



Australian Government
**Fisheries Research and
Development Corporation**

Aquatic Animal Health Training Scheme.

**Fish disease diagnosis, biosecurity & disease management
training for fish farming industry of Australia.**

R. O. Bowater, A. Fisk, K. Dyrting I. Anderson & R. Chong

February 2016

FRDC Project No. 2009-315.28



Acknowledgments

The members of the *Australian Barramundi Farmers Association*, *Ridleys Agriproducts Pty Ltd*, and staff of the *Great Barrier Reef Marine Park Authority* are thanked for supporting and proactively participating in the two-day theory and practical workshop. James Cook University, School of Veterinary Sciences, are thanked for providing the laboratory facility, microscopes, and a staff member to facilitate the practical workshop. We thank *Good Fortune Bay Fisheries*, Townsville for providing barramundi for the purposes of the practical workshop. Ingo Ernst of the Department of Agriculture, Australia, kindly provided valuable resources including 'AQUAPLAN 2014-2019', and a copy of "*Aquatic Animal Diseases significant to Australia. Identification Field Guide 4th edition*". Ridleys Pty Ltd thanked for providing fish anaesthetic.

We acknowledge the Department of Agriculture & Fisheries, Biosecurity Queensland, and the Northern Territory, Berrimah Veterinary Laboratory for supporting their staff to attend, and teach at the workshop (Rachel Bowater, Andrew Fisk, Ian Anderson, Roger Chong, Kitman Dyrting), and for supporting Biosecurity Queensland Field Services Veterinary staff to attend for training purposes.

Executive Summary

This workshop delivered new knowledge and technical skills with hands-on training to 24 participants representing of Australian fish-farming and government veterinarian sectors. The workshop focused on delivering training in both theory and practical aspects, with delivering hands-on technical skills, relating directly to fish disease detection, diagnosis, treatment, control, disease emergency response, disease reporting, fish health certification, fish toxicology and fish kills. The workshop was held in Townsville, Queensland on July 17th-18th, 2015, and was organized and delivered by Dr Rachel Bowater, Mr Andrew Fisk, Dr Kitman Dyrting, Dr Ian Anderson and Dr Roger Chong, with whom collectively have >100 years of experience in fish diagnostics, research, pathology, policy and aquaculture extension. The main objectives of the project with outcomes are listed below and encompassed;

1. Six hours of lectures and 2 demonstrations were provided on the following topics;
 - The diagnostic approach to fish disease
 - Fish health certification programs
 - Normal fish anatomy
 - Parasitic and nutritional diseases of barramundi (sampling a fish for parasites, treatment and control of these diseases)
 - Bacterial and viral diseases of barramundi (sampling a fish for parasites, treatment and control)
 - Barramundi disease issues encountered in the Northern Territory
 - Fish toxicology and fish kills
 - Exotic diseases and disease emergency response
 - Correct packing of fish samples to send via air or road to a veterinary laboratory for disease diagnosis

2. Training resources were provided to all workshop participants on the above topics (CDs, posters, USB, practical notes)

3. A full day of practical training with demonstrations and hands-on technical skills were taught by aquatic animal health professionals to fish farmers, technical staff, aquarists and state field veterinarians on the following topics;

- Fish sedation and external examination of a fish for external signs of disease
- Sampling a fish for ectoparasites from the skin and gills
- Methods to sample and then identify common skin and gill parasites of fish
- Demonstration of fish euthanasia
- Normal external and internal anatomy of a fish
- Fish dissection and examination of internal organs of a fish for signs of disease
- Sampling the internal organs and tissues from a fish for laboratory histology analysis for disease testing
- Demonstration of aseptic technique of sampling a fish for bacteriology and virology disease testing
- Sampling, preserving, and packing of fish samples for submission to a NATA accredited veterinary laboratory for disease testing

4. Networking and communication occurred between fish farmers, farm managers, technicians, aquatic and terrestrial field veterinarians, laboratory veterinarians, and government officials (within and between Australian states), and with James Cook University technicians, allowing for knowledge transfer and professional network development.

The outcome of this workshop is that 24 participants, representing 10 fish farms or supporting companies and staff from 3 separate government agencies and 1 teaching university, now have enhanced knowledge, technical skills and expertise, workshop resources and increased professional networks, that together, can be utilised during a disease emergency response to a disease epizootic that may occur on a fish farm, or in a wild fishery. The training of these workshop participants will have further beneficial flow-on effects, with further extension of newly acquired knowledge and technical skills to other farm staff and field veterinarians, with respect to improved disease detection and disease emergency response, and disease reporting by government veterinarians and officials, within the various states of Australia.

Introduction

Fish farmers, technicians and veterinarians in all States of Australia require vigilance with respect to early disease detection, diagnosis, control and eradication of newly emerging, endemic and exotic fish diseases. The northern States of Australia (Northern Territory and Queensland) are at greatest risk for disease incursions, because of the vast expanse of land and waters in northern regions, the remoteness of many aquaculture farms, frequent shipping movements in northern waters (there are over 13 Ports in Queensland), frequent movement of people and the proximity of far northern Australia to neighbouring countries such as Indonesia and Papua New Guinea. In 2013, two Queensland State Government laboratories providing disease diagnostic services to the aquaculture industries were closed. This resulted in reduced capacity for passive disease surveillance in Queensland. Prompt and accurate disease detection with biocontainment and disease control is necessary to protect the biosecurity of the Australian Fish Farming industry, and prevent disease incursion or spread within and between States of Australia.

The continued productivity of the barramundi & freshwater fish industries in all Australian States requires the need for both farmers and government veterinarians to be trained in early disease detection at the grass-roots level, so that farm workers and government veterinarians are able to detect, control and treat fish diseases, and thereby reduce the risk of disease spread within and between aquaculture enterprises and natural fisheries resources.

A specific training workshop was envisaged to train fish farmers, technicians, fisheries officers, and regional field veterinarians, with hands-on, practical, technical skills & knowledge provided by Aquatic Animal Health Professionals, so these skills can be practically applied by these people in the event of a disease epizootic, disease investigation, or disease emergency event. This in turn is needed to support the continued growth, productivity and sustainability of the Australian fish farming industry, disease being a major limiting factor. This workshop will support on-going disease reporting activities by the various Australian States to DAF, OIE and NACA, allowing continuation of Australia's trade in fish and to maintain Australia's mainly disease-free status. This workshop was identified as a priority by the ABFA and by Biosecurity Queensland, QDAF.

Objectives

There were four main objectives of this Project;

1. Develop and run a two day training workshop on fish sampling, disease diagnosis (endemic & exotic fish diseases), disease control, treatment, biosecurity, and farm health management plans, targeted for fish farmers, technicians, field & government veterinarians and fisheries officers, to improve disease detection and reporting skills.
2. Produce training resources on fish disease sampling, diagnosis, identification, biosecurity, health management that can be utilised by fish farmers, technicians, aquarists and veterinarians attending the workshop.
3. Train fish farmers, technical staff, fisheries officers, aquarists and state field veterinarians in fish disease detection, sampling, diagnosis, treatment, control, biosecurity, and aquatic disease emergency response.
4. Improve linkages, networking and communication between broader industry (fish farm managers, operators, technicians), aquatic and terrestrial veterinarians, fisheries officers, government officials (within and between Australian states), knowledge transfer and professional network development.

Methods

In 2013 the president of the *Australian Barramundi Farmers Association* (ABFA), Mr Marty Phillips, and individual barramundi and fish farmers (both members and non-members of the ABFA) from various states of Australia were individually consulted. Fish farmers were individually approached and discussion was had regarding the need for a training workshop, prior to seeking FRDC funding in 2013. Mr Marty Phillips then presented the proposal for this workshop at the AGM in 2013, at the combined AB&APF conference in 2013, where members showed support for this activity. Further discussions were had with the Queensland Government, Department of Agriculture and Fisheries, Biosecurity Queensland, Queensland Fisheries, Policy

officers and Veterinarians from James Cook University School of Veterinary Sciences prior to securing funding.

Following FRDC funding, letters of invitation to attend the workshop, were sent out nationally, to fish farmers including both ABFA and non-ABFA members, Reef HQ aquarists, Department of Agriculture and Fisheries (QDAF) Biosecurity Queensland (BQ) field services veterinarians, and to the Chief Veterinary Officer (QCVO) of Queensland. Priority of attendance was given to fish farmers from various States of Australia, with remaining spaces filled by the above-mentioned people.

The workshop entailed the use of live barramundi and ornamental fish for scientific and teaching purposes, therefore an Animal Ethics application was written and submitted by R. Bowater to the AEC and was subsequently approved on 15 June, 2015 (Animal Ethics Committee Reference Number SA 2015/06/512). *Good Fortune Bay Fisheries* in Kelso, Townsville kindly provided live barramundi for the purposes of the practical part of the workshop. Other live ornamental fish for purposes of the practical sessions of the workshop were obtained from local retail pet shops.

The two-day workshop was organised and developed by Dr Rachel Bowater with assistance from Mr Andrew Fisk. The Project leader invited other aquatic animal health veterinarians including Dr Kitman Dyrting (Berrimah Veterinary Laboratory, NT), Dr Ian Anderson and Dr Roger Chong (Biosecurity Sciences Laboratory, Coopers Plains) to attend and present talks. The idea was to provide a variety of talks from different states and from different perspectives to diversify the workshop. Day 1 consisted of a series of lectures and 2 demonstrations held at the site of Biosecurity Queensland (North Region), Department of Agriculture & Fisheries, Garbutt, Townsville, Queensland, Australia. Day 2 was a practical session held in a wet laboratory at the School of Veterinary Sciences, James Cook University, Townsville.

The workshop was free to all participants, apart from their accommodation and travel costs. The workshop was held in Townsville, because of its central location in north Queensland, to allow for reasonable travel and attendance by local fish farmers, and for other fish farmers residing north or south of Townsville (eg. Daintree, Cairns, Innisfail, Ingham, Ayr, Bowen, Proserpine, Mackay, Rockhampton and Gladstone). Townsville was also chosen because the Veterinary Sciences School at James Cook University offered to provide laboratory and necropsy facility for the practical sessions. A list of all project staff is given below.

Table 1. List of all Project Staff	Name	Title, affiliation
Dr Rachel Bowater		Senior Veterinary Officer, Biosecurity Queensland, Department of Agriculture & Fisheries, Townsville, Queensland, Australia.
Mr Andrew Fisk		Senior Aquaculture Technician, Biosecurity Sciences Laboratory, Department of Agriculture & Fisheries, Queensland, Australia.
Dr Ian Anderson		Senior Veterinary officer, Biosecurity Sciences Laboratory, Department of Agriculture & Fisheries, Queensland, Australia.
Dr Roger Chong		Senior Veterinary Officer, Biosecurity Sciences Laboratory, Department of Agriculture & Fisheries, Queensland, Australia.
Dr Kitman Dyrting		Veterinary Pathologist, Berrimah Veterinary Laboratory, Northern Territory, Australia.
Mr Laurie Reilly		Team Leader, Laboratory & Technical Support, Division of Tropical Health & Medicine, James Cook University, Townsville, Australia.
Mrs Melanie Turnbull		Administrative Officer, Regional Corporate and Counter Services, Nambour - Maroochy Research Station, Australia.

Day 1 of the workshop was run by Dr Rachel Bowater and Mr Andrew Fisk and included 8 presentations and 2 demonstrations, delivered by 4 Australian veterinarians with expertise in aquatic animal health including; Dr Ian Anderson, Dr Roger Chong, Dr Rachel Bowater (Queensland) and Dr Kitman Dyrting (Northern Territory). Topics included; the diagnostic approach to fish disease, farm health management plans and biosecurity, fish anatomy, examining a fish for parasites and disease, parasitic, nutritional, bacterial and viral diseases of fish, disease issues encountered in fish from the Northern Territory, fish toxicology, fish kills, exotic diseases and disease emergency response. Two demonstrations were given; general fish anatomy by Dr Rachel Bowater and sample packing of preserved fish for disease diagnostic purposes, by Senior Aquaculture Technician, Mr Andrew Fisk.

Day 2 of the workshop was a practical session held in a wet Laboratory at the Veterinary Sciences School, James Cook University. Demonstrations and practical sessions were done on both live and dead fish, and taught principally by Dr Rachel Bowater, with the microscope session run by Mr Laurie Reilly (JCU) and with technical assistance from Mr Andrew Fisk. Dr Ian Anderson, Dr Roger Chong and Dr Kitman Dyrting, also assisted with practical demonstrations. The practical demonstrations were run according to Animal Ethics Committee guidelines outlined in the project (AEC Project reference no. SA2015/06/512). Demonstrations were done on both live and dead fish by AEC-approved veterinarians, followed by veterinary-supervised, hands-on practical procedures and activities done by workshop participants on both live and dead fish including; fish sedation with general external examination for signs of disease; correct use of the light microscope; performing a skin scraping and making a 'wet mount prep' to identify skin parasites under the light microscope; performing a gill scraping from a live fish and making and examining a 'wet mount prep' to identify gill parasites under a light microscope; fish euthanasia; fish dissection with identification of internal organs; sampling of fish organs and tissues for preservation and histopathology analysis; sampling of a dead fish for bacteriology & virology; correct fish sample packing for disease testing (for histology analysis). A detailed demonstration of sampling a dead fish for virology, bacteriological and histological analysis was done by Dr R. Bowater in the veterinary post mortem room, with video relay to all participants seated in the adjacent viewing amphitheatre.

Workshop resources developed included a set of practical notes developed by R. Bowater that were provided to all workshop participants at the practical. CD's containing all lectures on Day 1 was provided to all workshop participants, after the workshop. A poster on common 'gill and skin parasites of barramundi' was created by R. Bowater and distributed to all participants at the workshop (Appendix II). Copies of AQUAPLAN 2014-2019 outlining Australia's strategic plan for aquatic animal health, and a USB with "*Aquatic Animal Diseases significant to Australia. Identification Field Guide 4th edition*" was kindly donated by Ingo Ernst, Director Aquatic Pest and Health Policy, Department of Agriculture, Australia and was distributed to all workshop participants. Workshop evaluation forms for both day 1 and Day 2 of the workshop were given out to all workshop participants and results were tabulated and summarised into Tables 3 and 4 (Results section).

Results, Discussion & Conclusion

This workshop provided the Australian aquaculture industry, including fish farmers, farm managers, technicians, aquarists, and Queensland and Northern Territory government field and laboratory veterinarians with increased knowledge relevant to

fish diseases and practical skills that can be applied effectively and efficiently in the event of a fish disease emergency event. Farm workers learned new practical technical skills that can be practically applied in the event of a fish disease epizootic or disease emergency event on a fish farm, marine aquarium or during a wild fish kill event in Queensland or other state of Australia. Overall this has assisted in expediting fish disease detection and disease reporting in these states. The flow-on effects include reduced the risk of disease spread, both within and between fish farms and the environment, with improved both long-term farm productivity and sustainability of the fish-farming sector, of the aquaculture industry in Australia.

The workshop provided members of the aquaculture fish-farming industry, aquarists and Queensland government field veterinarians an opportunity to exchange and increase their knowledge base on fish diseases and disease emergency response. More detailed, specific knowledge gained included; identifying clinical signs of a diseased fish; endemic and exotic fish diseases (parasitic, viral, bacterial, fungal, nutritional, toxic etc.), the aetiology, treatment and control of fish diseases; aquatic biosecurity; farm health management plans; fish kills; fish toxicology; aquatic disease emergency response. Furthermore, workshop participants were upskilled with hands-on practical skills that can be applied on-site by farmers, vets or aquarists, in the event of a disease emergency on an aquaculture farm or marine aquarium. Practical skills gained by participants included; identifying and detecting of early signs of disease; techniques for identifying common endemic fish disease pathogens (parasites, fungi etc.); techniques and skills for sampling sick fish for laboratory disease diagnosis and correct sample packing procedures according to current airline and transport regulations. Workshop participants are now able to identify and sample diseased fish, detect & identify common endemic fish pathogens and identify signs of both endemic and exotic fish diseases. Overall this has benefited Australia by improved reporting of fish disease epizootics and natural fish kill events, at a State, Territory and National level.

This workshop has benefited fish farmers by providing resources on how to identify, treat and control commonly occurring endemic fish diseases. Farmers have resources enabling them to correctly sample a sick fish, and how to correctly preserve and send samples of a diseased fish to an accredited veterinary laboratory for disease diagnosis by a qualified veterinary fish pathologist for endemic or exotic disease confirmation and/or exclusion.

This workshop has benefited the Great Barrier Reef Marine Park Authority, Berrimah Veterinary Laboratory and Biosecurity Queensland, DAF by up-skilling and improving professional staff capability including Reef HQ aquarists, government field veterinarians and the Chief Veterinary Officer of Queensland (QCVO). Aquarists, government field veterinarians and the QCVO effectively networked with fish farmers, facilitating exchange of information. Through this workshop, enhanced staff capability and career development has been provided for, with participants receiving specialist training from aquatic animal health professionals on a range of relevant and specialist fish disease topics. New knowledge and skills gained will result in improved fish disease detection, diagnosis, treatment, control, biosecurity, disease response, and disease reporting, all of which are beneficial for both detecting disease, preventing disease spread on fish farms, marine aquaria or in a wild native fishery, enabling increased fish disease surveillance and reporting capacity both within the state of Queensland, the Northern Territory and henceforth on to DAF, Canberra.

A list of workshop participants and their affiliations are listed in Table 2. A total of 24 participants attended from 7 fish farms, 1 fish hatchery/fish stocking enterprise, 2 companies associated with the barramundi farming industry, 2 aquarists from Reef HQ (affiliated with the Great Barrier Reef Marine Park Authority), the Chief Veterinary Officer of Queensland, and 4 Biosecurity Queensland (BQ) Field Services veterinarians from the Queensland Department of Agriculture and Fisheries (QDAF).

Table 2. Workshop participants and affiliations

Name	Organisation
Justin Forrester	Good Fortune Bay Fisheries Pty Ltd.
Dylan Bennett	Sealord King Reef
Matt Chapman	Sealord King Reef
Scott Hurlstone	Sealord King Reef
Thomas Jordison	Good Fortune Bay Fisheries Pty Ltd.
Chris Tomlinson	Good Fortune Bay Fisheries Pty Ltd.
Brett Smith	Good Fortune Bay Fisheries Pty Ltd.
Ben Punch	Good Fortune Bay Fisheries Pty Ltd.
Laura Coulton	Reef HQ, Great Barrier Reef Marine Park Authority
Chris Benstead	Reef HQ, Great Barrier Reef Marine Park Authority
Marcell Boaventura	Ridley Agri Products Pty Ltd
Justin Holgate	Ridley Aquafeed
Ron Shaw	Giru Barramundi & Crayfish
Thomas hayes	Gladstone Area Water Board, Fish hatchery
Margarita Schionning	Kuranda Fish farm
Lynetta Schionning	Kuranda Fish farm
Rhys Mitchell	Tropical Finfish Australia Pty Ltd.
Steyn Sias	Tropical Finfish Australia Pty Ltd.
Roberta Mizzi	Pejo Enterprises
Allison Crook	Chief Veterinary Officer, Biosecurity Queensland, Department of Agriculture & Fisheries
Jonathan Lee	Biosecurity Queensland, Department of Agriculture & Fisheries (BQ, QDAF)
Barry Robinson	Biosecurity Queensland, Department of Agriculture & Fisheries (BQ, QDAF)
Michelle Jeffery	Biosecurity Queensland, Department of Agriculture & Fisheries (BQ, QDAF)
Nina Kung	Biosecurity Queensland, Department of Agriculture & Fisheries (BQ, QDAF)

The workshop was well received by all participants who actively asked questions and participated in discussion both between presentations and at the end of each day. The practical demonstrations provided new skills for many participants, who said new skills learned were highly applicable to farm situations where they would be actively utilized and passed on to fellow farm workers (see Extension and Adoption).

Workshop evaluation forms were completed by participants for both Day 1 and 2 of the workshop. Participants were asked to rank each presentation or practical session with one of four different ranking scores (*'good'*, *'OK'*, *'poor'*, or *'not needed'*). Results were tabulated and presented in Table 3 & 4. Workshop participants were also asked to state which practical demonstration they found to be *'the most useful'*, *'the least useful'* or *'what they would like to know about in more detail'*.

A summary of workshop evaluations for Day 1 are presented in Table 3. 80%-100% of participants ranked all the presentations as *'good'* (Table 3). 90% of participants

voted 'good' for the talk on 'the diagnostic approach to fish disease', and for 'bacterial and viral diseases of barramundi' and 'barramundi disease issues encountered in the Northern Territory'. The '*most useful*' topics were considered talks on bacterial, viral, nutritional and parasitic diseases of fish, with '*the most least useful*' being the talks on the fish health certification program and fish anatomy (Table 3). 31% of participants wanted to know more about bacterial, viral, fungal, nutritional and parasitic diseases, and disease emergency response. Further comments indicated participants would like to know more information on disease diagnosis, algae identification, bacterial and viral diseases, disease management and treatment, disease emergency response, parasitic diseases, exotic diseases, toxicology, diseases of marine reptiles and mammals, disease management and biosecurity measures, case studies and fish anatomy. Other comments for improvements for future workshops included more '*do-it-yourself*' disease diagnosis, more interaction of PhD students with farmers, with more time to cover more topics.

Table 3. Presentations delivered on Day 1. Evaluation by workshop participants

Day 1. Lecture/ Talk topic	Good	OK	Poor	Not needed
1. Diagnostic Approach to Fish Disease	90%	10%		
2. Fish Health Certification Program	85%	15%		
3. Fish Anatomy	85%	15%		
4. Parasitic & Nutritional Diseases of Barramundi	85%	15%		
5. Bacterial & Viral Diseases of Barramundi	90%	10%		
DEMO 1: Fish Anatomy & Identification of internal organs	71%	29%		
DEMO 2: Packing up Fish samples to send to Lab for testing	70%	30%		
6. Barramundi Disease Issues in the Northern Territory	90%	10%		
7. Fish Toxicology & Fish Kills	80%	20%		
8. Exotic Diseases & Emergency Disease Response	80%	20%		

Workshop evaluation forms from Day 2 were summarized and are presented in Table 4. 93% of participants voted '*good*' for the demonstration and practical sessions on fish dissection and sampling of the internal organs for histology examination, with 83% of participants voting '*good*' for the demonstrations and practical examination of fish skin and gills for ectoparasites, fungi & bacteria (Table 4). The '*most useful*' practical voted was 'examining the gills of fish for ectoparasites' and 'dissecting a fish with organ identification and sampling for histology analysis'. These topics, together with 'sampling fish for bacteriology and virology', were also topics that some farmers wanted to know more about. The '*least useful*' topic was fish euthanasia. Farmers indicated; they want more of telling them "*how to do*" and less of "*what to do*" with more information on practical treatment methods including new and emerging chemicals.

Other general comments indicated the time of year chosen was good to run a workshop. 60% liked a 2-day workshop, with 33% preferring a 3-day, and 7% voted for a 1 day workshop. Preference for location of future workshops indicated 40% would prefer Townsville, 40% would prefer Cairns, 10% were prefer Port Douglas and 10% do not mind any location.

Table 4. Evaluation of practical sessions by workshop participants

Day 2. Practical Demonstrations (Laboratory, JCU)	Good	OK	Poor	Not needed
Demo 1: Light microscope set up & use	73%	20%		7%
Demo 2: Fish sedation & external examination for disease	67%	27%	6%	
Demo 3. Examining fish skin for ectoparasites, fungi & bacteria	87%	13%		
Demo 4: Examining fish gills for ectoparasites, fungi & bacteria	87%	13%		
Demo 5: Fish euthanasia	67%	27%		6%
Demo 6: Fish Dissection & sampling internal organs for histology	93%	7%		
Video Demo 7: Sampling Fish for Bacteriology & Virology	87%	13%		
Demo 8: Packing up Fish samples to send to Lab for testing	73%	20%		7%

In conclusion, the workshop was very successful and well-received by fish farmers, technical staff, aquarists, feed company representatives and veterinarians. Participants were keen to participate in the hands-on practical sessions and this was reflected by positive feedback in workshop evaluation forms. The Australian barramundi farming industry, Reef HQ, and Biosecurity Queensland now have 24 better trained individuals, with knowledge, skills and expertise that can be utilised and passed onto co-workers in the event of an endemic disease outbreak or disease emergency on their farm, hatchery, commercial marine aquarium or during a fish kill event involving a natural fisheries resource.

Implications

In the event of a declared disease, or an aquatic disease emergency, occurring on a fish farm, hatchery or wild fishery resource in Australia, farm managers, veterinarians and aquarists are now better equipped to take appropriate samples for disease diagnosis. Farm workers, aquarists and field veterinarians now have appropriate technical skills, knowledge and ability to recognize signs of fish diseases and take appropriate action, for confirmation and/or exclusion of an endemic or exotic disease. In the event of disease emergency, farmers are required to report this event to their appropriate State Government Department, with legislation varying between states. In Queensland, the new '*Biosecurity Act*' indicates there is to be a '*shared responsibility*' for both the farm and the government to mitigate against the escape of an infectious agent from the farm into the environment. This has implications for the aquaculture industry, natural fisheries resources and for movement of aquatic animals and trade within and between the various states and territories of Australia. During a disease outbreak, the farm or hatchery may be requested by the relevant state authorities to collect relevant epidemiological information pertaining to the

disease outbreak, and to sample, preserve and send samples of sick animals to the local state government veterinary laboratory for disease diagnosis and confirmation or exclusion of a disease as newly emerging, endemic or exotic.

Early response by farmers, aquarists and field veterinarians with correct sampling procedures are essential to expedite the disease diagnosis process. This has obvious implications for the long term sustainability of the aquaculture industry and for commercial marine aquariums relying on wild sourced marine animals for display and educational purposes in Australia. This workshop has implications where it allows for a flow-on effect for the States and Territories, resulting from improved farmer and government veterinary capacity for fish disease detection, response, diagnosis, treatment, and control, disease surveillance and disease reporting for both Queensland and for the Northern Territory.

Extension and Adoption

This workshop has provided direct extension to the fish farming and marine aquaria sector of the aquaculture industry within Australia. This workshop has facilitated extension to Reef HQ staff of the Great Barrier Reef Marine Park Authority, and to Queensland government field and laboratory veterinarians of BQ, Biosecurity Sciences Laboratory and Berrimah Veterinary Laboratory of the NT, by providing both knowledge and practical hands-on training and skills in fish disease identification, fish sampling for disease diagnosis and disease emergency response. All workshop participants were up-skilled in fish disease detection, identification, diagnostic skills and biosecurity as it relates to disease of aquatic animals. These skills will be further utilised by workshop participants during a disease incursion or disease emergency response.

Further extension will continue as this new knowledge, the technical skills and expertise gained by all workshop participants are passed onto fellow co-workers on many fish farms and hatcheries, at marine aquaria within the state of Queensland or in the Northern Territory. Similarly, exchange of all new information, technical skills and practical expertise gained by veterinarians attending the workshop from both Queensland and the Northern Territory has allowed for further dissemination and extension of knowledge and skills to other staff, that can be utilised in the event of a disease incursion or disease emergency in each State.

Project coverage

This workshop was brought to the attention of fish farmers at the Annual General Meeting in 2013, at the combined AB&APF conference in 2013, whereby the majority of ABFA members showed support for this activity.

A government article on the workshop was advertised on the DAF internal Intranet site titled 'Nineteen fish farmers and eight DAF veterinarians are now better able to detect and control fish diseases after attending a two-day workshop in Townsville' in November, 2015 (Appendix I).

Project materials developed

Project materials provided are outlined in the Methods section. This included; powerpoint presentations, that were posted out to all workshop participants as a CD. A poster listing common parasites of barramundi was created and distributed to all workshop participants. (Appendix II). AQUAPLAN 2014-2019 brochures outlining

'Australia's Strategic plan for Aquatic Animal Health', and a USB with "Aquatic Animal Diseases significant to Australia. Identification Field Guide 4th edition" was kindly donated by Ingo Ernst of the Department of Agriculture, Australia and were distributed to all workshop participants.

APPENDIX I

Fish disease & biosecurity workshop in Nth Qld

Nineteen fish farmers and eight DAF veterinarians are now better able to detect and control fish diseases after attending a two-day workshop in Townsville.

Senior Veterinarian, Dr Rachel Bowater led the workshop covering endemic and exotic diseases of fish cultured in Queensland, biosecurity, emergency aquatic animal disease responses, fish kills and lessons learned from disease outbreaks occurring in the Northern Territory.



Pictured: Dr Rachel Bowater sharing her skills and knowledge during the fish disease identification practical session.

Rachel said she was pleased to see so many industry members attending and really getting involved.

"The goal of the workshop was to provide some basic disease identification skills and an understanding of biosecurity, and emergency disease responses.

"The workshop combined theory and practical skills in examining fish for signs of endemic & exotic diseases and to identify common parasites of farmed fish.

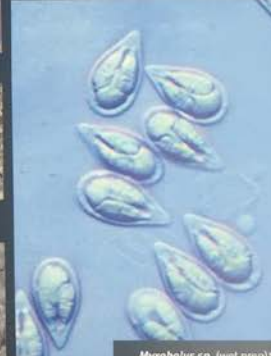
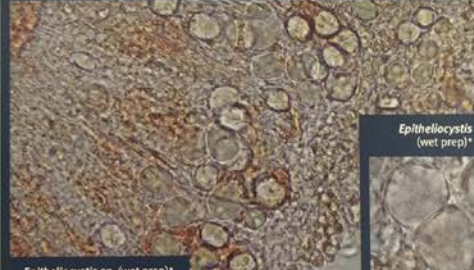
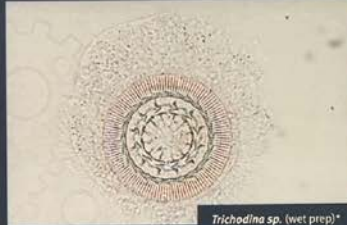
"Participants actually practiced preparing their own fish samples for examination and using the labs at James Cook University we could show them where to look and what to look for when diagnosing a disease.

"We were lucky to have some of Queensland's leading veterinarian on hand to provide advice and share their experience.

Three DAF veterinarians gave talks during the workshop; Dr Rachel Bowater, Dr Ian Anderson and Dr Roger Chong. Additionally, visiting veterinarian Dr Kitman Dyrting also presented during the workshop.

The workshop was funded by the Fisheries Research & Development Corporation (FRDC), People development Program. For more information on the program visit the [FRDC website](#).

Gill & skin parasites of barramundi



CSy341_02/15

* Images courtesy R. Bowater
* Images courtesy J. Anderson