Aquaculture Innovation Hub

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Australian Government
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Table of Contents

Non-Technical Summary

2009/12: Aquaculture Innovation Hub

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PROJECT OBJECTIVES:

1. Increase communication and collaboration among industry and research participants.
2. Identify priorities and help develop applied research, training and extension activities.

The Aquaculture Innovation Hub was a new initiative from the Seafood CRC and the Fisheries Research and Development Corporation to coordinate aquaculture research under the Seafood CRC, facilitate improved communication and assist development of new collaborative projects.

The hub brought together industry participants and research providers and fostered a better understanding of the research challenges faced by industry and the capacity and potential for researchers to address these challenges. The hub arranged face-to-face meetings, established a website and put help people stay in touch through email, teleconferences, text messaging and other forms of communication.

In addition, the hub developed and managed two hatchery networks, one for shellfish and one for marine finfish. The aim of the networks was to help hatcheries access and adopt the latest technology and identify key research, training and education priorities. The networks helped coordinate specific sessions on hatchery technology at the Australasian Aquaculture conferences in 2010 and 2012. Vocational and academic training needs were identified and training workshops, technical exchanges and visits organised.

OUTCOMES ACHIEVED

- Better programs and projects that deliver on Seafood CRC outcomes (address industry priorities, cost-effective, on-time, innovative science).
- Increased understanding of research project development and management among Seafood CRC participants
- Increased communication among aquaculture research and industry.

LIST OF OUTPUTS PRODUCED

Allan, G., Booth, M., Mair, G., Clarke, S. and Biswas, A. (eds.) 2009. The 2nd Global COE Program Symposium of Kinki University, 2009. Sustainable Aquaculture of the Bluefin and Yellowfin Tuna – Closing the Life Cycle of Commercial Production. ISBN 978 1 74256 021 2. 95 pp.

Fielder, D.S. and Heasman, M.P. 2011. Hatchery Manual for the production of Australian Bass, Mulloway and Yellowtail Kingfish. Industry and Investment NSW. ISBN 978 1 74256 058 8. 17 pp.

Yoshizaki, G. 2010. Germ cell transplantation in fish: Can surrogate bonito make tuna gametes? Paper presented at Australasian Aquaculture 2010, 23-26 May 2010, Hotel Grand Chancellor, Hobart, Tasmania.

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Zambonino, J. 2010. Dietary vitamin A, C and D influence the morphogenesis of marine fish larvae: a review of the main results and recommendations obtained from finfish (EU project). Paper presented at Australasian Aquaculture 2010, 23-26 May 2010, Hotel Grand Chancellor, Hobart, Tasmania.

Cobcroft, J. 2010. Skeletal malformations in cultured fish from Australian marine finfish hatcheries. Paper presented at Australasian Aquaculture 2010, 23-26 May 2010, Hotel Grand Chancellor, Hobart, Tasmania.

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Hutchinson, W. 2010. Effect of live food feeding regimes on yellowtail kingfish *Seriola lalandi* larval survival and growth. Paper presented at Australasian Aquaculture 2010, 23-26 May 2010, Hotel Grand Chancellor, Hobart, Tasmania.

Reynolds, A. 2010. Digestive tract development and associated enzyme activity in larval coral trout, *Plectropoumus leopardus*. Paper presented at Australasian Aquaculture 2010, 23-26 May 2010, Hotel Grand Chancellor, Hobart, Tasmania.

Mobin, S. 2010. Effects of application of two feeding regimes of live feeds enriched in the presence or absence of an antioxidant at two different periods of time on

the growth and mortality of larval and juvenile red seabream, *Pagrus major*. Paper presented at Australasian Aquaculture 2010, 23-26 May 2010, Hotel Grand Chancellor, Hobart, Tasmania.

Chapman, C. 2010. Microbial communities within an oyster hatchery. Paper presented at Australasian Aquaculture 2010, 23-26 May 2010, Hotel Grand Chancellor, Hobart, Tasmania.

Kalam Azad, A. 2010. Factors influencing larval development and survivorship of laboratory-reared purple sea urchins (*Strongylocentrotus purpuratus*): implications for aquaculture. Paper presented at Australasian Aquaculture 2010, 23-26 May 2010, Hotel Grand Chancellor, Hobart, Tasmania.

Luis de Almeida Marques, H. 2010. Study of seeding densities in brown mussel (*Perna perna* L.) cultured in Caraguatatuba, Sao Paulo State, Brazil. Paper presented at Australasian Aquaculture 2010, 23-26 May 2010, Hotel Grand Chancellor, Hobart, Tasmania.

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Acknowledgements

We would like to thank Drs Graham Mair and Len Stephens from the Seafood CRC for their support developing and carrying out this project. Ms Emily Mantilla, also from Seafood CRC was pivotal to the success of this Hub project. She helped ensure the Seafood CRC website serviced the needs of Hub project participants (members only section) and non-Seafood CRC members of the Hub hatchery networks (public access section of the site). More importantly, she communicated her enthusiasm for the Seafood CRC and aquaculture generally.

All the Seafood CRC participants who participated during the meetings, training programs and visits were enthusiastic and very willing to share their knowledge. We are very grateful to the nearly 90 members of the hatchery networks across Australia (plus a couple of international members) who embraced the concept of working together and, despite commercial pressures, were happy to share their experience and skills. A special thanks to Mike Thompson from Clean Seas Tuna and Dr Amal Biswas from Kinki University for their help coordinating the tuna symposium in December 2009 and Drs Jenny Cobcroft and Stephen Battaglene for coordinating the hatchery technology workshop in May 2010.

The Hub organised a Visiting Scientist Bursary for Professor Gavin Burnell from Cork University, Ireland. We would like to thank Professor Burnell for sharing his experience with forming AquaTT and with communication within the aquaculture community. The meetings and workshops he conducted in Perth, Hobart, Adelaide and Port Stephens were very valuable.
One of the tasks the Hub team were asked to do was to assist with the development of a cobia consortium and when this fell over, a cobia project. While neither came to pass, we would like to acknowledge the support we received, particularly from Alaister Dick from Pacific Reef, Dr Richard Smullen from Ridley and Dr Peter Lee from DEEDI.

To help improve technical skills among Australian hatchery technicians, the Hub offered a travel grant to attend the 8th Annual Workshop on Physiology and Aquaculture of Pelagics with Emphasis on Reproduction and Early Developmental Stages of Yellowfin Tuna, *Thunnus albacares*, held at the Achotines Laboratory, Republic of Panama, Central America, 7-19 June 2010. We thank Drs Daniel Bennetti (University of Miaimi) and Daniel Margulies (Inter American Tropical Tuna Commission) for organising the workshop.

We would also like to acknowledge the help and support from all those who contributed to the sessions and workshops we ran in conjunction with the Australasian Aquaculture conference in 2010, the Prawn and Barramundi Conference and the many technical exchanges and training visits facilitated by this project.

The Hub project was terminated early after the Principal Investigator, Dr Geoff Allan, changed positions within NSW Department of Primary Industries (formerly Industry & Investment NSW). We thank Dr Jenny Cobcroft for taking over the leadership of the project.

1. Introduction and Background

This was a project under both the Seafood CRC and FRDC. For the Seafood CRC, the project related to Program 1, the Production Innovation Program. The overall outcome for Program 1 was the “Increased profitability and industry value through production innovation and efficient delivery of Australian seafood to the consumer”. This outcome was intended to deliver $1.1 billion in added value to the Australian Seafood Industry. To help achieve this outcome, the Seafood CRC developed several theme business plans, two of which related exclusively to aquaculture; Finfish – Aquaculture Production Innovation and Breeding for Profit. The theme business plans were developed following extensive consultation with all Seafood CRC participants, particularly those involved with production and production research. This consultation culminated in a two day theme business plan workshop in Melbourne (14-15 April 2008) and the identification of five strategies for the Finfish Theme and five strategies for the Breeding theme. One of the strategies in the Finfish Theme Business Plan, and also a critical component of the Breeding for Profit Theme Business Plan, was to improve coordination and increase collaboration among producers and researchers. This project underpinned that need.

For the FRDC, this project addressed the challenge to respond to, and take advantage of, increased demand for seafood and for recreational and customary fishing experiences. For FRDC stakeholders, this project helped to improve access to the latest technology, particularly hatchery technology for shellfish and finfish.

Aquaculture in Australia is characterized by a large number of relatively small, geographically dispersed industries, often challenged by a small domestic market and significant transport challenges to access export markets. There is a strong research base and considerable industry and government funding, particularly through the FRDC and CRC’s. A key strength of Australian aquaculture has been the collaboration between researchers and researchers and industry. Specific programs have been set up to coordinate research and facilitate collaboration for individual species (e.g. tuna, salmon, abalone) and topics (e.g. nutrition, animal health, inland saline aquaculture) (See Table 1 attached). However, a weakness in Australia has been that it is difficult to identify research problems that are common across the industry sectors, and as a consequence, research has often targeted or had a "narrow" focus on a particular sector. Another weakness has been that communication between disciplines is sometimes lacking. We need to improve coordination and communication so that our research plans are informed by problems across multiple sectors and so that our knowledge across multiple related disciplines can be effectively utilised. This should result in research outcomes that are more generally applicable and of greater benefit and improve the efficiency of research funding (benefit per dollar spent).

In 2006, the FRDC agreed to support the establishment of a hatchery network in recognition of the need to share technology within those sectors of the mollusc and finfish industries. The need for a specific finfish hatchery working group was also identified as a separate priority at the Melbourne CRC the business plan workshop held in April 2008. In addition, some of the production

sectors within the CRC have specific projects to assist with R&D planning and management (e.g. Clean Seas Tuna, the Oyster Consortium). Support for increased sector specific networking opportunities is clearly important, both within and outside the CRC. However, it is important to recognise the cost of collaboration - regular meetings are very expensive for industry and research agencies.

Within the CRC there are over 25 participants and supporting companies or agencies. This gives the CRC a great depth and ability to solve research challenges for industry participants. However, building effective synergies between so many participants is challenging and requires considerable efforts in communication, building trust and demonstrating the benefits of collaboration. There is an opportunity to develop a mechanism to coordinate and improve collaboration for production based activities within the Seafood CRC (including fish and invertebrate research and technology development).

2. Need

Within the Seafood CRC, approximately half the industry participants committed most of their contribution to the CRC for production-based research and the majority of research provider participants are involved with production research. In total, approximately $3.5 million p.a. was committed to finfish production or genetic research. While many participants were already committed to projects to address their priorities, the level of collaboration within these projects was modest and industry and research participants expressed a desire to increase collaboration and networking. There was therefore an opportunity to better exploit synergies between industry and research participants to improve delivery of planned outcomes. Within the aquaculture industry, including sectors and companies outside the Seafood CRC, there was a strong need to increase the overall level of technology. In many cases, organisations have difficulty accessing the latest successful technology, particularly in the hatchery sector. This needs, addressed through better networking and information exchange, underpinned this project.

Specific needs were:

- To develop new levels of collaboration and cooperation across aquaculture sectors, disciplines and CRC programs and projects
- To coordinate training and capacity building programs for industry and research participants (including within and outside the CRC)
- To improve efficiency of project initiation and delivery of research outcomes
- To plan and budget activities to achieve target industry outcomes
- To generate investment in strategic research focused CRC outcomes
- Create mechanisms and cooperative research systems which can outlive the CRC

3. Objectives

1. Increase communication and collaboration among industry and research participants.
2. Identify priorities and help develop applied research, training and extension activities.

4. Methods

The stakeholders, including Seafood CRC participants and non-Seafood CRC participants (members of the hatchery networks) represented in the Hub project are listed in Table 1.

1. Increase collaboration among aquaculture producers and researchers.

Regular production innovation hub meeting were held for all Seafood CRC industry and research participants involved with production. The meetings involve a combined session for all participants where overall aquaculture industry developments were presented, progress against CRC planned outcomes discussed, CRC information communicated, and program–level future priorities and plans developed. Vocational and academic training needs were also identified.

This activity was primarily designed to be of benefit to Seafood CRC participants.

Two networks were established for marine hatchery operators in Australia. Successful expansion of aquaculture in Australia depends on cost-effective hatchery technology and well designed breeding programs have been a key to the successful development and ongoing viability of major aquaculture industries worldwide. The aim of the hatchery networks was to improve communication among hatchery operators, selective breeding program operators and technical staff, increase the uptake of new technology developed in Australia and overseas and improve training opportunities for hatchery technicians. The shellfish hatchery network was coordinated by Dr Wayne O'Connor and the finfish hatchery network by Dr Stewart Fielder. Dr Nick Robinson provided expert guidance to coordinate breeding plans for different sectors and coordinate training and extension needs for breeding. This guidance was provided directly to the Seafood CRC Program Manager, Dr Graham Mair.

All experts have extensive experience with hatchery production and coordinating the exchange of technical information.

The networks established and maintained regular communication among all hatcheries and selective breeding programs in Australia and improved linkages between overseas hatcheries, selective breeding programs and experts. Workshop were designed to address identified priorities and separate technical exchanges, whereby technicians visited or workedat operating hatcheries were facilitated.

The networks were designed to be of benefit to all hatchery operators and those designing and implementing selective breeding plans including both Seafood CRC participants and non-participants. The network coordinators also organized sessions and workshops in conjunction with Australasian Aquaculture (AA) 2010 and 2012. Organising and running sessions and

workshops at AA helped ensure Australian aquaculture producers were kept informed of international developments.

2. Identify priorities and help develop applied research, training & extension activities.

Priorities and opportunities for research, training and extension were identified during the usual project development process and during the Seafood CRC Production Innovation workshops. When industry research priorities were identified, “project development teams” were formed to work with the CRC Program Management team to help develop new projects (e.g. cobia consortium).

Cross-project (and cross-program) training needs and opportunities were identified. During the Production Innovation Workshop and hatchery network workshops and meetings, worthy applicants for the Seafood CRC Industry Bursary, Research Travel Grants and Visiting Scientist’s Scheme under the Communication and Education Program were identified.

Table 1. Industry sectors “represented” within the Seafood CRC, themes and FRDC Sub-programs and proposed networks.

Species	S CRC Participants	Seafood CRC				FRDC						
		Breeding for Profit Theme (A)	Finfish Theme (B)	Oyster Consortium (C)	Finfish Hatchery Network (E)	Shellfish Hatchery Network (F)	ISA (G)	Sub-Programs				
								Abalone	Tuna	Salmon	Nutrition	Health
Edible oysters	✓	✓		✓		✓						✓
Pearl oysters						✓						✓
Abalone	✓	✓						✓			✓	✓
Prawns	✓						✓				✓	✓
Finfish - barra	✓	✓	✓		✓		✓				✓	✓
Finfish - YTK	✓	✓	✓		✓						✓	✓
Finfish - Tuna prop.*	✓		✓		✓				✓		✓	✓
Finfish - Tuna ranch									✓		✓	✓
Finfish - Salmon	✓		✓							✓	✓	✓
Finfish - Striped Trumpeter			✓		✓							✓

* Prop = propagation

5. Results

Results are presented as the series of milestone reports. These reports detail the agendas and participants for all the workshops and training programs organised, the program and reports from the visiting scientist, reports from technical exchange program undertaken by hatchery technicians and other progress with communication and project development.

5.1 Milestone Report No. 1 – 1 July 2009

The first milestone was to submit a draft press release about the project to FRDC for approval, as follows:

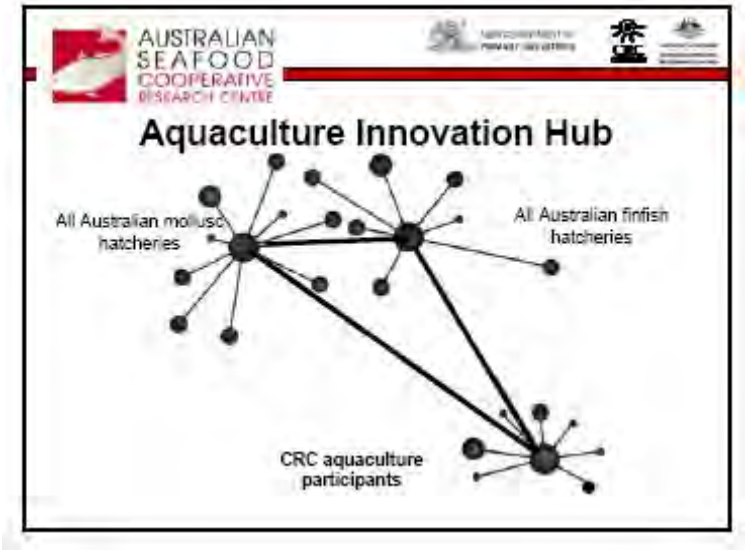
AQUACULTURE INNOVATION HUB:
Helping producers and researchers communicate.

The Aquaculture Innovation Hub is a new initiative from the Seafood CRC and the Fisheries Research and Development Corporation to coordinate aquaculture research under the Seafood CRC, facilitate improved communication and assist development of new collaborative projects.

The hub will bring together industry participants and research providers and foster a better understanding of the research challenges faced by industry and the capacity and potential for researchers to address these challenges. The hub will arrange face-to-face meetings, establish a website and put help people stay in touch through email, teleconferences, text messaging and other forms of communication.

In addition, the hub will develop and manage two hatchery networks, one for shellfish and one for marine finfish. The aim of the networks is to help hatcheries access and adopt the latest technology and identify key research, training and education priorities. The networks will help coordinate specific sessions on hatchery technology at the Australasian Aquaculture conferences, the next one scheduled for May 2010 in Hobart.

The hub will be managed by Dr Geoff Allan, with assistance from Mrs Helena Heasman and Dr Mark Booth. Dr Stewart Fielder will lead the finfish hatchery network and Dr Wayne O'Connor will lead the shellfish hatchery network.



5.2 Milestone Report No. 2 – 9 July 2009

The second milestone was:
1. Coordinate the production innovation group.
2. Deliver Prod Innovation Workshop.
3. Coordinate hatchery networks.
4. Prepare AOP for Finfish and Genetics TBP.
5. Prepare detailed extension strategy.

Progress with the project has been excellent. The aquaculture innovation group within the Seafood CRC are all aware of the Hub and plans for coordination. A meeting with the aquaculture innovation group was held during the seafood CRC Forum in May. In addition, a meeting with those CRC participants with an interest in cobia aquaculture was held and the potential for new CRC investment (additional to the GFB investment) in cobia identified. Both shellfish and finfish hatchery operators have been contacted. Consultation throughout the aquaculture community in Australia about the hatchery networks has been extensive.

Two activities have taken place in delivery of this milestone. The first was the meeting of Seafood CRC aquaculture participants at the Seafood CRC Forum in May and the second was a meeting of potential new participants in cobia R&D. At the Forum, aquaculture industry representatives were asked to discuss emerging priorities and research providers to discuss their capacity. A list of actions from that meeting was discussed with the broader CRC members and the CRC Management Team. The cobia meeting was held in Brisbane 15 June 2009. Four producers (three currently trailing cobia) plus two research providers (CSIRO & DEEDI) participated. A proposal to increase the existing industry investment of $40,000 pa from Good Fortune Bay to up to $150,000 pa has been submitted to the Seafood CRC Board for consideration. The timing of the first Hub Production Innovation Workshop has been discussed and is likely to be held in conjunction with a planned tuna symposium in December 2009.

The Finfish and Genetics Theme Business Plans were reviewed and future actions identified at the Seafood Forum in May 2009. The following future actions were agreed:

Breeding for Profit

<u>Existing approved projects (Communal)</u>

2008/773 Establishment of a cryopreserved gene bank for aquaculture. Time did not permit discussion of this project but out of session discussions identified key actions.

Action points:

- Full proposal to be submitted to the CRC by end May (XL, AS & NR)

2008/771 Genotyping central lab scoping study
Initial discussion have been held with Ag Research in NZ but WA Chemistry Centre is interested in pitching for this.

Action points:

- Review feasibility of WA Chem Centre providing genetic markers services to CRC members. (GCM, NE)

2008/769 Needs analysis for support tools for implementation of genetic improvement programs and development of strategy for a syndicated approach and 2008/770 Genetic data management and analysis software tools development/adaptation
It was broadly agreed that this was a good project to act as a catalyst to bring together a number of breeding programs under a common platform. GCM and Nick Elliot outlined discussions to date. CSIRO are working on modifications to their existing salmon and oyster databases and following this will provide a more detailed concept focused on the development and packaging of a suite of genetic data management and analysis packages which will also outline how IP will be dealt with.

Action points:

- PRP to be developed by November (NE and PK)

Education and Training

Existing approved projects

2008/772 Education and training exchange program with NOFIMA, a world leading aquaculture research institute.
There was qualified support for this project with concerns raised over effective use of Norwegian experts. There was interest in extending the scope to the use of Norwegian experts in disciplines outside just genetics and also to look at the options for bringing in genetics experts from not only Norway. It was confirmed that trainings conducted in country will use local experts supported by the exchange visitors from overseas. Clearly, now that this project is approved the PIs need to get a better idea of training needs from the participants and identify the focal areas for training and the appropriate use of international experts.

Action points:

- Development of topics and ID of trainees for genetics training (including masterclasses) at the four different levels through consultation with partners (NR & PK) – draft report for participants by early November.
- Develop special session for AA 10 on breeding plans and the business of breeding to include a Nofima guest (NR, GM & PK with Justin Fromm) – draft session framework by early September
- Develop initial researcher exchange to Norway with SARDI/Flinders and CSIRO (NR & PK) – details of exchange agreed and dates set by early July
- Agree terms of collaboration with Nofima and extend the scope and scale of the project to include exchange visits on offshore aquaculture, biosecurity and the business of research farms (NR & GCM) – GCM and NR to discuss with Nofima representations at IAGA in Bangkok in June and visit Norway August 09 – nature and funding of exchanges agreed by end August 09.
- Identify additional sources of funding and directly support participant applications (NR & PK) – list of sources with deadlines distributed to participants by end August 09

2008/902 Aquaculture Innovation Hub

There was an active discussion on a number of issues that the Hub could support including training activities through its networks (see Nofima project comments above). There was a good discussion on the issue of translocation and how current or potential restrictions to translocation (mostly state based) are acting as a constraint to the development of viable breeding program (e.g. for abalone and barramundi). It will be difficult to impact this issue on a national level and issues are probably best dealt with in the short term on a case by case basis. The Hub agreed to raise this issue at one of its meetings with the NAC acting as an advocate with the CRC playing the role of supporting research required to provide key evidence related to risk assessments.

Action points:

- Aquaculture innovation hub to develop activities focused on translocation policy and its impact on genetic programs and other issues (GA and NR with Justin Fromm – also see Finfish theme)

New Project Ideas (Research and Education and Training)

Business planning for a national barramundi breeding program Following on from discussion with the CRC and ABFA executives it was agreed to develop a proposal for the development of a business plan and informally identify the key issues regarding translocation of barramundi between QLD and NT. Discussion with ABFA have identified at least 5 ABFA members who are willing, in principle, to invest in a breeding plan – such commitment is a necessary pre-requisite to approving this concept.

Action points:

- Develop concept proposal for the development of a business plan for a barramundi. GCM to attend IAGA conference and review opportunities at completion. Consider continuation of working group to develop concepts (NR - concept for next CRC Board)
- Commission short term (informal) review of issues related to translocation of barramundi (GCM – completion by end June)

Next generation genetic marker and genomics technologies Shortage of time prohibited lengthy discussion. This is an area where significant advances are to be made with the right project. A number of research providers outlined some of the issues (NR gave a preview of the BCA of MAS project - 2008/904 whilst Nick Elliot outlined the work on whole genome selection for salmon and Abigail Elizur her work on functional genomics on prawns). Industry found it difficult contribute to the discussion but were interested in cost effective outcomes. No clear path to an innovative new research focus was evident in the time available – key opportunities may become clearer pending completion of 2008/904 and review of new international research at the International Association for Genetics in Aquaculture conference to be held in Bangkok at the end of June 09. An example of a potential opportunity would be a collaborative approach looking at the functional genomics of sexual maturation or nutrition in shellfish and finfish with common methodologies being applied to both groups.

Action points:

- GCM to attend IAGA conference and review opportunities at completion – consider creation of working group to develop concepts (GCM, NR, NE, AE)
- Consider PhD proposal on functional genomics of nutrition in prawns (AE)

Mentoring in Genetics

CST have requested a genetics “mentor” to assist them develop their hatchery practices and awareness of genetics related issues (as a precursor to investing in a YTK breeding program in the foreseeable future).

Action points:

- Develop a genetic ‘mentoring’ program for CST and others. Determine interest from other parties for similar models (NR, AS, WK)

Finfish

Existing approved projects (Education and Training)

2008/902 Aquaculture Innovation Hub

The Aquaculture Innovation Hub project was discussed and the basic structure explained. There is to be an annual forum for CRC aquaculture participants designed to share research results, identify new priorities for research, training and education and to assist with the development of new projects. In addition the hub will coordinate two hatchery networks, one for finfish and the other for molluscs. The networks are open to anyone in Australia. The hub project will fund the coordination of the project, communication activities and organisation of training workshops and meetings (and most catering at such events). Most participants to meetings and workshops will fund their own travel and accommodation. There was considerable discussion about whether funding should be allocated for people to attend the various meetings and workshops. However, the budget is not sufficient to fund all costs and there is a strong argument that if participants do not attend because of funding, then the meetings or workshops are not of enough value, and the project will need to be revised.

Action points:

- Compile comprehensive contact data base for CRC aquaculture participants and for potential members of both hatchery networks
- Survey potential hatchery network members to identify priorities and investigate the potential to use different forms of communication (e.g. facebook and novel web based communication), in addition to more traditional email, phone and face-to-face.
- Develop a plan for each network and for first annual forum.

New Project Ideas (Research and Education and Training)

- A meta-economic analysis of the options for future development of aquaculture. GCM to explore option of local and visiting scientist to work with a number of key industries (Prawn, oyster, barramundi)
- Cobia – a workshop of current and prospective stakeholders is planned for June
- GCM and Mike Thomson to visit WA to discuss options for rebuilding research collaboration (GCM to work with WA DOF and WAFIC to assess industry commitment) linked to WAFIC approved YTK research
- Geoff Allan to bring forward a project involving Ridley
- GCM to discuss a bioremediation (extracting value from bioremediation of waste water from culture ponds) concept with ABFA and APFA.
- It was agreed for the hub to coordinate watching briefs on offshore aquaculture and multi-trophic aquaculture
- An international forum on tuna reproduction and larval rearing is proposed to be co-sponsored by CRC, Kinki University and CST. Concept to be developed through the Aquaculture Innovation Hub.

- Propagation and improved larval rearing efficiency for tropical sea cucumbers (Tasmanian Seafoods)

The following table lists the agree extension outputs and strategy for the project:

FINFISH THEME ANNUAL OPERATING PLAN	CST; TSGA; ABFA, WAFIC; RIDLEYS	N/A	ANNUALLY UPDATED PLAN
TRAINING W'SHOPS REPORTS (GENETICS TRAINING; FINFISH HATCHERY TRAINING; SHELLFISH HATCHERY TRAINING)	AAGA, APFA, CST; ABFA; WAFIC; TSGA, OYSTER CONSORTIUM	OTHER COMMERCIAL AND GOVERNMENT HATCHERIES; PEARL OYSTER HATCHERIES	PRODUCED WITHIN 2 MONTHS AFTER TRAINING ACTIVITY
ANNUAL PRODUCTION INNOVATION WORKSHOP SUMMARY	SEAFOOD CRC PARTICIPANTS	OTHER AQUACULTURE INDUSTRIES	PRODUCED WITHIN 2 MONTHS OF WORKSHOP
R&D PRIORITIES	SEAFOOD CRC PARTICIPANTS	FRDC STAKEHOLDERS	PRODUCED WITHIN 2 MONTHS OF WORKSHOP
TRAINING PRIORITIES LINK WITH COMMUNICATION AND E&T PROGRAM (SPECIFICALLY INDUSTRY BURSARY SCHEME, RESEARCH TRAVEL GRANTS AND VISITING SCIENTIST'S SCHEME)	SEAFOOD CRC PARTICIPANTS	FRDC STAKEHOLDERS	PRODUCED WITHIN 2 MONTHS OF WORKSHOP
NEW PROJECT PRIORITIES	SEAFOOD CRC PARTICIPANTS	FRDC STAKEHOLDERS	PRODUCED WITHIN 2 MONTHS OF WORKSHOP
REPORTS (INFO) FOR MANAGEMENT	SEAFOOD CRC PROGRAM MANAGEMENT TEAM		

A survey of hatchery managers is currently underway to determine the optimum communication mechanisms for the members. A new initiative from the Communications and Education Program to evaluate modern communication methods, including mobile phone voice messages about research outputs, will be evaluated in a trial by members of the Hub.

5.3 Milestone Report No. 3 – 1 December 2009

The objectives of the project are to increase communication and collaboration among industry and research participants and to identify priorities and help develop applied research, training and extension activities. The project commenced 1 July 2009. The first two milestones were submitted (in early July) and approved with the following comments. Responses to comments are in parentheses):

- Where CRC and Hub meetings are conducted in parallel the hub activities should be clearly identified and delineated. (Noted).
- The extension plan does seem a bit lacking especially as we asked for them to consider innovative communication methods such as web blogs, You tube etc as well as international linkages. (Noted. Hub members and hatchery network members have been surveyed with regard to preferred methods of communication. Most preferred methods are email and telephone. Further trials of novel new communication methods are underway.)
- Appears that the component of the milestone regarding coordination of hatchery networks has not been reported. Whilst this could be shifted to another milestone report we ask that this be expanded upon in the next report? (Reported here. Please note there was less than one month after project approval and the submission of the first two milestones.)
- Dissemination and coordination outside of the CRC is a bit light on (given that FRDC is providing additional resources for incorporation outside of the CRC) and this should be picked up in future milestone reports. (Noted. See above.)

This third milestone represents the first six months of progress with the project. The project is on track. Additional requests for activities for the hub to undertake include assistance with organising the cobia consortium and leading the organisation of the international tuna symposium (held in December 2009). These activities are reported in more detail below.

The first hub meeting was held in December 2009, immediately following the tuna symposium, and brought together a majority of aquaculture participants in the CRC. The Record of Meeting is presented as Appendix 1. Coupling the hub meeting with the tuna symposium led to excellent representation from finfish producers within the CRC and strong participation from research providers. Notable exceptions were the oyster consortium and the prawn farmers association. A meeting to assist the cobia consortium was also held in conjunction with the hub meeting. Unfortunately, only two of the four industry participants were able to attend so the meeting focussed on identifying research able issues. The hatchery networks have been established. The networks are focussed on reaching operating hatcheries and contacts are made with technicians as well as hatchery managers. The first hatchery workshop has been planned and a number of technical exchanges have taken place or been planned. Preferred methods of communication have

been discussed with hub members and separately with all hatchery network members. The highest priority methods of communication are email and phone.

NSW GOVERNMENT | Industry & Investment

Agenda

MEETING	Seafood CRC Aquaculture Innovation Hub
MEETING NO.	1
DATE/TIME	2-3 December 2009 LOCATION SARDI, Adelaide
PREPARED BY	Geoff Allan

DRAFT AGENDA

DAY 1 – Wednesday 2 December

14:00-14:20	Welcome, Hub Project & outline of meeting	*Geoff Allan Stewart*
14:20-14:30	Hatchery networks	*Fielder Stephen*
14:30-14:45	Trip report from Greece	*Battaglene Bennan*
14:45-15:00	Trip report from Taiwan	*Chen*

Industry Session- lessons from past CRC projects and priorities for the next 5 years

15:00-15:30	Clean Seas	*Mike Thomson*
15:30-15:45	Abalone growers	*JustmFromm*
15:30-16:00	Ridley	*Richard Smullen*
16:00-16:20	Afternoon break	
16:20-17:30	Facilitated network discussions	*Coordmated by Emily Downes*
17:30	Meeting close	
18:30	Pre-dinner drinks (Oaks Plaza Pier Hotel bar)	*Sponsored by Hub*
19:30	Dinner (Scampi's on the Beach)	*Sponsored by Hub*

DAY 2 – Thursday 3 December

08:30-10:30 Cobia Session- research planning (Chair: Peter Lee)

0830-08:45	Introduction – history of cobia consortium	*Peter Lee*
08:45-09:15	Overview of cobia	*Dan Bennelli*
09:15-09:45	Context existing activities – DEEDI, ACIAR & Ridley	*Peter Lee/Geoff Allan/Richard Smullen*
09:45-10:30	Positioning cobia in the market-project proposal	*Evan Douglas*
10:30-11:00	Morning break	

11:00-13:30 Cobia Session- continued. Aim to identify specific research objectives (Chair: Peter Lee)

11:00-11:30	Production systems research 1ssues
11:30-12:00	Nutrition & feeding research issues
12:00-12:30	Broodstock & breeding research 1ssues

12:30-13:30	**Lunch**	
13:30-16:10 Seafood CRC General Session. Aim: to gather ideas for new "innovative" projects, to seek new ideas for projects under development and identify priorities for students, travel grants and industry bursaries (Chair: Geoff Allan)		
Tea & coffee available during the session – no break planned		
13:30-13:50	Overview of Seafood CRC progress	*Len Stephens*
13:50-14:10	Innovation – ideas for new projects	
14:10-14:20	New finfish theme projects	*Geoff Allan/David Stone*
14:20-14:50	New genetics theme projects	*Graham Mair/Nick Robinson/ Xiaoxu Li*
14:50-15:10	Student projects	*Emily Mantilla*
15:10-15:30	Industry bursaries – a new approach	*Graham Mair/Emily Mantilla*
15:30-15:50	Travel grants	*Emily Downes*
15:50-16:10	General discussion + whiteboard	
16:10	Meeting close	

The Hub project team was asked to help coordinate formation of the cobia consortium following identification of cobia aquaculture as a priority and acceptance by the CRC Board to form a new cobia consortium. The hub team was also asked to lead the organisation of an international tuna symposium by Clean Seas. The first Production Innovation Workshop was held in December 2009. Surveys and discussions with participants in the hub indicate that the communication methods preferred are email and telephone. However, novel methods will continue to be assessed and evaluated. The oyster consortium is involved with Seafood CRC project 2009/747: Can they hear me? Around 80 people in total are involved in trialling this technology including oyster consortium members. The first trial will be of "Seafood Industry News" in Jan/Feb 2010. Depending on the response, this technology may be used to communicate information to hub and/or network members.

Cobia: Following a meeting organised thorough the hub in June 2009 with CRC members interested in cobia aquaculture, a proposal to form a consortium was agreed with the CRC and members. Industry participants were Pacific Reef Fisheries (PRF), Good Fortune Bay (GFB), Marine Produce (MP) and Ridley Aquafeeds. Subsequently, WAFIC agreed to join. The current composition and funding model is shown in the table below. The next stage required before the consortium members make contributions is an agreed R&D plan and identified research providers for the different components. A meeting of cobia consortium members and potential research providers was arranged in conjunction with the December Production Innovation Workshop. Unfortunately, consortium participants from GFB and PRF were unable to attend. Research priorities were addressed and DEEDI scientist, Dr Peter Lee, coordinated the meeting (see Production Innovation Workshop agenda, below, for details of the meeting). Further agreement/endorsement of the research plan and identification of research providers for the individual components is still required.

Proposed contribution for cobia consortium:

Source	2009-10	20010-11	2011-12	2012-13	2013-14	$ Total
GFB	40,000	40,000	40,000	40,000	40,000	200,000
MPA	40,000	40,000	40,000	40,000	40,000	200,000
Pac Reef	40,000	40,000	40,000	40,000	40,000	200,000
Ridley	10,000	10,000	10,000	10,000	10,000	50,000
WAFIC CRC Funds	40,000	40,000	40,000	40,000	40,000	200,000
CRC	105,000	105,000	105,000	105,000	105,000	625,000
Total	255,000	255,000	255,000	255,000	255,000	1,475,000

Tuna: The tuna symposium was an initiative from Clean Seas. Clean Seas have collaboration with Kinki University, Japan, for cooperative research on breeding bluefin tuna. Kinki University have a grant from the Global Centre of Excellence that includes funding to conduct international symposia. Kinki asked Clean Seas to host the second of these symposia in Australia. Clean Seas requested help from the Hub to lead the organisation of the symposium. The organisation involved advertising the symposium, organising registrations, organising all catering, assisting with accommodation, drafting the agenda, collecting and editing all papers for a published proceedings (including extensive English language corrections for papers from Japanese and international contributors), arranging chairs for the symposium and managing discussion periods. The symposium was titled “Sustainable Aquaculture of the Bluefin and Yellowfin Tuna – Closing the Life Cycle for Commercial Production”. The symposium was held at the SARDI campus in West Beach, Adelaide, and over 100 people registered. The advertising flyer appears below. The delegate list and proceedings are presented as Appendix 2 and 3.

Hatchery networks have been coordinated. There are 53 participants in the finfish hatchery network (49 from Australia) and 36 (32 from Australia) in the shellfish hatchery network. Details of the participants are presented as Appendix 4. All participants in the networks were surveyed to determine priorities and preferred methods of communication. Participants preferred to use email exchange as the major means of communication.

Seafood CRC Aquaculture Innovation Hub

Hatchery Network Questionnaire

Under the auspices of the CRC Aquaculture Innovation Hub, a network for commercial hatchery practitioners will be established with the overall aim of:

- Fostering a better understanding of the many and ever-changing challenges faced in a commercial hatchery production.
- Obtaining a better understanding of problems associated with hatchery production of various species and indentifying areas of common interest and potential solutions. Keeping in mind production problems frequently vary latitudinally and temporally, and are often site or species specific.
- Integrating hatchery processes from a diverse range of species and develop a future focus for beneficial research and communication.

Two separate networks are currently planned, “Finfish” and “Shellfish” (Molluscs and prawns), which will operate largely independently, but will interact in areas of common interest. There will be no fee charged to be a member of the network.

To assist in developing a Hatchery Network your response to the following questions would be greatly appreciated.

1. Do you want to be involved in the Hatchery Network
   □ Yes □ No

2. In which Network would you like to be involved
   □ Finfish □ Shellfish

3. What services could be provided that would be advantageous to you

☐ Conference topics and/or Work Shops that focus on specific hatchery issues or recent developments in the field: eg. water treatment, bacteriology, production techniques, etc.

☐ Staff exchanges.

☐ Visiting experts from overseas to speak about specific issues indentified as pertinent to industry.

☐ Technical tours

Are there any other services a network could provide?

_____
_____
_____

4. What is your preferred method of communication
   □ Mail □ E-mail □ Fax

5. Are you the appropriate point of contact at your Company/Facility, should others be contacted as well? Please provide contact details (Name, Address, Ph, email)

_____
_____
_____

6. Would you be happy to have your contact details entered into the Network data base?
   □ Yes □ No

7. Would you be interested to participate in a Hatchery email forum?
   □ Yes □ No

Please forward your response to Helena Heasman who will coordinate activities on behalf of the hub:

Helena Heasman: Industry & Investment NSW Port Stephens Fisheries Institute | Locked Bag 1 | Nelson Bay | NSW 2315, T: 02 4916 3912| F: 02 4982 1107 | M: 0410 057 448 | E: Helena.Heasman@industry.nsw.gov.au

For further information regarding the hatchery Networks please contact:

Finfish Hatchery Network: Stewart Fielder
Ph: 02 49821232
Fax 02 49821107
stewart.fielder@industry.nsw.gov.au

Shellfish Hatchery Network: Wayne O'Connor
Ph: 02 49821232
Fax 02 49821107
wayne.o'connor@industry.nsw.gov.au

The networks have arranged the first hatchery session at Australasian Aquaculture 2010 in Hobart and the first Hatchery Technology Workshop in conjunction with the conference (assistance from Drs Jenny Cobcroft and Stephen Battaglene, UTAS, is gratefully acknowledged).

Progress against dissemination,extensionand commercialisation

The Tuna Symposium is available on the Seafood CRC website; extracts of recorded presentations from the Tuna Symposium are available as pod costs; media releases about the Hub have been distributed via Seafood CRC and FRDC contact databases; Hub activities have been reported in Seafood CRC newsletter; the Oyster consortium participants in the Hub project are trialling new communication technology in conjunction with Seafood CRC Project 2009/747: Can they hear me?

5.4 Milestone Report No. 4 – 1 July 2010

The Hub project has coordinated new website information for Seafood CRC members (through the members section of the Seafood CRC website) and specifically for members of the hatchery networks (through the public access section of the Seafood CRC website). Assistance has been provided with development of a cobia aquaculture project following the collapse in the proposal for a Seafood CRC cobia consortium. Assistance with improving communication was provided through a visit from Professor Gavin Burnell, a founder of AQUATT, a group established to foster technical exchange and communication among aquaculture stakeholders in Europe.

New aquaculture innovation projects are being developed for tuna larval rearing, feed management for yellowtail kingfish and cobia.

New activities have been initiated to assist members of the Hatchery Networks. These include:

1) Marine Finfish and Shellfish Hatchery Sessions at AA'10
2) Hatchery technology workshop 27 May TAFI
3) Management of a travel grant for technicians to attend the tuna larval rearing workshop in Panama
4) Contribution to the Seafood CRC training needs analysis for hatcheries
5) Technical exchanges.

Cobia: The Hub project team was asked to help coordinate formation of the cobia consortium. Several meetings were convened and numerous individual telephone calls and teleconferences were held. Despite significant national interest in the species from producers in Queensland and Western Australia, the proposed Seafood CRC consortium for cobia aquaculture will not proceed and a new investment strategy has been recommended to the Seafood CRC Board.

Why did development of the consortium fail despite clear and ongoing interest in aquaculture of the species? One of the major problems was the lack of a true industry and/or research provider representative to champion the consortium and drive it forward. There was also no clear research constraint to the industry that potential participants felt was likely to have been resolved by Seafood CRC research. The third primary reason was that the potential participants had very different corporate priorities and these were not well aligned nor are likely to be addressed through the consortium. The late withdrawal of Marine Produce reduced overall investment in the consortium, reduced the potential national benefit of successful consortium research and ultimately led to the collapse in negotiations.

Cobia remains an excellent prospective species in northern Australia and a number of companies intend to continue to invest in development of the species for cage and pond culture. Cobia represents the best prospect at this stage to deliver on the following key milestones for the Seafood CRC:

1.1 Output Technically verified new aquaculture production systems on a commercial scale
1.1.1 Milestone Pilot-scale systems operational in at least two new production systems
1.1.2 Milestone Key researchable constraints identified and characterised in at least two new production systems
1.1.3 Milestone Key researchable constraints successfully addressed in at least two new production systems

It was recommended that the Seafood CRC support development of a single, smaller (e.g. $100,000 pa cobia aquaculture project) to be developed by DEEDI or another Seafood CRC research provider. The draft proposal is presented as Appendix 5.

The Hub Project Leader has held meetings with DEEDI staff and representatives from Pacific Reef and Ridley to help identify a suitable research strategy. A series of conditions for Seafood CRC support were prepared in collaboration with Seafood CRC Program Manager, Dr Graham Mair. A proposal is being developed.

Communication Workshops & Visiting Expert: The Hub also coordinated a successful application to host Professor Gavin Burnell under the Seafood CRC Visiting Expert program (see attached application). The Seafood CRC project, Aquaculture Innovation Hub, was designed to increase communication and collaboration among industry and research participants, exchange successful technology and increase training among hatchery operators, identify priorities for training and extension, and develop and manage collaborative projects. One of the planned activities is to investigate the potential for new communication technologies to assist with planning and communication.

This Visiting Scientist Bursary allowed Professor Burnell to visit a representative cross- section of CRC members and advise on how other models for communication among aquaculture stakeholders have been successfully developed. Professor Burnell was instrumental in establishing the AQUATT network (www.aquatt.ie) established to initially systematise, coordinate and develop the training requirements of the aquaculture industry but is also now actively involved in coordinating technology transfer and information dissemination throughout Europe. In addition, Professor Burnell is an expert on mollusc aquaculture, particularly interactions with the environment. This is a key area of challenge to oyster farmers, particularly in parts of Tasmania and the northern rivers in NSW.

Professor Burnell consulted with research providers and industry end-users. The European model of knowledge management (AQUATT) was presented in a series of meetings and workshops. Professor Burnell will produce a report to advise what, if any, lessons from AQUATT might benefit the Australian seafood sector and to suggest other potential ways to improve communication within the Seafood CRC.

Professor Burnell conducted formal workshops in Perth, Hobart, Adelaide and

Port Stephens. He also visited research providers and industry representatives involved with the Seafood CRC in Western Australia, Port Lincoln, Tasmania, the Hawkesbury River, NSW and Townsville. The major workshop on communication was organised by the Hub and held in Adelaide 22 June 2010. The meeting included presentations on AQUATT from Professor Burnell as well as presentations and discussions from others specifically involved with communication. These included Mark Booth (Seafood CRC, I&I NSW – Hub), Mrs Emily Mantilla (Seafood CRC), Justin Fromm (NAC), Jane Ham (MISA), Rachel King (Seafood CRC, Oyster Consortium) and Mike Thomson (Seafood CRC, Clean Seas Tuna) (See attached agenda and notes from the meeting. All presentations are available on Seafood CRC members website.)

Report on visit of Prof Gavin Burnell supported by the Seafood CRC Visiting Expert Award (June 14 – July 22, 2010).

Purpose of visit

This Visiting Scientist Bursary was designed to allow Professor Burnell to visit a representative cross section of CRC members and advise on how other models for communication among aquaculture stakeholders have been successfully developed. Professor Burnell was instrumental in establishing the AQUATT network (www.aquatt.ie) established initially to systematise, coordinate and develop the training requirements of the European aquaculture industry but also now actively involved in coordinating technology transfer and information dissemination throughout Europe. Prof. Burnell remains involved with AQUATT as a member of its Board. In addition, Professor Burnell is an expert on mollusc aquaculture, particularly interactions with the environment. This is a key area of challenge to oyster farmers, particularly in parts of Tasmania and the northern rivers in NSW.
Proposed outputs for the visit were:

- Adoption of improved methods of communication between aquaculture producers in Australia (through the Aquaculture Innovation Hub) based on lessons learned from the AquaTT experience.
- A framework for a longer term linkage with AquaTT
- Recommendations to the oyster consortium on environmental interactions in the Australian oyster industry

Itinerary

The Visiting Expert programme of industry meetings and workshops and presentations are attached as Appendix 5.

Workshops and Presentations

The AquaTT model was presented as a 45 minute powerpoint lecture at the following venues:

1. June 18 Western Australian Fishing Industry Council (WAFIC), Osbourne Park, nr Perth, WA. First AQUATT presentation.

2. June 22 SARDI, Adelaide, SA. Hub Communications Network Workshop (Seafood CRC) incorporating Second AQUATT presentation.
3. June 25 CSIRO, Hobart, Tasmania. Third AQUATT presentation**.
4. July 1 NSW, Government, Industry and Investment, Newcastle, NSW. Fourth AQUATT presentation.

**The CSIRO presentation was filmed and can be accessed at http://www.cmar.csiro.au/seminars/hobart/past2010.htmlhttp://www.cmar.csiro.au/seminars/hobart/past2009.html

Observations and feedback arising from AQUATT presentations given in Perth, Adelaide, Hobart and Port Stephens

1. Adoption of improved methods of communication between aquaculture producers in Australia (through the Aquaculture Innovation Hub) based on lessons learned from the AquaTT experience.

1.1: Choosing the best tool for the job. This topic starts with first identifying the needs of industry and then getting their support and involvement in the project. Finally the results need to be communicated and disseminated in an appropriate format. It was clear from the Hub Communication workshop in Adelaide that there was no shortage of ideas on how to address the dissemination stage (see Appendix 3). One of the common features of successful communication was ensuring the method of communication (e.g. face-to-face, phone, email, etc) was appropriate for all parties and for the type of message (see Appendix 2). A suggestion from Graham Mair that some meetings could be "virtual" (eg " Go –To Meeting software) is definitely worth following up. I think that the large distances between provider and stakeholder in Australia have encouraged the use of electronic methodologies over more traditional methods. However nothing beats the personal touch so ways must be found to balance this situation. One example of this would be to run in-workplace training. Seafood CRC could make more use of existing industry associations and networks as an opportunity to go and meet the "customer".

1.2: Coordinating the network of research providers. In addition to communication between academia and industry it is important that the various bodies involved in aquaculture research both within and between states also talk to each other. On the face of it there appear to be a plethora of agencies and organisations, some with unique agendas and others chipping away at similar problems. In Europe the Aquaculture Technology Platform is attempting to bring all stakeholders together under one roof in order to present a coordinated agenda to the EU with respect to funding and governance. On the face of it this role is undertaken in Australia by the FRDC (The FRDC's stakeholders are the Australian Government and the three sectors of the fishing industry: commercial (wild catch and aquaculture), recreational and indigenous. It is also guided by state and territory governments, other funding bodies, research providers, community and interest groups and ultimately the people of Australia.). I think that Aquaculture sometimes tends to get lost in this large forum and needs to

present a stronger more coherent voice. Perhaps Seafood CRC could be more proactive in taking on such a role?

1.3: Supporting all stages of the project life-cycle. Preparing an application for funding can be onerous, particularly for researchers in small teams or in academia where they have heavy teaching and administrative roles. There will also be requirements for interim and final reports by specified deadlines (see Appendix 1, Kube email). This can cause stress to academics as they will be mainly judged on their publication in peer reviewed journals rather than by the provision of technical documents for industry and/or government. Project leaders can then either hire a person to manage the project or include an AQUATT like partner to take on this role. These activities need to be recognised by allowing a budget line for project management.

2. A framework for a longer term linkage with AquaTT

2.1: Setting up and Internship. The possibility of embedding an Australian communications person into the AQUATT organisation was discussed. AquaTT would be prepared to host and train this individual for a suggested period of at least 3 months. The Internee would work alongside the various project officers and the financial controller and observe the AQUATT model of project initiation and management. Would CRC support such an initiative?

2.2: Targeting international funding opportunities. There are thematic areas where collaboration between Australia and the EU would be mutually beneficial. The desire for a sustainable approach to fisheries management and aquaculture production is a common issue as are the associated concerns over the impacts of global climate change. The Forum for European – Australia Science and Technology cooperation (FEAST) is a starting point. However as Steve Clarke (PIRSA-SARDI) has pointed out “opportunities for Australian participation in EU projects appears to be limited without a better funding model”. Attempts by Porf Burnell to explore this issue with FEAST did not yield any useful results (see Appendix 4). In the EU the recently formed Aquaculture Technology Platform is taking on this role with respect to influencing future Framework work programmes. Are the FRDC involved in similar activities in Australia? FEAST needs to be lobbied by the industry to get aquaculture and fisheries on their agenda. AquaTT could try to identify areas of mutual interest and source potential EU partners.

3. Recommendations to the oyster consortium on environmental interactions in the Australian oyster industry.

In Ireland, Bord Iascaigh Mhara (Irish Seafisheries Board) is undertaking a considerable amount of work in the area of marine conservation to help fish farmers and fishermen work responsibly, in harmony with the environment. Their CLAMS initiative is a unique Coordinated Local Aquaculture Management System that has helped aquaculture companies to integrate their operations into the coastal zone and to work in cooperation with fishing and angling concerns on conservation issues. As farmed shellfish are not

artificially fed or treated, they are reliant on their natural environment. If there are too many shellfish farms in a bay relative to the natural food supply, currents and mixing of the water column, growth may slow down. Under the UISCE project BIM are working with a team of international experts to determine the carrying capacity of a number of aquaculture areas in Ireland. Using the latest sampling and computer modelling methods they obtain in-depth knowledge of the optimal growing conditions to produce high quality seafood with minimal environmental impact.

The Sustainable Aquaculture Strategy drawn up for the NSW oyster industry by the NSW government is an impressive body of work. The resulting award winning document is a comprehensive bible of information and best practice for the industry. However there does appear to be one major omission in the strategy and this concerns carrying capacity. In the section "6.5 Stocking density (pg 35) it states the following: Experienced oyster farmer can estimate local carrying capacities based upon previous production and environmental conditions. It s acknowledged however, that because oyster farmers rely on a common food source, a conflict between individual interests and the common good may develop. The Department of Primary Industries (DPI) can prepare stock management plans to manage this issue for estuaries or parts of estuaries, at the request of the local oyster industry. There is no mention in the report of how this might be carried out but it is my impression that it would be based upon traditional two-dimensional techniques. It is my opinion that all important Australian shellfish growing estuaries and bays should be computer modelled as part of an assessment of their environmentally sustainable carrying capacity. There are several good examples of this including the SMILE (Sustainable Mariculture in northern Irish Lough Systems) project and the SPEAR (Sustainable Options for People, Catchment and Aquatic Resources) that was carried out in China.

Conclusions

The Seafood CRC is already performing a key coordinating function in both sourcing funding for research, overseeing the project performance, monitoring reporting and assisting dissemination. One area that could however be improved is in the recognition and support of good project management.

The active promotion of seafood is generally much more advanced in Australia than in the EU where it is either taken for granted (eg Mediterranean countries) or ignored (UK, Ireland). Norway is a possible exception to this sad state of affairs. I saw several excellent examples (eg Barrilla Bay oysters, Tassal Salmon) where the production activity, the product and the consumption of the product were imaginatively combined to promote seafood and educate the public.

Another area where Australia could become world leaders is in the encouragement of sustainable aquaculture. For example new South Wales has a "Sustainable Aquaculture Strategy" for the oyster industry that has been developed and accepted by all stakeholders. This should be a template of good practice for fish and shellfish farming across all states. However the

assessment of environmentally sustainable production levels could be streamlined by using recently developed, computer based, hydrographic modelling techniques.

One trend that was not healthy is that of obsessive secrecy apparent in some new and developing sectors of the industry (e.g. tuna, rock lobster and mussel hatcheries). It is understandable that investors would want to see returns for their money, but there is a risk that by adopting a closed shop attitude they will become excluded from national and international R& D breakthroughs.

Appendix 1 – Feedback from (a) Dr Peter Kube, (b) Dr Catriona MacLeod (c) Dr Steven Clark and (d) Douglas McLeod who attended the various AQUATT presentations

(a) from Dr Peter Kube

From: Kube, Peter (CMAR, Hobart)
Sent: Monday, 28 June 2010 10:22 AM
To: Geoff Allan (geoff.allan@industry.nsw.gov.au); Graham Mair (graham.mair@flinders.edu.au)
Cc: 'g.burnell@ncc.ie'
Subject: AquaTT presentation

Dear Geoff and Graham,

Gavin Burnell from AquaTT visited us on Friday and we had the pleasure of listening to his presentation and chatting with him. Thank you for organising and funding that visit. I am envious of the type of support that AquaTT provide to projects.

Gavin mentioned that you and he will meet to review his visit and I wanted to take the opportunity to add my support for actions that raise the profile and importance of good project management.

Gavin's presentation had resonance for me because I have found the Project Management aspects of CRC/FRDC projects onerous. In particular, the application and final reporting processes are extremely time consuming. In our last project, we also put a large effort into industry meetings and, although that was an important contributor to success, the organisation of that took a lot of time and could have been done better. None of these aspects get proper time and cost allocation and often a good outcome in these areas is dependent on the good will and extra work of project staff. We are always under pressure to cut costs and one of the things that seems to suffer is good project management and the provision of high quality and information. Finding the right balance between good science and good delivery is not something we do particularly well.

Gavin suggested I record my thoughts down, so I offer the following suggestions for your discussion;

1. How can the preparation of project applications be assisted, and the costs associated with preparing applications be better acknowledged?
2. How can we encourage the inclusion of the type of communications activities that AquaTT provide into project planning and costing (such as glossy publications, information via the web, extension)?
3. How can we get widespread acceptance that project management needs to be included as a costed activity in budgets?
4. How can this message of a different approach to project management be sold to Boards, Industry, and Researchers?

There are undoubtedly many other things that can be done to raise the profile of project management, but I'm sure Gavin can express them more clearly than I.

Yours sincerely,
Peter

Peter Kube PhD
Aquaculture Geneticist
CSIRO Food Futures Flagship
CSIRO Marine and Atmospheric Research

Phone: +61 3 6232 5241| Mobile: 0400 050 922
Address: Castray Esplanade, Hobart, Tasmania 7001
peter.kube@csiro.au | www.csiro.au |

(b) from Catriona Macleod

Hi Gavin,

Glad you made it back in one piece, it was really nice to meet you and chat.

I've included below some points that I took from our discussions/ your presentation of areas where there might be potential for collaboration or that I felt would be worth addressing:

- Assistance in training for researchers/ relevant industry participants in preparing "non-standard" funding applications (i.e. targetting appropriate issues & strategic emphasis)
- Project planning and management - either direct support or training in this area, particularly for multi-stakeholder/ multi-disciplinary projects to help ensure timely and relevant reporting and consistent delivery on KPI's
- and finally my pet project area - improved information transfer; improving uptake by ensuring we are talking the right language and addressing the stakeholder needs ("what's in this for me"). I am actually hopeful that we might get some funding in this area in the not too distant future and would be very interested to keep in touch with any other similar projects.

I've cc'd Harry on this email, and he'll probably contact you directly with his new email address as soon as it is confirmed.

Hope you really enjoy the rest of your trip, and have a great holiday with your family.

Take care. Cheers,

Dr Catriona Macleod
Senior Research Fellow

(Section Leader - Estuaries & Human Impacts

Research Group Leader - Environmental Effects of Aquaculture)
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Catriona.Macleod@utas.edu.au

(c) from Steven Clarke (PIRSA – SARDI)

Gavin
Enjoyed meeting with you; my comments in brief are:

- Informative presentation and much appreciated the example products provided.
- A number of EU AquaTT projects given as examples would offer similar benefits if undertaken in Australia.
- My feeling was that there were two key potential opportunities:
    - Having a suitable Australian group (Fisheries Research and Development Corporation (FRDC) or perhaps the Australian Seafood CRC (AS-CRC) work with AquaTT to facilitate improved communications between the EU and Australia.
    - Establish an AquaTT like organisation in Australia
- Suggest the Australian AquaTT organisation focus on communication (newsletters, organising workshops, key meetings, collating R&D information into a more usable form for industry, policy makers and regulators, educational institutions, public, etc) and not diversify into undertaking matters associated with direct R&D (grant application writing, project management, transferring technology) as many Australian R&D service organisations already do the latter (ranging from FRDC and CRCs to FRDC Subprograms, to MISA type organisations to individual research organisations/universities).
- Challenging to see how an identical AquaTT model would work in Australia because of the much smaller funding base, however:
    - The National Aquaculture Council would seem a good parent organisation for a dedicated AquaTT like communication group.
    - The start up and possibly early ongoing life of the communication group could be facilitated by the FRDC (and any possible relevant CRC's) providing a proportion of funds from each approved project to the company and including within project contracts a stipulation that project participants provide certain information to the company (however this should be done so as not to detract from scientists directly interacting with industry either in liaising to assess research priorities, discuss research methods and results or transferring technology).
- Opportunities for Australian participation in EU projects appear's limited without a better funding model, more funds need to be made available by the EU and/or Australian Federal Government and aquaculture a priority area (see recent review by FEAST outlining the challenges – see link attached for FEAST).

Regards
Steven

(d) from Doug Mcleod

Hi Gavin,

I trust you are 'up to your neck' in the warm waters of the Coral Sea, and enjoying your Oz adventure with the family!

Herewith some musings on AquaTT, as requested!

I was interested to learn about the current incarnation of AquaTT, as I was aware that it had 'moved on' since I was last involved; and it appears to have morphed into a much more proactive, 'involved' operation than when I was a Board Member. The old AquaTT, as I recall, was more limited to supporting project participants administratively, whereas the new version appears to be more involved as a partner, and proactively creating and establishing projects. Projects that can clearly range across a number of specialisations, with AquaTT focusing on IT stuff, applications/reports, and so on.

This is a fascinating development - probably one that was required, if the organisation was going to last - and which should guarantee the continued existence of the company.

I'm sure David Murphy would be interested to compare the application procedures in EC and here! Speaking of the Oz system (to the extent of my knowledge!), there are a number of avenues for funding, but in the aquaculture/fisheries sphere they frequently appear to pass through FRDC of thee Department of Fisheries - and their application form, 'FishNet', is certainly a big form to complete! So,some similarities. But I'm not an expert in this area!!

Improving communication in the aquaculture sector - I believe that the area that needs most improvement is contact between industry and researchers/scientists/regulators. As in Europe, there is a requirement to expand the communications - how? I suggest a need for stronger, well funded industry trade associations, in Oz that would mean fewer associations (there's currently an alphabet soup of associations and organisations across the States and at Federal level!) with improved funding. As always the difficulty is raising funds from within, so there may be a need for some public funding at least as start up cash.

Hope these brief comments are of some use - I have to run, taxi to the airport in 5 minutes, then France until August!! Yes, vacation time at last!!

With best wishes,

Doug McLeod (DouglasMcLeod@aol.com)
Shellfish Consultant
Adelaide
SA

Appendix 2: Extract from report written by Geoff Allan for CRC Newsletter

Benefits from visit

The visit delivered a number of immediate benefits to Seafood CRC participants and there are likely to be further benefits following consideration of recommendations that will arise from Prof. Burnell's report:

- The first immediate benefit was facilitation of a structured discussion on communication and methods of communication. It is very clear that effective communication is a significant challenge within the Seafood CRC, and that this challenge is similar to that experienced with comparable, large, multi-partner collaborations in Europe. For the Seafood CRC, specific issues/challenges with communication have reduced effectiveness of research, impacted on timely initiation of research programs and impeded adoption of research outputs. There are specific communication difficulties within the companies of some industry participants and between individuals from some industry participants and collaborating research agencies. This situation is common for a large, multi-partner collaboration.
- There are significant parallels with challenges experiences by the Seafood CRC and with the establishment of large research projects in the EU. Over the last few years, the organisation AQUATT has been used to help manage communication, to help interpret stakeholder research priorities and prepare project applications and to disseminate results to stakeholders. A better understanding of AQUATT should assist the Seafood CRC address some of the ongoing communication challenges.
- It was clear from workshop discussions that one of the common features of "successful" communication was ensuring the method of communication (e.g. face-to-face, phone, email, etc) was appropriate for the all parties and for the type of message. With the massive increase in information from all sources, making sure a message is heard by the intended recipients is a challenge. Some recommendations on how to improve message delivery were presented.

Report by Dr Geoff Allan
Industry & Investment, NSW
28 July 2010

Appendix 3: Edited extracts from notes made by Helena Heasman on the CRC Communications Hub Workshop

Notes on Hub Communications Network Workshop
Tuesday 22nd June 2010, SARDI, West Beach.

In Attendance: Mark Booth (Chair), Helena Heasman, Steven Clarke, Emily Mantilla, Graham Mair, Jane Ham, Julie Haldane, Mike Thomson, Rachel King, Gavin Burnell, Justin Fromm, Doug McCloud (ex CEO AquaTT), Rob Thomas

Aim: To discuss advanced methods in communication used by the AquaTT network in Europe and explore lessons for the Australian aquaculture community. To examine how the R&D needs of Seafood CRC aquaculture industry participants become successful research projects that lead to increased production and profitability and how to ensure effective communication throughout the process.

The AquaTT Model (Gavin Burnell, Seafood CRC Visiting Expert, Aquaculture and Fisheries Development Centre, University College Cork, Ireland)

AquaTT is an international not-for-profit foundation which provides project management and training services to support the sustainable development of Europe's aquatic resources. It was founded in 1992 under the EU COMETT programme as the University Enterprise Training Partnership (UETP) for the European Aquaculture Industry. It's services include:

- MOBILITY - International exchanges of students and recent graduates
- PILOT PROJECTS - Development of vocational training products
- TRAINING COURSES - High level scientific training courses in aquaculture (Aqualabs)
- THEMATIC NETWORK - Future needs analysis in education and training (AQUA-TNET)
- SURVEYS - Analysis of the fisheries/aquaculture sectors
- WORKSHOPS - Identification of industry research needs
- DISSEMINATION - Dissemination of information and results from EU research and technological development (RTD) programmes
- NEWS - Training News E-Newsletter on latest EU developments in education and training. E-Newsletters are provided as hyperlinked Table-of-Contents style so the reader need only open the story of interest to him/her rather than scroll through the entire newsletter.
- NEEDS ANALYSIS STUDIES - Industry, higher and vocational education surveys on forecasting future needs
- LANGUAGES - Glossaries and multilingual teaching materials
- MULTIMEDIA - Online training materials and courses
- INDUSTRY PROMOTION - Information posters, leaflets and online background information

AquaTT provides Project Management at every level – from first conceptual idea, finding expertise to conduct research, writing of the proposal, handling budgets, milestone reports, final reports and delivery of outputs. Or AquaTT can come in at any point during the project cycle. They use ProjectPath software – an off-the-shelf online project management tool. Projects don't fail from lack of charts, graphs, stats or reports, they fail from lack of clear communication. ProjectPath solves the problem by providing tools that are tailored to improve the communication between people who are working together on a project.

Seafood CRC's Tools for Communication: What's worked and what hasn't (Emily Mantilla, Program Manager – Communications and Education, Seafood CRC)

Forms of communication include:

- Emails should be as succinct as possible and start with a clear subject heading with an invitation to delete if the recipient is not interested in the topic, e.g. IF YOU ARE NOT INTERESTED IN THE ANNOUNCEMENT OF A NEW SEAFOOD CRC PHD SCHOLARSHIP OPPORTUNITY, PLEASE DELETE
  It is important not to send out too many blanket emails at a time and consider the best time to send them, e.g. Emily sends out Seafood Stories on Friday afternoons.
- Fact Sheets should be professionally printed, not too long and contain digestible chunks of non-technical information.
- In-House Magazines should be colourful and eye-catching with lots of photos and a stable format.
- In-House CRC Print such as Annual Reports, Project Summary Books, Participant Report Cards and Project Dossiers should be professionally produced and easy to navigate.
- Public print and electronic media (Newspapers, Trade Magazines, Radio and TV) are also utilized to get the message out.
- Nothing beats face-to-face talking such that you would do at Conference Trade Booths and Forum Meetings, Retreats and Master Classes.
- Other modern forms of communication include websites (Seafood CRC private and public, NING, Facebook), Mobile Phone Technology used to deliver the Seafood Industry News, film (videos, DVDs, You Tube, video games). Consider using celebrities to deliver messages.
- Experiment with more avant-garde forms of communication such CRC Pop Quiz, Hub Speed Dating, Themed Workshops/Seminars.
- MISA Snapshots a one-pager to communicate research results in layman's languageto replace bulky, expensive, technical final reports.
- E-MISA Electronic newsletter

A Seafood CRC project is looking at new and innovative ways to communicate research results to the Seafood Industry quickly and efficiently. A pilot project is producing 6 monthly news videos 'Seafood Industry News' (1-2 minutes in duration) that can be viewed on a mobile phone via a web link. At present these are directed to the oyster industry. Download costs on an average mobile plan are around 25¢ however, 45% of farmers prefer the text version.

General Discussion

Graham Mair described a new on-line, virtual meeting tool used by Seafood CRC called Go-To Meeting. Travelling to meetings is expensive and different locations can be linked together and documents can be shared. Now used for RAC meeting and decisions are typed up on the screen as they are made. There are 3 licenses (costing ~$3,000) and Seafood CRC can make this available to members. Another tool is Webinar - Short for Web-based seminar, a presentation, lecture, workshop or seminar that is transmitted over the Web. A key feature of a Webinar is its interactive elements -- the ability to give, receive and discuss information. It was generally agreed that it was a real eye-opener hearing about the barriers to successful communication in particular industries/companies. It would be useful for example if Mike Thompson and Rachel King delivered their presentations at the next Seafood CRC Forum for members to get an appreciation of the vast difference in communication needs from their respective target audiences.

- Communicating with the 500+ oyster farmers in the Consortium is mainly by telephone or face-to-face conversation. Oyster farmers attending AA'10 were mainly networking in the hallway not listening to scientific presentations. Oyster farmers do not Blog or use Facebook. They certainly need to have an understanding of how the R&D $$ are spent. We "need to get the personal back into

technological solutions"eg MISA Snapshots that summarise results in reader-friendly language.

- The question was asked "can we rule out Blogs and Facebook" as effective ways of communicating? There was unanimous agreement that we are not in the business of social networking..
- It was agreed that use of FaceBook was a generational thing – the next generation of oyster farmers might use it but not current oyster farmers. The MISA mobile phone video technology which is oyster industry specific at present was advertised and farmers were very sceptical – they needed a face-to-face introduction and demonstration. Oyster farmers would/might appreciate a familiar friendly face.
- It was acknowledged that sometimes industry doesn't know what R&D they want and rely on the researchers to suggest it. Conversely, sometimes researchers find it difficult to sell an R&D topic to industry. For example, it took 3 years for the SBT metabolism project to get up until industry finally saw the value of it. Proof of concept R&D would make this easier.
- More use should be made of Television after all it's modern technology that everyone has. In Australia there are some regional television channels but air time is very expensive unless it's part of a news program or Landline for example. We should not only concentrate on communicating with industry but with the public in general and educate them about the benefits of aquaculture.
- It is important to release staff for training and accreditation and sometimes industry is not prepared to do this. Life long training is essential. In Australia, only recognised courses are accredited – competencies and up-skilling are not accredited.
- The question was asked who is/are Seafood CRC trying to communicate with – industry, researchers, consumers?
- Industry is responsible for R&D results and uptake.
- Other points to follow up are impediments to staff exchanges and new tools for communication.
- It was generally agreed that Australia has the key elements along the AquaTT lines but they are not coordinated as well.

Appenidx 4: Various communications with The Forum for European – Australia Science and Technology cooperation (FEAST)

Hi Gavin,

I don't know what they mean by the group involving Australia... I can't find any reference to it other than in the Work Programme. Perhaps my colleage Jean-Francois will know more. They may be looking to put together this group, whereas the USA group is already established.

It would be worthwhile contacting the EC directly regarding this call. They may know of some strong consortiums already being put together, and it would make sense to approach them.

Rado.

On 09/08/2010, at 11:13 PM, Burnell, Gavin wrote:

Dear Rado,

Many thanks for your quick reply. I had a look at the latest FP7 calls and 2 of them looked interesting (see attached file). With respect to the International Cooperation one, would I be correct in assuming that this is a project to which only the 2 groups mentioned can apply? If so would there be any scope for approaching them to get involved? I would be very grateful for your advice here. I am the Director of a Knowledge Management company called AQUATT (www.aquatt.ie). It is through this area of expertise that we would be of use to a consortia who might wish to apply for funding under this topic (see attached file on my recent trip to Australia to promote AQUATT).

Regards

Gavin

-----Original Message-----
From: Rado Faletic [mailto:info@feast.org]
Sent: 09 August 2010 04:52
To: Burnell, Gavin
Subject: Re: Current opportunties for collaboration between EU and Australia

Dear Gavin,

There are some general schemes that may cater to your needs. Firstly, the latest FP7 calls have just been released. It may be that your intended collaboration topics are addressed in one of the KBBE calls:

http://cordis.europa.eu/fp7/dc/?fuseaction=UserSite.FP7ActivityCallsPage&ID_ACTIVITY=2

There is also a useful Marie Curie staff exchange program, called IRSES. There is no call open at the moment, but there is usually an annual call opening at the end of Nov each year.

http://cordis.europa.eu/fp7/dc/?fuseaction=UserSite.PeopleCallsPage SFI

used to have a program to help with bilateral collaborations:

http://www.sfi.ie/funding/funding-calls/closed-calls/sfi-international-research-partnership-supplement/

But this now seems defunct. It would be worthwhile giving SFI a call to find out if they have anything suitable for you.

If you give me more specific detail about the type of project and collaboration you want to establish then I can get you more relevant information.

Rado.

On 06/08/2010, at 8:23 PM, Burnell, Gavin wrote:

Deaf Sir/Madam,

I have just returned from a 6 week study tour of Australia that was part funded by the Seafood Cooperative Research Centre of Australia. My area of expertise in in sustainable Aquaculture and Fisheries and I am based in University College Cork, Ireland. I would be very grateful for SPECIFIC information on current or forthcoming opportunities for putting together joint EU - Australia projects in this study area.

Regards

Gavin Burnell
Dr Rado Faletic
Acting Executive Director
Forum for European-Australian Science and Technology cooperation
Beryl Rawson building 13,The Australian National University, Canberra ACT 0200, Australia

Appendix 5: The programme of industry meetings and workshops delivered by Professor Burnell as part of the Visiting Expert programme

Date	Institution/Location	Contact/s	Activity/Topics of discussion	Comments
June 16 (am)	Aquaculture Development Unit, Challenger Institute of Technology, Fremantle	Greg Jenkins (Manager Challenger TAFE)	Sources of funding for aquaculture research;	ADU regrets not being partners in Seafood CRC and arising from this concerns at having only limited participation in blue-fin tuna breeding programme despite perceived expertise in this area
June 16 (pm)	Western Australian Fisheries and Marine Research Laboratories, North Beach WA	Dr Rick Fletcher (Director, Fisheries Research WA Fisheries)	An ecosystem based approach to fisheries management).	DIPSR approach outmoded for their purposes. They address issues at the FISHERY level but also define ecosystems at risk on a REGIONAL(geographical level
June 17 (am)	Western Australian Research Advisory Board, Maritime Museum, Fremantle	Patrick Hone (CEO FRDC)	A stakeholders planning workshop to discuss research priorities for the next round of FRDC funding	FRDC now tends to fund capacity building projects (eg PhDs and Postdocs).
June 18 (pm)	Western Australian Fishing Industry Council (WAFIC), Osbourne Park, nr Perth, WA	Richard Stevens, Dan Machin (Aqua Council of WA)	First AQUATT workshop. Present: Richard Stevens (WAFIC), Graeme Stewart (Graeme Stewart Associates), Brett McCallum (Pearl Producers Association); Dan Machin (Aquaculture Council of Western Australia); Gavin Burnell (AquaTT/UCC).	See Outcomes of Workshops section.
June 21 (pm)	South Australia Research Development and Innovation (SARDI), Adelaide, SA	Doug McLeod, Catherine McLeod	Discussion on how to improve communication. Present: Catherine McCleod (Marine Innovation South Australia, MISA - SARDI), Doug McCleod (Shellfish Consultant); Jane Gallagher (CRC); Mike Thompson	Everyone seems to be wrapped up in their own area of interest and expertise (e.g. research, or production or governance) – this is generally referred to as the “silo” syndrome.

			(Clean Seas Tuna); Gavin Burnell (AquaTT/UCC)	
June 22 (all day)	SARDI, West Beach, near Adelaide, SA	Mark Booth (NSW Govt), Graham Nair (Seafood CRC)	Hub Communications Network Workshop, incorporating Second AQUATT presentation. Present: Mark Booth (Chair - Industry and Investment, NSW); Graham Mair (Seafood CRC); Helena Heasman (Industry and Investment, NSW); Gavin Burnell (AquaTT – UCC); Steven Clarke (SARDI); Justin Fromm (National Aquaculture Council); Jane Ham (PIRSA - SARDI); Mike Thompson (Cleanseas Tuna); Emily Mantilla (Seafood CRC); Doug McCleod (Shellfish Consultant); Rachel King (Oyster Consortium); Rob Thomas (SARDI); Stephen Madigan (PIRSA - SARDI)	The themes of this workshop at which Mark Booth, Gavin Burnell, Emily Mantilla, Jane Ham, Justin Fromm, Rachel King, Mike Thompson and Graham Mair gave presentations, have been summarised by Helena Heasman (see: Notes on Hub Communications Network Workshop and Appendix 3).
June 23 (am)	The Fresh Fish Place (Proper Bay Rd, Port Lincoln)	"Lilly"	Commercial Guided Tour of processing and packaging plant.	A very intimate experience which enabled the tourists (n=10 – 20) to observe the whole process at very close quarters.
June 23 (pm)	Port Lincoln Marine Science Centre (SARDI – University of Flinders owned building)	Ben Stobart and Clinton Wilkinson	Biosecurity and food safety	Recent blooms of Noctiluca have been documented and occasionally detected Pfisteria is a cause for concern
June 23 (pm)	Pristine Oyster Farm (Coffin Bay, Port Lincoln, SA	Brendan Guidera	Visited land based site – processing and packaging plant	The area has outstanding water quality that gives the product a nationally respected reputation and the name "Coffin Bay" does not appear to have a negative impact upon marketing!!
June 24 (am)	Kinkawooka Mussels	Andy Dyer and Andrew Puglisi	Visited processing factory and had a long discussion about the	Innovative vertically integrated company from (hatchery (in planning) to longline on-growing to processing. They have

			vulnerability of the mussel industry to variable seed settlement.	some problems with broken shell in processing and a shortage of seed (hence plans for a hatchery. . Their mussels reckoned to be M. galloprovincialis
June 24 (am)	Southern Australian Seafoods	Ben Smith (Breeding and Research Manager).	Fully mechanised, intensive pump ashore abalone farm (600 tonnes per annum)	The pumped water supply is the main factor limiting an increase in production. They have their own breeding program (with Flinders University).
June 24 (pm)	Clean Seas Tuna, Port Lincoln	Mike Thompson	The company is in the middle of an ambitious breeding programme to try complete the lifecycle for bluefin tuna and so end the reliance on wild caught fish for cage fattening.	Not allowed access to broodstock building for reasons of biosecurity and IP issues.
June 25 (am)	CSIRO, Castray Esplanade, Hobart, Tasmania	Beth Fulton	An ecosystem approach to fisheries management And modelling the marine ecosystem Beth has developed the highly respected ATLANTIS model for marine resource management.	This area of research is highly relevant to Irish fisheries management at the moment and Prof Burnell currently coordinates a large national project on this topic.(under the Beaufort Programme).
June 25 (pm)	CSIRO, Hobart	Richard Taylor	Third AQUATT presentation to CSIRO staff including Richard Taylor, Peter Lube and Nic Ellis (CSIRO), and Catriona McLeod (TAFI)	Catriona and Peter made some very useful contributions to the communications debate (see Appendix 1).
June 25 (pm)	Tasmania Aquaculture and Fisheries Institute (TAFI) ,University of Tasmania, Hobart.	Catriona McLeod	They have a successful striped trumpeter (Latris lineata) breeding programme and a southern rock lobster breeding (Jasus edwardsii) project.	I was not allowed to see the lobster project for reasons of IP.
June 26	TASAL Various sites around Tasmania	Richard Taylor	Tassal Group Limited (Tassal) is an Australia-based company engaged in hatching, farming,	One of the major bottleneck is the provision of freshwater at sea sites to help control the endemic amoebic gill disease problem. They have an outlet called The Salmon Shop

	The Salmon Shop (Salamanca, Hobart, Tasmania)		processing, sales and marketing of Atlantic Salmon.	(Salamanca, Hobart, Tasmania) that sells both fresh and processed salmon products, runs cookery demonstrations and tasting sessions to promote the product.
June 28 (am)	Spring Bay Seafoods Triabunna, Tasmania.	Phil Lamb	Visited the hatchery and processing plant.	It is vertically integrated company that produce mussel and seed in their own hatchery and ongown on longlines. They were very secretive about the larval rearing process, especially the way in which they get the spat onto the ropes and subsequent deployment. More industrial secrecy!!
June 28 (pm)	Barilla Bay Oysters Cambridge, Tasmania		Visited the seafood restaurant and shop that overlooks their oyster leases.	Another good example of a vertically integrated company where the public are encouraged to learn more about the product.
June 29 (pm)	NSW Government Industry and Investment, Port Stephens, NSW 2315	Steve McOrrie	Tour of facilities including rearing untis for Yellowtail kingfish, Mulloway, Snapper and FW bass; also a demonstration recirculation unit and Sydney rock oyster hatchery.	The complex sits on a site where mangrove is naturally regenerating and great care is taken to harmonise with the local environment.
June 30 (all day)	Broken Bay Oysters Berowra Heights, NSW 2082.	John and Sharon Stubbs	Visited Broken Bay Oysters the Hawkesbury Estuary. We were given a tour of the facility and the leases by the owner Robbie Moxhan and his cousin John Stubbs.	Oyster production in this estuary has risen from the ashes of the 1994 collapse caused by MQX disease and the success is due to the combined strategy of farming disease resistant Sydney Rock oysters (*Saccostrea commercialis*) and triploid *Crassostrea gigas* (produced by the 4C technology under license).
July 1	NSW Government Industry and Investment, Port Stephens, NSW 2315	Geoff Allan	Fourth AQUATT presentation to Port Stephens lab staff (including Geoff Allan, Steve McOrrie, Michael Dove).	Useful discussion on the process that culminated in the Sustainable Aquaculture Strategy for the NSW oyster industry.

At the communication workshop and at each workshop/meeting the Hub project has organised, participants were asked their preferred methods of communication. In addition, all participants of the hatchery networks were surveyed to determine preferred methods of communication. All participants preferred to use email, telephone and face-to-face meetings. Social networking methods (e.g. Facebook, Twitter, etc, were rejected). See agenda below. Notes from the meeting are presented as Appendix 6.

Agenda

MEETING	Hub Communications Network Workshop	
DATE/TIME	22 June 2010/09:00	LOCATION SARDI, West Beach
ATTENDEES	Gavin Burnell, Graham Mair, Bob Fleming, Emily Mantilla, Steven Clarke, Bennan Chen, Jane Ham, Mark Booth, Helena Heasman, Mike Thomson, Rachel King, Justin Fromm, Julie Haldane	
PREPARED BY	Geoff Allan	

Workshop Chair: Mark Booth, Industry & Investment NSW

Aim: To discuss advanced methods in communication used by the AquaTT network in Europe and explore lessons for the Australian aquaculture community. To examine how the R&D needs of Seafood CRC aquaculture industry participants become successful research projects that lead to increased production and profitability and how to ensure effective communication throughout the process.

09:00 – 09:15	Introduction and welcome	Steven Clarke/Mark Booth
09:15 – 09:30	Seafood CRC Aquaculture Innovation Hub and Networks	Mark Booth
09:30 – 10:30	The Aqua TT model	Gavin Burnell
10:30 – 11:00	Morning tea	
11:00– 11:20	Seafood CRC's Education and Training Program: What has worked and what hasn't	Emily Mantilla
11:20 – 11:40	Tools for communication: the MISA experience	Jane Ham
11:40 – 12:30	Industry experiences. How does communication within the company/consortium work, how does communication between industry and research providers work and how can communication be improved? Mike Thomson, Clean Seas Tuna and Rachel King, Oyster Consortium.	Chair: Justin Fromm.
12:30– 13:30	Lunch	
13:30 – 14:00	Industry issues (continued)	
14:00 – 14:45	Discussion: recommendations for Seafood CRC Communication	

Coordination of the two hatchery networks progressed. The following activities related to the hatchery networks were completed during the previous six months: 1) Session on Hatchery at AA'10, 2) Hatchery technology workshop 27 May TAFI, 3) Management of a travel grant for technicians to attend the tuna larval rearing workshop in Panama, 4) Contribution to the Seafood CRC training needs analysis for hatcheries, 5) Technical exchanges.

A separate Aquaculture Innovation Hub, Hatchery Network section in the public domain Seafood CRC public domain website is being prepared and will be launched and promoted. The website will include outputs from hatchery workshops, abstracts from the AA'10 hatchery session and Seafood CRC trip reports relevant to hatchery technology. This part of the website is being

developed in conjunction with Mrs Emily Mantilla, Program Manager, Education and Communication.

Marine Hatchery Session at AA'10. The Hub organised the Marine Finfish and Shellfish Hatchery Sessions at AA'10. See session plan below. The keynote presentation was provided by Professor Goro Yoshizaki (Department of Marine Biosciences, Tokyo University of Marine Science and Technology, Tokyo 108-8477, Japan). Professor Yoshizaki presented a paper on: "Germ cell transplantation in fish: Can surrogate bonito make tuna gamets?" There was an excellent attendance at the session, particularly for the first part of the day.

Australasian Aquaculture 2010. Marine Hatchery Session.
Wednesday 26 May.
Session Chairs: Geoff Allan, Wayne O'Connor, Stephen Battaglene, Jenny Cobcroft, Stewart Fielder

DURATION	Title	FirstName	LastName	AbstractTitle
40 mins		Goro	Yoshizaki	GERM CELL TRANSPLANTATION IN FISH: CAN SURROGATE BONITO MAKE TUNA GAMETES?
20 mins	Dr	Abigail	Elizur	THE EFFECT OF KISSPEPTINS ON REPRODUCTIVE DEVELOPMENT IN THE YELLOWTAIL KINGFISH
20 mins	Ms	Erin	Bubner	TOWARDS GERM CELL TRANSPLANTATION FOR SOUTHERN BLUEFIN TUNA (*Thunnus maccoyi*i) USING YELLOWTAIL KINGFISH (*Seriola lalandi*) AS A SURROGATE HOST
20 mins	Mrs	Polly	Hilder	DEVELOPMENT OF VISION AND FIRST FEEDING BEHAVIOUR IN SOUTHERN BLUEFIN TUNA *Thunnus maccoyii* AND YELLOWTAIL KINGFISH *Seriola lalandi* LARVAE
20 mins		Jose	Zambonino	DIETARY VITAMIN A, C AND D INFLUENCE THE MORPHOGENESIS OF MARINE FISH LARVAE: A REVIEW OF THE MAIN RESULTS AND RECOMMENDATIONS OBTAINED FROM FINEFISH (EU PROJECT
20 mins	Dr	Jennifer	Cobcroft	SKELETAL MALFORMATIONS IN CULTURED FISH FROM AUSTRALIAN MARINE FINFISH HATCHERIES
20 mins		Reham	Negm	THE EFFECT OF DIETARY VITAMIN A DURING ROTIFER FEEDING ON THE PERFORMANCE AND SKELETON FORMATION OF STRIPED TRUMPETER *Latris lineata* LARVAE
20 mins	Dr	Richard	Knuckey	COPEPODS: WORTH THE EFFORT? RESULTS FROM THE INCLUSION OF COPEPODS IN A GROUPER LARVAL DIET
20 mins	Mrs	Elizabeth	Elliott	DEVELOPMENT OF A BACTERIOPHAGE THERAPY WITH THE POTENTIAL FOR BIOCONTROL OF LUMINESCENT VIBRIOSIS IN MARINE HATCHERIES
20 mins	Mr	Wayne	Hutchinson	EFFECT OF LIVE FOOD FEEDING REGIMES ON YELLOWTAIL KINGFISH *Seriola lalandi* LARVAL SURVIVAL AND GROWTH
20 mins	Mr	Adam	Reynolds	DIGESTIVE TRACT DEVELOPMENT AND ASSOCIATED ENZYME ACTIVITY IN LARVAL CORAL TROUT, PLECTROPOMUS LEOPARDUS
20 mins	Dr	Saleh	Mobin	EFFECTS OF APPLICATION OF TWO FEEDING REGIMES OF LIVE FEEDS ENRICHED IN THE PRESENCE OR ABSENCE OF AN ANTIOXIDANT AT TWO DIFFERENT PERIODS OF TIME ON THE GROWTH AND MORTALITY OF LARVAL AND JUVENILE RED SEABREAM, *Pagrus major*
20 mins		Chris	Chapman	MICROBIAL COMMUNITIES WITHIN AN OYSTER HATCHERY
20 mins	Mr	A	Kalam Azad	FACTORS INFLUENCING LARVAL DEVELOPMENT AND SURVIVORSHIP OF LABORATORY-REARED PURPLE SEA URCHINS (*Strongylocentrotus purpuratus*): IMPLICATIONS FOR AQUACULTURE
20 mins	Dr	Helcio	Luis de Almeida Marques	STUDY OF SEEDING DENSITIES IN BROWN MUSSEL (*Perna perna* L.) CULTURED IN CARAGUATATUBA, SAO PAULO STATE, BRAZIL.
POSTER	Ms	Lindsey	Woolley	HATCHING SUCCESS AND EARLY LARVAL DEVELOPMENT OF SOUTHERN BLUEFIN TUNA *Thunnus* maccoyii

Hatchery Technology Workshop 27 May 2010 TAFI

The first Hatchery Technology Workshop was organised to coincide with the AA'10 conference. The workshop was organised with assistance from Drs Jenny Cobcroft and Stephen Battaglene, UTAS, and the focus was on technology for disinfection (water, eggs) and live feeds management. The workshop was held at TAFI 27th May after AA'10. The workshop was advertised initially to hatchery network participants and the intention was to fill any additional available places through a general call for participants. However, the demand for the
workshop among network participants was very high and all places were filled within two weeks and limitations were placed on numbers from each company. 52 participants from commercial hatcheries were provided with background information and hands-on training in egg disinfection with ozone, seawater disinfection (ozone and UV) and live feeds management (see attached agenda).

Participants were also canvassed on priorities for future Hub activities – these included workshops on:

- Species specific disease identification, diagnosis and treatment.
- General microbiology – preparing agar plates etc.
- Basic system design.
- Live algae production.
- Basic genetics for beginners.
- Live feeds workshop.
- Basic nutrition – phages, probiotics and copepods.

Hatchery Technology Workshop

Aim: Provide background information and hands-on training in egg disinfection with ozone, seawater disinfection (ozone and UV) and live feeds management.

Agenda for workshop

Dates:

Social gathering: Sunday 23rd May 2010 AA'10 Welcome Drinks at the Hotel Grand Chancellor 6:00 to 7:00 pm. Must be registered for AA'10.

Dinner: Wednesday 26th May 2010, 7:00 pm. Customs House Hotel (Heritage listed waterfront hotel) 1 Murray Street, Hobart. (Sponsored by Seafood CRC Aquaculture Innovation Hub)

Workshop: Thursday 27th May 2010 (day after AA'10 Conference). Starting at 9:00 am and finishing at 5:00 pm.

Cost

There is no cost to attend the workshop. Dinner and lunch are provided free to participants. The Workshop is sponsored by the Australian Seafood CRC Aquaculture Innovation Hub, Atlantium, Primo Aquaculture, ProAqua and TAFI-UTas.

Workshop Venue

University of Tasmania, Tasmanian Aquaculture & Fisheries Institute, Marine Research Laboratories, Nubeena Crescent, Taroona, Tasmania.

Time	Speaker	Affiliation	Topic
9:00-9:15	Stewart Fielder and Wayne O'Connor	Seafood CRC Hub, NSW Fisheries	Welcome and introduction
Microbial management - Seminar-style presentations			
9:15-9:40	Quinn Fitzgibbon	UTas	How and why to disinfect seawater with ozone?
9:40-10:05	Stephen Battaglene	UTas	How and why to disinfect eggs with ozone?
10:05-10:30	Limor Barak	Atlantium, Israel	UV disinfection of seawater for aquaculture
10:30-10:40	Gavin Partridge	Challenger Institute of Technology, WA	Prophylaxis – Chemicals, Probionts, Phages
10:40-10:55	Wim Maartens	INVE	
10:55-11:05	Lisa Elliott	ProAqua	
11:05-11:20			Morning tea
Hands-on activities			
11:20-12:00	Concurrent activities 1-5, see table below		
12:00-12:40	"		
12:40-13:20	"		
13:20-14:00			Lunch

Live feeds - Seminar-style presentations			
14:00-14:25	Tim Reed, Amy Reidel	Reed Mariculture, Aquatic Ecosystems	Recirculation systems & algae pastes for rotifer production
14:25-14:50	Wim Maartens, Liz Evans	INVE Primo	SepArt - Using magnets to separate hatched Artemia from cysts
Hands-on activities			
14:50-15:30	Concurrent activities 1-5, see table below		
15:30-16:10	"		
16:10-16:30			Afternoon tea
16:30-17:00	Stewart & Wayne		Wrap-up and close

Five groups of approximately 8-10 people will spend 40 min at each of the following activities

Hands-on activities			
	Presenters	Affiliation	Activity topic
1	Limor Barak, Alan Beech	Atlantium, Israel UTas	Demonstration of Atlantium HOD UV disinfection system
2	Ross Goldsmid, Stephen Battaglene	UTas	Demonstration of egg disinfection with ozone
3	Jenny Cobcroft, Quinn Fitzgibbon, Tom Litjens	UTas	Tour of MRL fish hatchery and ozone disinfection system for seawater
4	Amy Reidel, Anna Overweter	Aquatic Ecosystems UTas	Demonstration of rotifer recirculation systems
5	Liz Evans Wim Maartens, Mel Evans	Primo INVE UTas	Demonstration of SepArt to separate hatched Artemia

We look forward to seeing you at the workshop.

Stewart Fielder and Wayne O'Connor (Seafood CRC Hub, NSW Fisheries)
Stephen Battaglene and Jenny Cobcroft (TAFI, UTas)

The workshop was enthusiastically received by all participants but Joel Bertani, Hatchery Technician with SpringBay Seafoods, Tasmania, felt compelled to put pen to paper – see below.

After achieving a Bachelor of Science last year, majoring in both, Marine biology and Aquaculture from James Cook University, I stepped in to the work force as a hatchery technician for Spring Bay Seafoods in Tasmania. Moving on from what had been an enriching part of my life academically, to a commercial production felt like a real accomplishment. The excitement of being constantly challenged at a professional level was an important factor in determining my choice of career in this rapidly progressing industry. Therefore, when my manager, Ian Duthie offered me to participate in the inaugural hatchery technology workshop hosted by TAFI (the Tasmanian Aquaculture and Fisheries Institute) on the 27th of May, I jumped on the opportunity with great enthusiasm.

Prior to the workshop I was invited to attend a dinner at the Customs House Waterfront Hotel sponsored by the Australian Seafood CRC. The restaurant, famous for its seafood dishes and located in the hotspot of the capital, provided an ideal setting to receive the gathering of seafood lovers. The dinner itself was a perfect chance to pick the minds of some of the most interesting aquaculturists in Australia and New Zealand within a relaxed environment. After a pleasant evening chatting with a couple of fish farmers from North Queensland, trading appetisers with Cameron Tasmania's hatchery manager, and taking notes on some secret recipes, It was time to go rest our minds and prepare ourselves to get in the heart of the matter on the following day.

Stewart Fielder from the Seafood CRC and Wayne O'Connor known by some of us as the Guru of oyster farming research, began the event by introducing what was going to be a very exciting day. The event, supported by the Australian Seafood CRC Aquaculture Innovation Hub, Atlantium, Primo Aquaculture, Proaqua and Tafi-UTas, was structured in seminar style presentations directly followed by hands-on activities.

The main subject of interest was microbial management covering a vast array of topics, from water quality management and fish egg disinfection with the use of ozone gas, to the new breakthrough UV technology, as well as the use of prophylaxis, bacteriophages and probiotics. Personally, I found the Hydro- Optic UV disinfection system presented by Atlantium really interesting. It is difficult not to appreciate the qualities of the HOD system which combines the fibre optic technology by incorporating a quartz chamber and the known benefit of UV light to eliminate pathogens and thus providing great control over the water quality. The afternoon focused on live feeds and we took a close look at recirculating systems for rotifer production, the innovating SepArt technology to separate Artemia from their cysts, and the use of algae paste diets.

The workshop concluded with the implementation of a network to allow for the future flow and communication of ideas between hatchery managers, which will subsequently benefit technicians as well. Ultimately, I found the entire experience to not only be academically challenging and rewarding, but also fun. It was certainly inspiring to mingle with people who are well established within the industry as well as invigorating to know that I will be part of the generation to implement and pursue these new cutting edge technologies that will ensure the further progress of this growing industry.

Tuna larval rearing workshop in Panama. To help improve technical skills among Australian hatchery technicians, the Hub offered a travel grant to attend the 8th Annual Workshop on Physiology and Aquaculture of Pelagics with Emphasis on Reproduction and Early Developmental Stages of Yellowfin Tuna, Thunnus albacares, to be held at the Achotines Laboratory, Republic of Panama, Central America, 7-19 June 2010 (see below). The following announcement was circulated to Hub and network participants. "The Australian Seafood CRC through its Aquaculture Innovation Hub is pleased to offer a travel grant for a young Australian scientist or technician working in the

Australian aquaculture industry to participate in the University of Miami-RSMAS and IATTC workshop. The grant will contribute to the US$2,200 registration fee, international and domestic air-fares and other expenses." An application was also made to use Seafood CRC travel grant funds to provide an additional place. Four applications were received, including two from I&I NSW. Because applications were received from I&I NSW, the applications were reviewed by an independent panel that excluded representatives from I&I NSW. The two Seafood CRC places were awarded to Polly Hilder (TAFI) and Luke Cheviot (I&I NSW). Additional funds external to those provided by the Hub project were made available to allow one additional technician, Luke Vandenberg, to attend the workshop.

WORKSHOP ANNOUNCEMENT

UNIVERSITY OF MIAMI – RSMAS
And
INTER-AMERICAN TROPICAL TUNA COMMISSION (IATTC)

8th ANNUAL WORKSHOP ON PHYSIOLOGY AND AQUACULTURE OF PELAGICS WITH EMPHASIS ON REPRODUCTION AND EARLY DEVELOPMENTAL STAGES OF YELLOWFIN TUNA, *THUNNUS ALBACARES*.

1st Announcement

Dates: June 7-19, 2010

Location: Achotines Laboratory, Republic of Panama, Central America

The University Of Miami Rosenstiel School Of Marine and Atmospheric Science (RSMAS) and the Inter-American Tropical Tuna Commission (IATCC) are organizing the 8th Annual Workshop on "Physiology and Aquaculture of Pelagics with Emphasis on Reproduction and Early Developmental Stages of Yellowfin Tuna". Number of participants is limited to six. The organizers and primary instructors are Dr. Daniel Benetti (RSMAS-UM), Dr. Daniel Margulies (IATTC) and Mr. Vernon Scholey (IATTC).

As in previous years, we anticipate the participation of researchers and professionals from several countries combining advanced technologies to improve methods for raising larval tuna and other species of marine fish. Participants will be assisted by a qualified technical staff and by graduate students from the University of Miami's Rosenstiel School of Marine and Atmospheric Science. The workshop will be conducted at the world renowned Achotines Laboratory in Provincia de Los Santos, on the Pacific coast of the Republic of Panama.

The workshop will cover reproduction and larval development of pelagic fish species with a special focus on yellowfin tuna. Topics include physiology, biology, ecology, genetics, nutrition and environmental issues related to aquaculture of pelagic fish species such as tuna, mahimahi, cobia, yellowfin kingfish, Seriola and other Carangidae. The workshop also covers capture, handling, transportation, maturation, spawning, larval husbandry, nursery and growout techniques of a variety of marine fish species. Participants will learn about the research projects being conducted by the IATTC with yellowfin tuna, *Thunnus albacares*, including spawning and larval rearing. RSMAS - University of Miami is participating in innovative research at the Achotines Laboratory as part of a collaborative agreement with the IATTC, and workshop attendees will have the opportunity to participate in ongoing joint efforts to capture, transfer, and establish broodstock populations of sailfish and wahoo.

Trip reports from Luke Cheviot and Luke Vandenburg are presented at Appendix 8.

Contribution to the Seafood CRC training needs analysis for hatcheries. Hub project team members, Drs O'Connor, Allan and Fielder, contributed to the Hatchery Needs Analysis project. Assistance was provided during the survey design process and the officers participated in the hatchery needs analysis workshop to discuss results with those involved in the project. A number of priorities for training were listed during this project and the hatchery network coordinators (Drs O'Connor and Fielder) will use that information when planning future workshop and hatchery training activities.

Training Needs Analysis -Hatcheries
Project Plan

Stage, Indicitive Timings	Activities	Outcomes-Responsibility
Stage 1 Project Planning Dec 09-end Jan 10	• Preliminary discussions Agrifood/Seafood CRC • Initial research- • Project Planning meeting • Identify Technical Advisor	• Scope of the project, areas of responsibility b/w Agrifood and CRC and project duration confirmed (RO, RP) • TNA consultant appointed and Technical Advisor contracted (RO, input from RP) • Preliminary research completed inc identification of existing units etc (RO, Dos) • Meeting held confirming methodology, milestones, site selection and responsibilities of members of the advisory team (RO, RP) • Sites agree to involvement in the project (RP)
Stage 2 Develop Survey By end Feb10	• Confirm target group (from planning meeting) • Develop an inventory of all possible skills/knowledge that may be required by target group • Develop user-friendly survey • Field-test the draft survey	• TNA survey developed (RO, Dos)
Stage 3 Conduct TNAs End Feb-early May10	• Liaise with sites to confirm dates, their involvement inc availability of hatchery technicians/managers • Conduct 1st site visit • Review survey instrument etc prior to remaining 3 site visits • Conduct remaining 3 site visits • Map TNA outcomes to existing units and qualifications. Identify Skill sets etc	• Timetable for site visits and their involvement confirmed (RP, RO, Dos) • TNA conducted at the four sites (RO) • Skill sets and/or qualifications identified , and any gaps noted (RO, Dos)
Stage 4 Validation Workshop 23-26May10	• Arrange workshop at the aquaculture conference Tas May 2010 • Identify and invite participants • Distribute workshop papers • Hold workshop	• Workshop included in the conference program (GM/RP) • Workshop held to validate draft outcomes of TNA (RO, Dos) and agree prioritised training requirements. (GM/RP)
Stage 5 Final Report By end Jun10	• Draft report • Finalise report	• Final report forwarded to Seafood CRC (RO)

Technical Exchanges

The technical exchange program has commenced. Technical staff hatchery exchanges to date have involved: Shellfish Culture, CSIRO and NSW I&I, planned exchanges to include SAM Abalone, NT Fisheries DAC and Australian Seafood Industries. Some challenges have been identified, including commercial companies being reluctant to host visits from staff from competing commercial hatcheries, difficulties sparing key staff during busy periods and costs associated with exchanges. However, the program has commenced and it is anticipated that the issues identified will be overcome as communication and trust between individuals and companies participating in the networks improves. A template for a brief report has been drafted and two examples of technical visits follow (Lynne Foulkes and Stephen O'Connor respectively).

AUSTRALIAN SEAFOOD COOPERATIVE RESEARCH CENTRE

Australian Government
Fisheries Research and Development Corporation

NSW GOVERNMENT | Industry & Investment

Hatchery Hub Activity Report

1. Executive Summary

A trip was undertaken by Lynne Foulkes, Fisheries Technician, Algal Production Unit, Bivalve Hatchery, Port Stephens Fisheries Centre, to The CSIRO Marine and Atmospheric Research Laboratories, Hobart from 10th May until 14th May 2010 for the purpose of working at, and attaining knowledge within, The Australian National Algae Culture Collection (ANACC). The visit allowed me to review techniques associated with the culturing of alga on agar plates. These techniques will be of particular use in both maintaining our stock culture reserves and will enable us to maintain our Dinoflagellate species *Alexandrium minutum* in an efficient and controlled manner. This in turn will assist us in ongoing bio-toxin accumulation studies.

Firm lines of communication have also been established for the future exchange of information and support with CSIRO ANACC. A trip by Bill Wilkinson (TAFI) has also been organised for a five day work exchange visit to our Algal Unit at PSFC in July 2010.

2. Objectives of Trip/Activity

My objectives for this trip were twofold. First, to both gain and exchange knowledge in the maintenance and sub culture of Marine Microalgae and second, to visit a marine hatchery to observe the methods used by other algal technicians.

3 Itinerary

Date	Location	Facilities visited	Staff involved
10am to 14pm May	Hobart	CSIRO	Cathy Johnston Dr Susan Blackburn Ian Jameson
13th May	Taroona	TAFI	Bill Wilkinson

4. Activities

The following activities were undertaken:

Aseptic Technique

Observation of the methodology employed at CSIRO for aseptic transfer of alga reinforced my knowledge of these techniques. Using a Laminar Flow cabinet, I sub-cultured flask cultures to growth medium flasks which involved using fastidious aseptic techniques.

Culture Maintenance

The routine sub-culture of the Culture Collection which included the Dinoflagellate sub-collection and part of the "Main" collection, consisting of some 300 strains occurred during my stay. The sub-culture of 40 strains using SOmL and 125ml flasks were transferred by me, all of which have successfully grown. Part of this activity involved matching different growth media types with the correct strain labels, as it is important that growth media is correctly matched for culture viability, to ensure culture generations are maintained.

Using an inverted microscope, I examined *Gymnodinium catenatum* petri dish cultures for viability.

ANACC washing-up methods, water purification and seawater filtration systems were discussed and demonstrated.

Media

Marine f2 media agar growth petri plates were prepared by me using Difco / Bacto Agar and concentrated f2 nutrients added to sea water which was sterilized by autoclaving. Using aseptic technique the f2 agar solution was poured into sterile 35mm petri dishes.

The Culture Collection main marine media types, f2 media and GSe media preparation methods were discussed and noted.

Agar plating method

Spread plating technique was demonstrated and I subsequently plated 6 Aquaculture strains onto f2 agar plates. These included the Diatoms: *Skeletonema pseudocostatum, Navicula jeffreyae, Chaetoceros calcitrans,* and the flagellated strains; Prymnesiophyte: /sochrysis sp (T.ISO), Prasinophyte: *Tetrase/mis suecica* and Crytophyte: *Proteomonas su/cata.*

A "channel" method was discussed and demonstrated for plating, which is used especially for flagellated strains such as *Protoeomonas sulcata* that can prove difficult to grow on agar plates, and which tend to dislike growing on a firm substrate. All strains have grown successfully on the f2 agar plates.

Other Activities

A visit to the Tasmanian Aquaculture and Fisheries Institute (TAFI) at Taroona was organized. We met with Bill Wilkinson (Senior Technical Officer), who provided a tour of the microalgae and zooplankton growth areas, and we discussed the methods used there.

ANACC documents were provided, and many photographs taken for future reference and use within the PSFC Algal Unit.

5. Benefits

The trip was extremely beneficial to myself and to my work unit, as I have both reinforced my existing knowledge and skills as well as gaining valuable training in plating techniques and in the preparation of agar mediums. This enables me to fully undertake all tasks required as the Algal Technician. Our stock culture of *Alexandrium minutum* has now been successfully inoculated onto agar plates both using and reinforcing these techniques.

Many thanks go to Dr Wayne O'Connor and the Department for supporting this trip on my behalf, and to Dr Susan Blackburn and the staff of the CSIRO ANACC, especially Cathy Johnston for their time and assistance during my stay in Hobart. Thanks also go to Bill Wilkinson for the time he devoted to showing me through their facilities during my visit to TAFI.

AUSTRALIAN SEAFOOD COOPERATIVE RESEARCH CENTRE

Australian Government
Fisheries Research aod Development Corporation

NSW GOVERNMENT | Industry & Investment

Hatchery Hub Activity Report

1. Executive Summary

In December 09, S. O'Connor:- Mollusc Hatchery Manager, Port Stephens Research Institute visited Shellfish Culture Limited's larval and nursery rearing facilities at Bicheno and Pipeclay lagoon, Tasmania. The main objective was to observe larval and spat rearing, algal production and hatchery hygiene protocols adopted by Shellfish Culture for the commercial production of pacific oyster (Crassostrea *gigas)* spat and inform where improvements to hygiene protocols may be possible.

2. Objectives of Trip/Activity *(W/1at did you hope to gain)*

A review of current commercial cultivation techniques and associated problems involved in hatchery production of *C. gigas* spat and relevance to current research goals for improved shellfish production in NSW. The primary focus of this visit was to examine hatchery hygiene protocols utilised at both of Shellfish Cultures larval and early nursery rearing locations and their relevance so Sydney rock oyster production. Appraise infra structure requirements for larval rearing, algal production and early nursery rearing and again assess relevance fro Sydney rock oyster production.

3. Itinerary

Date	Location	Facilities visited	Staff involved
14/12/09	Travel	Tasmania	
15 & 16/12/2009	Bicheno	Bicheno Hatchery-larval facility	M. Bermudes T. Spyker and Hatchery Staff
17/12/2009	Hobart	Pipeclay Lagoon – Nursery and R&D facility	K. wells S. Parkinson M. Bermudes and Hatchery Staff
18/12/09	Travel	PSFI	

4. Activities

Bicheno Hatchery: This facility is primarily used for large scale larval rearing, settlement and early nursery rearing of *C. gigas*.
1. Examine and evaluate hatchery infrastructure and water treatment systems.
2. Evaluate continuous algal production facilities used for larval rearing: Production process pro's and con's.
3. Observe and assist with methods used for larval rearing (both static and flow through systems).
4. Observe and assist with epinephrine induced metamorphosis of *C. gigas* larvae.
5. Evaluation hatchery hygiene protocols.

Pipe Clay: This facility is primarily used for large scale early nursery rearing and experimental larval rearing.
1. Examine and evaluate hatchery infrastructure and water treatment systems.
2. Evaluate continuous algal culture systems used for spat production.
3. Evaluate early stage nursery rearing systems used for *C. gigas* spat.

5. Benefits

Observation, participation and evaluation of the different algal, larval and spat rearing systems commercial employed for hatchery production of *C. gigas* spat will aid in future research development of larval and spat rearing at the Port Stephens Research Institute. Discussion of hatchery hygiene protocols and difficulties encountered at during larval rearing will assist in identification of potential problematic processes during larval rearing. Obtaining a better understanding of the systems emp0loyed for commercial larval rearing will aid in design management of new systems for mollusc production.

Progress against dissemination, extension and commercialisation plan:

A separate Aquaculture Innovation Hub section of the Seafood CRC website, accessible through the member's section, was launched and promoted to Seafood CRC members. The website section (called Aquaculture Innovation Hub) includes background to the Hub project, agendas and records of meetings, copies of presentations and documents and will include a link to aquaculture projects. A separate Aquaculture Innovation Hub - Hatchery Network section of the Seafood CRC website, accessible though the public access section, is being developed for Hatchery Network participants (as many of these are not Seafood CRC members). The website sections from the Hub project have been developed in conjunction with Mrs Emily Mantilla, Program Manager, Education and Communication.

5.5 Milestone Report No. 5 – 1 December 2010

The Hub project has coordinated new website information for Seafood CRC members (through the members section of the Seafood CRC website) and specifically for members of the hatchery networks (through the public access section of the Seafood CRC website). Assistance has been provided with development of a cobia aquaculture project following the collapse in the proposal for a Seafood CRC cobia consortium.

Two workshops were facilitated in association with the Prawn and Barramundi Conference, held on the Gold Coast in August 2010. One workshop was on algal microscopy, delivered by Professor Gustaaf Hallegraeff (UTAS) and the other on Disease Management and Identification (the complete program is presented as Appendix 9).

The algal microscopy workshop was attended by 20-25 people ranging from Prawn and Barramundi Farmers, to commonwealth and state research providers. An excellent Powerpoint projector, connected to a high quality digital camera and light microscope allowed simultaneous instruction of the entire audience in the recognition and identification of key algal species of importance to their industry. Several farmers provided samples from their farms for this exercise. Identification of different algal species, followed with known management techniques to deal with any potential issues were discussed in detail. This workshop provided a proactive response to enhancing the already high quality seafood produced by our Australian Farmers. With every species appearing on the projector screen Prof Hallegraeff (30 years experience) could explain the ecological indicator value and expected implications for the prawn or barramundi farmers. Participants in the audience freely shared their knowledge and experience. Of particular interest were farm experiences of impacts of particular microalgae, but for which no scientific explanations can yet be provided, thus raising questions that call for experimental studies with unialgal cultures. Altogether, the format of this algal microscopy workshop was very successful and well worthy of future repeats.

Matt West from Australian Prawn Farms attended the course. “It was good insight into algal identification for those farms not already undertaking this skill. Identifying algae helps manage pond based systems on a higher level – what you can visually see by just looking at a pond is not always what is in the water. It is very difficult for us as farmers to observe the animals, so to keep their habitat in good shape helps us achieve the high quality product consumers expect. I would recommend the course to all farmers and especially new technicians.”

A marine finfish hatchery manual with sections for Australian bass, mulloway and yellowtail kingfish was completed by Dr Stewart Fielder and Dr Michael Heasman (through Industry & Investment NSW). The manual includes scientific information and interpretation and practical methods for hatchery and nursery production. Much of the research was funded through the Aquafin

CRC or through core NSW research and the Seafood CRC hub project facilitated printing and distribution of the manual to finfish hatchery network members.

Technical exchanges under the hatchery network component of the hub project were completed. Five mollusc exchanges were completed during the six months to December 2010.

A live food production workshop/exchange at the Northern Fisheries Centre in Cairns was organised through the hub and delivered by Dr Richard Knuckey, QDEEDI. This workshop was specifically designed to increase technology exchange for copepod production, seen as a potential key to improved survival of Southern Bluefin Tuna.

Finally, the hub project provided input to the third-year review of the Seafood CRC. The Aquaculture Innovation and Genetics Theme business plans were updated and a comprehensive report provided to the review panel. The project leader for the hub project, Dr Geoff Allan discussed research communication and the hub project with panel members.

Technical exchanges for mollusc technicians. The technical exchange program progressed. Technical staff hatchery exchanges to date have involved: Shellfish Culture, CSIRO and NSW I&I, planned exchanges to include SAM Abalone, NT Fisheries DAC and Australian Seafood Industries. Some challenges have been identified, including commercial companies being reluctant to host visits from staff from competing commercial hatcheries, difficulties sparing key staff during busy periods and costs associated with exchanges. However, the program has commenced and it is anticipated that the issues identified will be overcome as communication and trust between individuals and companies participating in the networks improves.

Live food production (copepod) training workshop. The one week training program for copepod culture was run by Dr Richard Knuckey (QDEEDI) at the Northern Fisheries Centre, Cairns. Mr Luke Cheviot (Industry & Investment, NSW) and Mr Alex Czypinka (Clean Seas Tuna) participated. A full report prepared by Mr Cheviot is attached below. Mr Cheviot reported that benefits of the workshop included:

1. The experience and practical knowledge of copepod culture at NFC is a valuable tool for all members of the Australian Seafood CRC and the SBT Tuna Working Group
2. With the added experience in new species and improved live feed technologies the PSFI and CST marine fish teams have enhanced capabilities for culture of SBT and YTK
3. New technologies and protocols will improve the PSFI and CST hatchery contributions to the Tuna Working Group and marine finfish hatchery technology generally
4. The marine fish teams at PSFI and CST now have a better understanding of the issues related to copepod culture and difficult to rear finfish species Australia wide.

Distribution of hatchery and nursery manual for Australian bass, mulloway and yellowtail kingfish. A manual was commissioned by the Aquafin CRC and Fisheries Research and Development Corporation (FRDC) and prepared by Dr Stewart Fielder (Industry & Investment NSW) and Dr Michael Heasman (Submariculture Pty Ltd) (a hard copy will be posted separately as it is too large to insert her as an object). The hub distributed the manual to finfish hatchery members.

The manual was the first consolidated and documented information on successful techniques for culturing juvenile Australian bass (*Macquaria novemaculeata*), mulloway (*Argyrosomus japonicus*) and yellowtail kingfish (*Seriola lalandi)* in NSW. This manual provides specialised instruction on how to collect and reproductively condition Australian bass, mulloway and yellowtail kingfish to spawn, how to induce them to spawn, how to hatchery-rear their young through the larval and early juvenile stages to an age and size suitable for on-farming or for stocking to enhance fisheries. The chapters are a blend of practical (hands-on) instruction and supporting scientific information. This approach was intended to develop a manual that can be understood by the layman, while at the same time provide background and references for those who require further reading and elaboration of the concepts and methods described.

The chapters start with information for Australian bass followed by mulloway and then yellowtail kingfish. This reflects the amount of published information and the history of culture of each species. Hatchery production of Australian bass has been developing for three decades and methods for culture are now proven reliable and sustainable. On the other hand, yellowtail kingfish is considered a ‘new’ species, having only been cultured for the last ten years and is currently the subject of much research effort to refine culture methods. The manual is presented as Appendix 10.

5.6 Milestone Report No. 6 – 1 July 2011

Growth/Nutrition models for mulloway and yellowtail kingfish were completed as part of an Aquafin CRC project and these were distributed through the hub to all Seafood CRC participants interested in culture of these species. In addition, Dr Mark Booth participated in several exchanges with CST staff to discuss nutritional modelling. He also participated in a number of planning meetings for the Seafood CRC project on feed management. The model for YTK will be a useful during that project and growth results benchmarked using predicted results from the model.

Potential for CST to establish a sea-cage farming operation in NSW to take advantage of warmer water was identified. The Seafood CRC advertised among participants that matchable funds were available for new investment to meet milestones and for innovation. Industry & Investment NSW worked with CST to develop a large project for experimental culture of YTK and SBT in NSW. This proposal involved staff from CST (Mr Marcus Stehr and Mr Frank Knight) led by CEO Mr Clifford Ashby and Industry & Investment (Aquaculture Managers, Messrs Bill Talbot, Ian Lyall, Tim Gippel, and Aquaculture Scientists Drs Geoff Allan, Mark Booth and Stewart Fielder). The proposal was submitted.

Technical exchanges under the hatchery network component of the hub project were completed. The PSFI hosted two staff from Shellfish Culture Ltd.

Shellfish hub activities have been to an extent overshadowed by the emergence of the Pacific Oyster Mortality Syndrome. Hub communication lines have been used for the distribution of material relating to POMS and strong interstate communication on the issue has occurred. The hub is assisting to facilitate industry information dissemination and two sessions have been organised for the International Oyster Symposium and Shellfish futures meeting in Hobart in September. The Hub will be supporting the attendance of Dr Standish Allen at the Symposium to discuss the latest developments in triploid Pacific oyster production.

The hub project provided input during the third-year review of the Seafood CRC. The Aquaculture Innovation and Genetics Theme business plans had been updated in 2010 and a comprehensive report provided to the review panel. The project leader for the hub project, Dr Geoff Allan participated during the review and discussed research communication and the hub project with panel members.

The Hub project team also helped coordinate the successful Seafood CRC Board visit to Port Stephens in April 2011.

Growth/Nutrition models

The models (attached) were commissioned by the Aquafin CRC and Fisheries Research and Development Corporation (FRDC) based on research undertaken during the Aquafin CRC by Industry & Investment staff. The models were prepared by Dr Mark Booth (Industry & Investment NSW). The hub distributed the models to Seafood CRC aquaculture innovation participants. Models are presented as Appendix 11.

Third year review. The hub project provided input during the third-year review of the Seafood CRC. The Aquaculture Innovation and Genetics Theme business plans had been updated in 2010 and a comprehensive report provided to the review panel. The project leader for the hub project, Dr Geoff Allan participated during the review and discussed research communication and the hub project with panel members.

Development of new project for sea cage aquaculture of YTK and SBT in NSW. The Hub team worked to develop a proposal for co-investment with the Seafood CRC following the call for new investment issued in February 2011. The research project that formed the proposal had the overall goals to develop and validate technology for offshore culture of marine finfish in NSW and to conduct the rigorous economic and environmental assessment required to facilitate expansion of this form of aquaculture throughout Australia.

The project was to be a partnership between Industry & Investment (I&I) NSW and Clean Seas Tuna (CST). The species involved will be yellowtail kingfish (YTK) (*Seriola lalandi*) and southern bluefin tuna (SBT) (*Thunnus maccoyii*) when hatchery technology being developed under the Seafood CRC is sufficiently advanced to allow production of sufficient number of juveniles.

The first phase will be obtaining an experimental lease in NSW. The second phase (only in Phase 1 is successful) is with YTK and the primary objectives are to:

1. Test the validity of existing growth/nutrition and economic performance models
2. Investigate health challenges and potential management options in an offshore environment
3. Monitor environmental impacts
4. Assess post-harvest and supply chain management.

The third phase will be to evaluate SBT. Depending on availability of fingerlings, the timing of the first and second phases could overlap.
The key objectives of the SBT phase are to:

1. Assess SBT performance under sea cage culture conditions in NSW
2. Evaluate feed management strategies
3. Develop growth models and evaluate economic performance
4. Evaluate health challenges
5. Evaluate market potential and consumer acceptance.

The project is consistent with the primary Seafood CRC objectives of increasing cultured finfish production volume by 100% by 2014, increasing cultured finfish value by at least 100% by 2014, and doubling the capital investment in finfish aquaculture. Specific outputs addressed include: 1.1 Output- Technically verified new aquaculture production systems on a commercial scale, 1.3 Output- Removal or reduction of key production constraints in selected aquaculture systems, and1.5 Output- Production interventions that add value to Australian seafood.

This project addresses the CST strategy of expanding marine fish aquaculture, particularly for SBT.

The project complements the current work being undertaken by the NSW Aquaculture Steering Committee to develop the NSW Marine Waters Sustainable Aquaculture Strategy, and a focus of NSW Aquaculture Research to develop cost-effective technology for marine aquaculture.

Communication & consultation for Pacific Oyster Mortality Syndrome (POMS). Hub communication lines have been used for the distribution of material relating to POMS and strong interstate communication on the issue has occurred. The hub is assisting to facilitate industry information dissemination. Specifically, two sessions have been organised at the combined International Oyster Symposium and Shellfish futures meeting in Hobart in September. The first session will focus providing available scientific information on the disease, while a second special session is being developed to look at Industry-Govt responses to management of the issue. Further the Hub will be supporting the attendance of Dr Standish Allen at the Symposium to discuss the latest developments in triploid Pacific oyster production.

Research/Production workshop for YTK. Planning has commenced for a workshop to bring together all research on YTK (including Seafood CRC research, Aquafin CRC research and research done by other agencies such as Challenger TAFE). The primary beneficiaries of the workshop will be Clean Seas Tuna but other temperate marine fish farming participants in the Seafood CRC will be invited. The workshop was intended to be run immediately following the Seafood CRC forum in July but insufficient time was available to adequate planning and the workshop has been postponed. It is still planned for 2011.

Coordination of the two hatchery networks progressed. The following activities related to the hatchery networks were completed during the six months to July 2011: 1) Technical exchanges, 2) planning has commenced for workshop(s) to be held in conjunction with Prawn and Barramundi Farmers conference, Sydney August, 2011.

The separate Aquaculture Innovation Hub, Hatchery Network section in the public domain Seafood CRC public domain website was updated to include all network information including workshop presentations, reports and technical exchange reports.

Technical exchanges for mollusc technicians

The technical exchange program progressed. Technical staff hatchery exchanges to date have involved: Shellfish Culture, CSIRO and NSW I&I, SAM Abalone and Australian Seafood Industries. Some challenges have been identified, including commercial companies being reluctant to host visits from staff from competing commercial hatcheries, difficulties sparing key staff during busy periods and costs associated with exchanges. However, the program has commenced and it is anticipated that the issues identified will be overcome as communication and trust between individuals and companies participating in the networks improves. Brief reports on the exchanges are attached.

Workshop(s) to be held with Prawn and Barramundi Farmers conference, Sydney August, 2011. Consultation with prawn and barramundi producers are being held to ensure the Hub helps facilitate relevant workshops to assist producers in priority areas, particularly to communicate research results of benefit to industry.

Contact with collaborators and beneficiaries

(a) Meetings with collaborators, beneficiaries or funding agencies relating primarily to planning and review: Meeting with CST, prawn and barramundi farmers. Meetings with DEEDI researchers and representatives from Ridley to discuss potential for projects.

(b) Visits and exchanges involving industry and other user groups (for example government agencies and independent consultants): Communication with a wide and diverse group of aquaculture producers, R&D providers, government officers and suppliers to inform them of the Production Innovation Hub and Hatchery Networks. Communication with hatcheries to explain progress with the Hub and the networks.

(c) Visits, staff or student exchanges, other collaborative activities associated with project: Hatchery exchanges to date have involved: Shellfish Culture, CSIRO and NSW I&I, planned exchanges to include SAM Abalone, NT Fisheries DAC and Australian Seafood Industries.

Marine Finfish hatcheries involved with Seafood CRC 2009/726 Southern Bluefin Tuna larval/juvenile rearing have been communicating regularly, a number of technical visits/exchanges have taken place under the new tuna larval rearing project. A/Prof Stephen Battaglene visited PSFI, Darwin Aquaculture Centre, SARDI and CST Hatchery, Arno Bay to assist with communication and collaboration under that project. Lindsey Wooley (PhD student, Flinders University) visited PSFI to assist with larval rearing experiments and collaboration under the project.

Agencies involved with feed management research plus Clean Seas Tuna, have met regularly to develop a new feed management project.

Progress against dissemination, extension and commercialisation plan.
A separate Aquaculture Innovation Hub section of the Seafood CRC website, accessible through the member's section, was maintained. The website section (called Aquaculture Innovation Hub) includes background to the Hub project, agendas and records of meetings, copies of presentations and documents and will include a link to aquaculture projects. A separate Aquaculture Innovation Hub - Hatchery Network section of the Seafood CRC website, accessible though the public access section, was developed for Hatchery Network participants (as many of these are not Seafood CRC members). The website sections from the Hub project have been developed in conjunction with Mrs Emily Mantilla, Program Manager, Education and Communication. Both sections are to be incorporated in the Seafood CRC website upgrade.

Education, research and training

- Marine Finfish and Mollusc Hatchery Sessions organised 26 May 2010 at AA'10.
- Hatchery Technology Workshop organised 27 May 2010, following AA'10.
- Communications workshop organised in Adelaide, 22 June 2010.
- Technical exchanges/visits for technicians involved with Hatchery networks.
- Participation of three technicians at 8th Annual Workshop on Physiology and Aquaculture of Pelagics with Emphasis on Reproduction and Early Developmental Stages of Yellowfin Tuna,Thunnus albacares to be held at the Achotines Laboratory, Republic of Panama, Central America, 7-19 June 2010.
- Algal identification workshop for prawn and barramundi farmers organised by Prawn Farmers Association Sofitel, Gold Coast, 4 August 2010.
- Disease management and identification workshop organised by Prawn Farmers Association Sofitel, Gold Coast, 4 August 2010.

6. Discussion

The three main achievements from the Hub project relate to sharing and improving skills, particularly for the finfish and shellfish hatchery sector, improved communication among Seafood CRC participants and hatchery network participants and, as a consequence, improved project development and ability to disseminate results.

To date, the Hub project has helped build trust among Seafood CRC participants and allowed hatchery operators the opportunity to communicate and learn from each other. Providing access to training opportunities, including designing workshops to address identified priorities, helping to fund attendance at international training workshops, and organising sessions at conferences has set the framework for a lasting network for producers. However, a major challenge for the remainder of this Hub project is to forge a lasting legacy of coordination and communication within the aquaculture sector.

Identifying priorities proved to be relatively straight forward and there was a higher degree of commonalty among operators for different species groups than expected. For example, all hatchery operators technology for disinfection (water, eggs) and live feeds management as a priority regardless of whether they operated shellfish or finfish hatchery systems. Other priorities that were common across sectors included general microbiology, preparing agar plates etc, basic system design, live algae production, basic genetics for beginners, live feeds production. Species specific disease identification, diagnosis and treatment, basic nutrition, and phages and probiotics were also rated as priority topics by all sectors. While some of these topics remain to be addressed, it is notewhorthy that the between sector similarities were greater than their differences. This augers well for cross-sector coordination, particularly among hatchery operators.

In addition, once relevant stakeholders were identified and brought together, identifying areas of mutual interest and priority were relatively simple and greatly facilitated the task of identifying, developing and improving projects. There is no doubt that projects crafted after extensive discussions between stakeholders and research providers were much better than those requested by individual commercial operators or drafted by individual research providers. The cobia consortium and the cobia project ultimately failed because the potential benefits identified for the industry partners were not sufficiently greater than the costs and risks. This should be seen as a success of the process. Far better for a project to fail at the development phase than to fail after long-term investment.

The challenge of coordination and communication is not new. The entire CRC Program was designed to improve the link between research, training and industry development. The Program Model used in the Seafood CRC and the Sub-Program concept adopted by FRDC are both attempts to coordinate development and delivery of species, sector or topic specific projects and all require on-going funding, usually from a mixture of government and industry funding.

In this Hub project, the costs of coordination were subsidised by the project and opportunities were provided through travel grants to attend training workshops overseas or to participate in the technical exchange program. The costs of attending workshops and conferences were borne primarily by participants. Despite the fact that the activities reported in Section 5 of this report were well received by all participants, the hatchery networks and the collection of aquaculture producers brought together during this project will not be self-maintaining without on-going coordination. This will require on-going contribution from participants. It is unrealistic to expect the Seafood CRC or the FRDC to fund a lasting coordination program to continue to run producer or even just hatchery networks. This is a challenge for the remaining life of the Hub project – how to create a lasting legacy from the networks that have been created.

The experience from AquaTT, as explained by visiting Professor Gavin Burnel, is a useful model for helping to coordinate aquaculture activities and resonated very well with participants. The model used by AquaTT for help fund that organisation's on-going communication activies included funding from European Union Programs to manage large (usually multi-lateral) progects and delivering training programs. However, largely because of the much smaller size of the aquaculture community in Australia than the European Union, this model is unlikely to have immediate application in Australia.

The development in Australia of the Australiasian Aquaculture series of biennial conferences has served the aquaculture stakeholders very well as a forum for technical information dissemination and, as importantly, the chance to network closely with colleagues. This delivers part of the challenge of on-going communication and coordination – a forum for stakeholders to come together.

During this project, we used the conferences to bring participants together in specific sessions (e.g. hatchery sessions) and then to run post-conference workshops to address previously identified priorities. This was particularly effective in maintaining the hatchery networks during the Hub project but the networks will not survive unless a more formal, lasting network is created. Consideration should be given to linking on-going funding support from FRDC for the conferences to organisation and contribution to specific sessions to capture this benefit from the conferences. The conferences are particularly useful for maintaining networking opportunities and organisation of specific sessions will help ensure participation and enhance networking.

7. Further Development

Following the resignation of Dr Geoff Allan as Principal Investigator on this project, the Seafood CRC determined that following its success, it should continue into a second phase with a new Principal Investigator. Dr Jennifer Cobcroft from University of Tasmania will take over this role.

8. Planned Outcomes

- Better programs and projects that deliver on Seafood CRC outcomes (address industry priorities, cost-effective, on-time, innovative science)

- Increased understanding of research project development and management among Seafood CRC participants

- Increased communication among aquaculture research and industry

Planned outcomes were achieved or partially achieved. The continuation of the project will help consolidate outcomes achieved and help create a legacy for on-going coordination and communication among aquaculture researchers, industry participants and policy makers.

9. Conclusion

This project achieved the objectives and planned outcomes. It helped coordinate project development and improved communication among both Seafood CRC participants and, for the hatchery networks, among researchers and industry throughout Australia. The coordination of opportunities for training and travel was very beneficial, particularly for senior technicians who often do not get opportunities to visit other centres, particularly those from other countries. Similarly, coordinating the tuna symposium helped bring international experts to Australia, providing a rare opportunity for communication and information exchange.

The organisation of special sessions at Australasian Aquaculture conferences was very successful to both exchange information and facilitate networking opportunities. This should continue and it is recommended that sponsorship (e.g. from FRDC) be linked to organisation of similar themed sessions. The training workshops and technical exchanges were well attended and valuable opportunities for information exchange, particularly for hatchery technicians who often do not get opportunities to visit other establishments. The similarity in priorities for both finfish and shellfish hatcheries, including disinfection and hygiene was surprising but demonstrated that despite different methods for individual species, there are very similar fundamentals that drive success in the hatchery sector.

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11. Appendices

11.1 Record of 1st Hub meeting

1 Record of meeting.doc

11.2 Delegate list for Tuna Symposium

2 Registration Tuna Symp.pdf

11.3 Proceedings of Tuna Symposium

3 Tuna Symposium Book of Abstracts 231

11.4 Hatchery Networks

4a Finfish Network.pdf

4b Shellfish Network.pdf

11.5 New Cobia Proposal

5 Cobia record of meeting 180609.doc

11.6 Notes on Communication Workshop

6 Notes Hub Communications Netw

11.7 Hatchery Technology Workshop Report

7 Notes on the HTW.pdf

11.8 Panama Trip Reports

8a Luke Cheviot-Republic of Panama.D

8b Luke Vandenberg-Republic of Panama.D

11.9 ABFA and APFA Conference 2010 Program

ABFA & APFA Program.pdf

11.10 Marine Finfish Hatchery Manual

Hatchery manual.pdf

11.11 Mulloway and YTK Feeds Models

11a Mulloway feed model.xls

11b YTK feed model.xls