<b>11</b>
<b>Appendix 2 -STAFF .....</b>	<b>11</b>

## NON-TECHNICAL SUMMARY

**2003/642 Aquatic Animal Health Subprogram: revision and expansion of the Australian Aquatic Animal Disease Identification Field Guide for publishing to CD ROM.**

**PRINCIPAL INVESTIGATOR:** Mr A. Herfort

**ADDRESS:** Aquatic Animal Health  
Office of the Chief Veterinary Officer  
Australian Government Department of Agriculture,  
Fisheries and Forestry  
PO Box 858  
Barton ACT 2601  
Telephone: 07 6272 4009 Fax: 07 6273 5237

### OBJECTIVES:

1. To assist fisheries and aquaculture managers with a quick reference pictorial guide of the diseases of aquatic animals most significant to Australia.
2. To update information in the existing Australian Aquatic Animal Disease Identification Field Guide, with greater knowledge of existing and emerging diseases of significance to Australia in terms of their potential impact on production and trade.
3. To improve pictorial representation of the major diseases of significance to Australian aquaculture.
4. To promote aquatic animal health in traditional veterinary streams by extending veterinary graduates' interest in fields outside of traditional terrestrial veterinary science.
5. To produce the revised Field Guide in a cost-effective and easily distributed format,

### NON-TECHNICAL SUMMARY:

#### OUTCOMES ACHIEVED TO DATE

The output of this project "Aquatic Animal Disease Significant to Australia: Identification Field Guide" provides a quick reference summary of the diseases of aquatic animals most significant to Australia in terms of their potential impacts on production and trade. The field guide has been produced on CD ROM with PDF printable pages for convenient dissemination as disease specific fact sheets by email or facsimile, and is also available on the web from <http://www.disease-watch.com>.

The original objectives of this project were revised to remove the emphasis from diagnostic and technical aspects, and enhance the pictorial content supported by the latest information and descriptions of gross signs of the diseases represented. It has also been revised to discourage presumptive diagnoses based on the information contained, but to recommend a course of action for obtaining more information and providing timely advice to authorities of suspicion of disease.

The field guide relies heavily on photographic references to gross signs of disease and supporting descriptions in dot point format to assist the early identification of

disease. Distribution of endemic disease is described according to official data from the Australian Government Office of the Chief Veterinary Officer, Office International des Epizooties and Network of Aquaculture Centres in Asia-Pacific data. All aquatic species known to be naturally, or shown to be experimentally, susceptible to the diseases covered by the publication are included. It also provides a succinct list of the most relevant and current aquatic animal disease related websites, including diagnostic references.

The field guide is a review of the most current literature on diseases on Australia's National List of Reportable Diseases of Aquatic Animals and has been developed in consultation with key Australian and international experts in their diseases of expertise. Drafts of the publication and a working draft of the CD were reviewed by disease experts, members of industry and Biosecurity Australia, National Aquatic Animal Health-Technical Working Group and the FRDC Aquatic Animal Health Subprogram Steering and Scientific Advisory Committees.

Copies of the CD have been distributed to all major universities offering aquatic animal health related courses, all major libraries in Australia, industry associations, aquatic animal health pathologists (non-government and government), Directors of Fisheries and Chief Veterinary Officers in each state and territory, Australian Quarantine and Inspection Service and Biosecurity Australia.

Government agencies, the veterinary education stream, pathologists, researchers and industry groups have applauded this initiative.

**KEYWORDS:**        **Aquatic animal disease, aquaculture, reportable diseases of aquatic animals, disease reporting**

## **ACKNOWLEDGEMENTS**

The author would like to thank all those who reviewed and commented on drafts of the revised Field Guide document and on the layout and functionality of the CD and the consultancies engaged to develop and build the CD: Smack Designs, Canberra; and Biotext Pty Ltd, Canberra.

Primary reviewers included international aquatic animal health specialists:

Drs Ellen Ariel and Niels Jørgen Olesen (Danish Veterinary Institute), Dr Susan Bower (Department of Fisheries and Oceans, Canada), Dr David Bruno (Marlab, Aberdeen, Scotland), Dr Supranee Chinabut (Thailand Department of Fisheries) and Dr Ben Diggles (National Institute of Water and Atmospheric Research, New Zealand), whose expertise was essential in ensuring information was accurate, current and consistent with international standards.

Peer review by Australian specialists was also critical for a national perspective and included:

Dr Rob Adlard (Queensland Museum), Dr Rachel Bowater (Oonoonba Veterinary Laboratory, Queensland Department of Primary Industries and Fisheries), Dr Jeremy Carson (Department of Primary Industries, Water and Environment Tasmania), Dr Mark Crane (CSIRO Australian Animal Health Laboratory), Assoc Prof Brian Jones (Department of Fish Health Western Australia), Dr Malcolm Lancaster (Department of Primary Industries Research Victoria), Drs Shane Raidal and Fran Stephens (Murdoch University), Dr Peter Walker (CSIRO Australian Animal Health Laboratory), Prof Richard Whittington (University of Sydney), Dr Belinda Wright (Biosecurity Australia), as well as members of the Fisheries Research and Development Corporation Aquatic Animal Health Subprogram Steering and Scientific Advisory Committees and the National Aquatic Animal Health Technical Working Group.

## **Photographic Contributors**

Special thanks to:

### *International Contributors:*

Dr David Alderman (Centre for Environment, Fisheries and Aquaculture Science, UK), Prof Tor Atle Mo (National Veterinary Institute, Oslo), Dr Jerry Bartholomew (Oregon State University), Dr Franck Berthe (IFREMER), Dr Susan Bower (Fisheries and Oceans Canada), Prof Eugene Burreson (Virginia Institute of Marine Science), Dr Birgit Dannevig (National Veterinary Institute, Oslo), Prof Larry Hanson (College of Veterinary Medicine MS State), Prof Tore Håstein (National Veterinary Institute, Oslo), Dr Ron Hedrick (University of California, Davis), Dr Michael Kent (Oregon State University), Prof Don Lightner (University of Arizona), Dr James Moore, (California Department of Fish and Game), Dr Kazuhiro Nakajima (Fisheries Research Agency, Yokohama), Dr Ronald Pascho (Western Fisheries Research Center, Seattle), Dr Trygve Poppe (Norwegian School of Veterinary Science, Oslo), Dr Melba Reantaso (Maryland Department of Natural Resources), Dr. Hans Jürgen Schlotfeldt, Dr Jim Winton (Oregon State University) and Dr Oded Zmora (University of Maryland, Baltimore).

### *Australian Contributors:*

Dr Rachel Bowater (Queensland Department of Primary Industries and Fisheries), Dr Richard Callinan (NSW Fisheries), Dr Angus Cameron (Department Primary Industries, Victoria), Dr Jeremy Carson (Department of Primary Industries, Water and Environment Tasmania), Marty Deveney (Department of Primary Industries and Resources South Australia), Dr Kevin Ellard (Department of Primary Industries, Water and Environment Tasmania), Dr Clive Jones (Queensland Department of Primary Industries and Fisheries), Dr Sarah Kleeman (Australian Government Department of Agriculture, Fisheries and Forestry), Dr Matt Landos (NSW Fisheries), Prof Bob Lester (University of Queensland), Dr Patrick Tully (NSW Fisheries), Dr Nick Moody (Queensland Department of Primary Industries and Fisheries), Prof Barry Munday (deceased), Prof Leigh Owens (Queensland Department of Primary Industries and Fisheries), Dr Mark Porter (University of Tasmania), Dr Howard Prior (Queensland Department of Primary Industries and Fisheries), Dr Greg Storie (Queensland Department of Primary Industries and Fisheries), staff of

the Dept of Microbiology and Immunology, James Cook University and staff at Australian Animal Health Laboratory.

## **BACKGROUND**

During 1998/1999, Commonwealth, state and territory government agencies and key members of the private sector signed on to "AQUAPLAN-Australia's national strategic plan for aquatic animal health (1998-2003)".

A key priority under AQUAPLAN Program 5-Awareness, was the preparation of an Australian Aquatic Animal Disease Identification Field Guide (Field Guide), which was officially released in March 2000.

The original edition of the Field Guide dealt with the major viruses, bacteria, fungi and parasites known to affect finfish, molluscs and crustacea overseas, as well as some enzootic (endemic) diseases of aquatic animals in Australia, providing reference to 30 of the 32 diseases on Australia's then current, "National List of Reportable Diseases of Aquatic Animals".

With advances in knowledge and diagnostic capacity for the diseases currently covered by the original Field Guide, the Aquaplan Business Group and its Scientific Advisory Committee, recommended at their 9th meeting (ABG/SAC-09) 25th July 2002, that the Field Guide be revised to update information on existing entries. The Field Guide was also to be expanded to incorporate recent and on-going changes (additions and deletions) to the OIE and NACA<sup>1</sup> disease lists (as revised in the Australian "National List of Reportable Disease of Aquatic Animals"). ABG/SAC further recommended that the revised Field Guide be published on CD ROM and be hosted on an appropriate internet web site, thereby reducing production and distribution costs allowing for wider dissemination of the product and periodic revision in line with on-going changes to National and regional disease lists.

ABG/SAC also recommended the production of Fish Disease Fact Sheets similar to those posted on the OIE website, and agreed that a revised Field Guide should also satisfy this requirement. It was further recommended that the Field Guide be revised with a greater focus on the more operational level of audience such as state and territory fisheries and aquaculture managers and staff, border protection officers, and those engaged in aquatic animal veterinary health, while remaining relevant to a non-technical audience. As well as for distribution to tertiary aquaculture and fisheries management graduates, the Field Guide CD was to be made available to veterinary graduates with the aim of promoting an interest in veterinary graduates beyond that of the traditional terrestrial stream.

A successful R&D application to the FRDC AAH Subprogram secured funding in February 2003 to carry out this project- Project 2003/642: revision and expansion of the Australian Aquatic Animal Disease Identification Field Guide for publishing to CD ROM.

## **NEED**

A revision of the original Field Guide was necessary to update information on recent changes to the National List as well as an increase in knowledge of diseases covered by the original Field Guide. The revised Field Guide also needed to target an audience at a more operational level than that of the original version and has been upgraded accordingly. Production of the Field Guide on CD ROM provides an excellent opportunity for wider and more efficient dissemination and to be readily hosted on an external web site. A web-based application allows for efficient updating of information and ready access to such updated information.

## **OBJECTIVES**

1. To assist fisheries and aquaculture managers with a quick reference pictorial guide of the

---

<sup>1</sup> Office International des Epizooties and Network of Aquaculture Centres in Asia-Pacific



diseases of aquatic animals most significant to Australia.

2. To update information in the existing Australian Aquatic Animal Disease Identification Field Guide, with greater knowledge of existing and emerging diseases of significance to Australia in terms of their potential impact on production and trade.
3. To improve pictorial representation of the major diseases of significance to Australian aquaculture.
4. To promote aquatic animal health in traditional veterinary streams by extending veterinary graduates' interest in fields outside of traditional terrestrial veterinary science.
5. To produce the revised Field Guide in a cost-effective and easily distributed format.

## **METHODS**

This project is largely a review of existing and emerging scientific literature pertaining to aquatic animal health management of the diseases listed by the OIE and NACA, with additional diseases of particular socio-economic concern to Australia, comprising Australia's "National List of Reportable Diseases of Aquatic Animals". Sources of information include:

- The OIE Aquatic Animal Health Standards Commission website,
- OIE Collaborating Centre for Information on Aquatic Animal Diseases, CEFAS,
- Network of Aquaculture Centres in Asia-Pacific website,
- Journal of Fish Diseases,
- Bulletin of the European Association of Fish Pathologists,
- Aquaculture,
- Diseases of Aquatic Organisms,
- Various sources via Winspurs and other scientific literature search engines.

Aquatic animal health experts both in Australia and internationally, key industry bodies, government and non-government pathologists, tertiary institutions and state and territory fisheries agencies were consulted in reviewing progressive drafts on specific diseases as well as the CD format.

## **RESULTS/DISCUSSION**

Changes to the original version of the Field Guide include:

1. production to CD ROM (with the provision for printing individual disease pages as fact sheets) and WWW access,
2. the inclusion of all diseases on Australia's "National List of Reportable Diseases of Aquatic Animals" as endorsed by PISC<sup>2</sup> in September, with updated information on all those from the previous (original) edition. The original edition covered just 30 diseases. The revised CD edition covers 46 diseases.
3. enhanced anatomy section.
4. addition of hyperlinks at the bottom of each disease page linking to sources of information used,
5. a prominent statement warning of the limitations of relying on gross pathology in reaching a definitive diagnosis, repeated on each disease page,
6. a designated emergency hotline number for each State and Territory, and
7. an improved differential diagnostic table, linking directly to specific disease pages and those that are similar.

The first draft of the revised Field Guide was approved as the first milestone by the FRDC AAH Subprogram Steering Committee and Scientific Advisory Committee (STC/SAC), 1 May 2003, and distributed to National Aquatic Animal Health-Technical Working Group (NAAH-TWG) for comment at their June 2003 workshop in Perth. Comments from each group were incorporated into the second draft of the revised Field Guide, which was circulated 31 July 2003, for peer review by all NAAH-TWG, STC/SAC members, international experts, state and territory fish pathologists,

---

<sup>2</sup> Primary Industries Standing Committee

relevant CSIRO specialists and related project Principal Investigators (a total of 13 primary peer reviewers and 22 secondary reviewers). A first draft of the CD was also presented to the NAAH-TWG June 2003 meeting, with subsequent comments factored into a revised Terms of Reference for the consultancy building the CD.

A request for photographs of gross pathology and images of histology was circulated to all OIE reference labs for aquatic animal diseases and relevant specialists of non-OIE listed diseases.

The 2<sup>nd</sup> working draft of the CD ROM, was presented at the FRDC Aquatic Animal Health Subprogram Scientific Conference (8-10 October 2003) for comment by the STC/SAC. A detailed review of the working draft of the CD was the subject of a special STC/SAC meeting in December 2003.

Recommendations of the December STC/SAC meeting were to cull much information (which was largely incidental), have greater reliance on the photographic images, professional editing of the draft document, further enhancement of the anatomy section and significant modifications to the CD design.

A new consultancy was engaged to edit the draft in line with STC/SAC recommendations and to progress CD development to completion.

### **BENEFITS AND ADOPTION**

Major beneficiaries of the CD will be state and territory fisheries and aquaculture managers and staff, border protection officers, and those engaged in aquatic animal veterinary health, the general public being secondary beneficiaries.

Distribution of the CD is to be guided by a database developed to identify tertiary aquatic animal health related courses, state and territory fisheries and research agencies, and industry bodies to receive the CD.

2000 copies of the CD have been produced and 1500 have been distributed to the institutions identified in the primary distribution list as well as state/territory fisheries, research and pathology agencies, and industry bodies for further dissemination. The Field Guide is also available on-line at <http://www.disease-watch.com>.

### **FURTHER DEVELOPMENT**

Periodic update of the field guide content will be achieved via the web version. The web version will be maintained by Aquatic Animal Health Unit staff with updates occurring as new information comes to hand and in line with changes to Australia's "National List of Reportable Diseases of Aquatic Animals", the OIE Aquatic Animal Health Code and the Network for Aquaculture Centres in Asia Pacific.

### **PLANNED OUTCOMES**

The output has satisfied the planned outcomes by;

1. enhancing awareness of aquatic animal diseases significant for Australia by expanding the target audience,
2. improving the pictorial content with gross sign images, expanded anatomy section and the inclusion of an histology section,
3. and providing a more versatile product than the original Field Guide publication.

### **CONCLUSION**

The initial objectives endorsed by STC/SAC and NAAHTWG and subsequently revised by STC/SAC;

1. To assist fisheries and aquaculture managers with a quick reference pictorial guide of the diseases of aquatic animals most significant to Australia,
2. To update information in the existing Australian Aquatic Animal Disease Identification Field Guide, with greater knowledge of existing and emerging diseases of significance to Australia in terms of their potential impact on production and trade,
3. To improve pictorial representation of the major diseases of significance to Australian aquaculture,
4. To promote aquatic animal health in traditional veterinary streams by extending veterinary graduates' interest in fields outside of traditional terrestrial veterinary science,
5. To produce the revised Field Guide in a cost-effective and easily distributed format

have been successfully achieved through;

1. production to CD ROM (with the provision for printing individual disease pages as fact sheets) and WWW access,
2. the inclusion of all diseases on Australia's "National List of Reportable Diseases of Aquatic Animals" as endorsed by PISC<sup>3</sup> in September (from 30 to 46), with updated information on all those from the previous (original) edition,
3. enhanced anatomy section,
4. addition of hyperlinks at the bottom of each disease page linking to sources of information used,
5. a prominent statement warning of the limitations of relying on gross pathology in reaching a definitive diagnosis, repeated on each disease page,
6. a designated emergency hotline number for each State and Territory, and
7. an improved differential diagnostic table, linking directly to specific disease pages and those which are similar.

## REFERENCES

- The OIE Aquatic Animal Health Standards Commission website,
- OIE Collaborating Centre for Information on Aquatic Animal Diseases, CEFAS,
- Network of Aquaculture Centres in Asia-Pacific website,
- Journal of Fish Diseases,
- Bulletin of the European Association of Fish Pathologists,
- Aquaculture,
- Diseases of Aquatic Organisms,
- Various sources via Winspirls and other scientific literature search engines.
- Australian Government CVO Quarterly Aquatic Animal Disease status database

## Appendix 1 -INTELLECTUAL PROPERTY

This project has not developed any intellectual property that requires legal protection. The nature of the output of this project is a field identification guide designed to improve awareness of, and to assist in the early detection of aquatic animal diseases significant to Australia. It is a review of most current literature and public databases on diseases of significance. Copyright of photographs and illustrations remains the property of their contributors.

## Appendix 2 -STAFF

Principal Investigator	Alistair Herfort
CD concept design	Smack Designs Canberra
Editing and CD Development	Biotext Pty Ltd Canberra

<sup>3</sup> Primary Industries Standing Committee

### **Appendix 3 –Aquatic Animal Diseases Significant to Australia: Identification Field Guide-CD**

- Weblink- <http://www.disease-watch.com/documents/CD/index/index.htm>