Department of Primary Industries

Aquaculture Research Advisory Committee

Annual Report

July 2011 to June 2012

Professor Ian White (Chairperson)
Ms Jo Pickles (Executive Officer)

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Chairpersons Report

Aquaculture is an important regional primary industry in NSW to which indigenous communities make a significant contribution. One lesson that has become increasingly clear over the past two decades is the reliance of the industry on sound, reliable, applied research. When major emergencies occur, even the most experienced farmers turn to researchers to help address the problems. In Australia the interaction of our extremely variable climate, ancient and isolated continent and indigenous fish species presents unique challenges. These cannot be solved by simply importing overseas knowledge. Research cannot be turned on and off like a tap. It requires a long term commitment and investment to establish a knowledge base and to build up the necessary skills and experience. The far-sighted support of successive NSW governments for fisheries research has paid handsome dividends, where 20 years investment in research is now supporting the viability of the industry.
In NSW we are singularly fortunate to have key, committed farmers and a group of NSW Department of Primary Industries and university researchers dedicated to providing the knowledge, experience and training necessary to sustain the aquaculture industry. The benefits that have flowed from the merger of NSW Fisheries with NSW Primary Industries have created opportunities both for farmers and fisheries scientists to draw on broader expertise.

One issue that has been raised previously is our restricted ability to transfer research into practice and to attract and support new entrants to aquaculture. ARAC believes that investment in a professional extension officer is a strategic opportunity. While other strategies, such as web-based materials, have been developed to support knowledge transfer, it has meant that fisheries staff had to take on extra responsibilities, for which ARAC is especially grateful. The sustainability of those efforts depends on the personal generosity of fisheries staff.

I want to again thank ARAC members. The farmer members have been outstanding and tireless representatives of their industries, and at personal cost to themselves and their businesses. I am also extremely grateful to NSW Primary Industry staff who have assisted and contributed to ARAC. Their professionalism, dedication, energy, commitment and organisational skills continue to be outstanding. I also want to thank the FRDC and the AS-CRC for their continued support for the NSW aquaculture industry. Finally I am extremely grateful to the Minister and NSW Primary Industries for their strategic initiatives in and support for aquaculture.

ARAC remains committed to increasing the sustainability, profitability and growth of the aquaculture in NSW through applicable research. I have great pleasure in presenting this report on activities of the NSW Aquaculture Research Advisory Committee.

Professor Ian White FTSE
CHAIR ARAC

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This report was compiled in July/August 2012

Preamble

This is the sixth Annual Report for the Aquaculture Research and Advisory Committee (ARAC). The Minister for Primary Industries approved the formation of the Aquaculture Research Advisory committee in October 2005 to provide advice on industry contributions and R&D expenditure for all aquaculture industries in NSW. Confirmation for ARAC's establishment was confirmed in 2006 after the completion of a NSW Government review of Boards and Committees. ARAC has replaced the Oyster Research Advisory Committee (ORAC) and the former Advisory Council on Aquaculture (ACoA).

ORAC was formally disbanded after its meeting in December 2005.

The Committee

The Aquaculture Research Advisory Committee (ARAC) was established in October 2006 and held its inaugural meeting on 31 January 2007.

ARAC is a statutory committee that advises the Minister on the amount of contributions payable by the NSW aquaculture industries into trust accounts for aquaculture research and development and the expenditure of those trust funds. The NSW prawn aquaculture industry is not included as it pays research levies directly to the Commonwealth.

ARAC is established under Section 157 of the *Fisheries Management Act 1994.*

Terms of Reference

1 Investigate and evaluate the requirement for aquaculture research and development in NSW, after consultation with NSW aquaculture industries and with reference to NSW, Australian and overseas experience, and whether funded by the Fisheries Research and Development Corporation or otherwise;

2 Revise as appropriate research and development plans for NSW aquaculture research and development and promote it to the wider research community;

3 Advise the appropriate NSW Fisheries Research Advisory bodies and the Fisheries Research and Development Corporation on NSW aquaculture research and development matters and priorities;

4 Advise the NSW Minister for Primary Industries on the level of funding from industry required for aquaculture research and development in NSW and on its expenditure.

5 Oversee the management of annual contributions for aquaculture research collected under Section 156 of the *Fisheries Management Act 1994*, and placed in separate trust accounts under Section 157 of the *Fisheries Management Act 1994.*

6 Report on a regular basis, including an Annual Report based on a financial year, to the NSW aquaculture industry, the NSW Minister for Primary Industries and NSW researchers on aquaculture research and development initiatives;

7 Facilitate the dissemination, adoption and commercialisation of the results of aquaculture research and development; and

8 Promote aquaculture research and development in NSW.

Membership and Selection Process

The *Fisheries Management (Aquaculture) Regulation 2002*, schedule 1 provisions relating to members and procedure of committee, section 2, states:

1 The Minister may convene a selection committee (including representatives of the aquaculture industry) for the purpose of recommending persons for appointment as members of a committee.
2 The Chairperson of a committee is to be the member of the committee for the time being appointed by the Minister as Chairperson.
3 Section 157 (7) of the Act requires the Minister to ensure that a majority of the members of the committee are representatives of the aquaculture industry.

Industry members of ARAC are appointed by the Minister through a competitive selection process from Aquaculture Permit holders who have submitted expressions of interest to join the committee. A selection committee is appointed, comprised of two representatives from the NSW Farmers Association, one representative from the Seafood CRC and the NSW Department of Primary Industries (Fisheries Division). Industry members are selected on merit.

The Chairperson is appointed to the committee by the Minister.

To aid the committee with their function, NSW Department of Primary Industries personnel attend meetings and undertake the role of facilitator and secretariat.

Deputy Members

The *Fisheries Management (Aquaculture) Regulation 2002*, schedule 1 provisions relating to members and procedure of committee, section 3, states:

1 The Minister may, from time to time, appoint a person to be the deputy of a member, and at any time revoke any such appointment.

Committee Members in 2011/12

Member	Representing	Date of Appointment	Expiry Date
Prof. Ian White	Independent Chair	Oct 2006	Oct 2012
Ms Milada Safarik	Industry	Oct 2009	Oct 2012
Mr Tony Troup	Industry	Oct 2006	Oct 2012
Mr Geoff Diemar	Industry	Oct 2006	Oct 2012
Mr Michael Wright	Industry	Oct 2009	Oct 2012
Mr Ewan McAsh	Industry	Oct 2009	Oct 2012
Mr Nick Arena	Industry	June 2008	June 2011
Mr Russell Sydenham	Industry	Mar 2012	Oct 2012

There are six members on ARAC, four lease-based (oyster) representatives and two land-based (non-oyster) representatives, which reflects the relative sizes of the industry sectors in NSW. All members of ARAC, including the independent Chairperson, are appointed for a term of three years.

Dr Wayne O'Connor (A/Research Leader, Aquaculture), Mr Ian Lyall (Manager, Aquaculture) and Ms Brigid Krug (Aquatic Biosecurity Officer, Aquatic Biosecurity and Risk Management) from NSW Department of Primary Industries sat as observers on the Committee for 2011/12. Ms Jo Pickles from NSW Department of Primary Industries is the Executive Officer. Mr Anthony Zammit (NSW Food Authority) also sat as an observer.

Meetings

Three meetings were held during the financial year 2011/12:

Member	21 July 2011	24 November 2011	19 April 2012
Prof. Ian White	✓	✓	×
Mr Tony Troup	✓	✓	✓
Mr Geoff Diemar	✓	×	×
Mr Nick Arena	×	×	✓
Ms Milada Safarik	×	✓	✓
Mr Michael Wright	×	✓	×
Mr Ewan McAsh	✓	✓	×
NSW Department of Primary Industries			
Dr Wayne O'Connor	✓	✓	✓
Mr Ian Lyall (or rep)	✓	✓	×
Ms Jane Frances (or rep)	✓	✓	✓
Mr Anthony Zammit	✓	✓	✓
Ms Jo Pickles	✓	✓	✓

Disclosure of Pecuniary Interests

Schedule 1 of the *Fisheries Management (Aquaculture) Regulation 2002* sets out provisions relating to members and committee procedure. Clause 8, sub clause 1 states a member of a committee:

a who has a direct or indirect pecuniary interest in a matter being considered or about to be considered at a meeting of the committee, and

b whose interest appears to raise a conflict with the proper performance of the member's duties in relation to the consideration of the matter

must, as soon as possible after the relevant facts have come to member's knowledge, disclose the nature of the interest at a meeting of the committee.

No pecuniary interests were declared in this financial year.

Trust Accounts for the 2011/12 Financial Year

Advice on Level of Contribution

Section 156 of the *Fisheries Management Act 1994* states a permit holder is required to contribute to the cost of administration or research or to other industry costs. Under section 157(4) of the *Fisheries Management Act 1994* the Minister is to appoint a committee of persons to advise the Minister on the amount of contributions payable into any trust account. Research contributions made by the aquaculture community (excluding the prawn industry) are reported to the Minister by ARAC.

Research contributions from the oyster industry have been set at $37.00/ha/year. The amount of research contributions billed for 2011/12 was $120,460.00.

Research contributions from the non-oyster aquaculture industry have been set at $28/ha/year or $134 for a minimum of 5 ha/year. The amount of research contributions billed for 2011/12 was $23,899.00.

The required annual contribution to the Fisheries Research Development Corporation is calculated at 0.25% average gross value of production (AGVP), based on three year rolling calculations. The contribution from the oyster industry for 2011/12 was $88,652.47 ($96,910.00 less the fee waiver of $8,257.53). The contribution from the non-oyster aquaculture industry for 2011/12 was $13,162.66 ($16,663.00 less the fee waiver of $3,500.34).

Advice on Level of Expenditure

Section 156 of the *Fisheries Management Act 1994* states a permit holder is required to contribute to the cost of administration or research or to other industry costs. Under section 157(4) of the same Act the Minister is to appoint a committee of persons to advise the Minister on the expenditure of money in the trust account.

Expenditure Purpose and Level

The allocated expenditures for the 2011/12 financial year are outlined below:

ARAC REVENUE AND EXPENSES – 1 July 2011 to 30 June 2012 *Note: this is an accrual accounting report for WBS 116-1 (Oyster Research Levy)		
Revenue:	Credit	Debit
Balance carried forward 30.06.2011	$28,585.49	
Research Contributions billed 01.07.2011 to 30.06.2012	$111,468.90	
Total Revenue	**$140,054.39**	
Expenses: Internal Transfer to Committee Account		$11,696.82
Bad Debts		$440.00
FRDC Contribution (reduced by fee waivers for research)		$88,652.48
Total Expenses		**$100,789.30**
Balance of Cost Centre as at 30.06.2012	**$39,265.09**	

ARAC Committee expenses – 1 July 2011 to 30 June 2012 *Note: this is an accrual accounting report for WBS 2492-1		
Revenue:	Credit	Debit
Balance carried forward 30.06.2011	$0.00	
Transferred from NSW Department of Primary Industries funds	$17,545.23	
Total Revenue	**$17,545.23**	
Operating Expenses:		
Travel		$7,307.21
Committee Fees		$4,830.82
Consumables		$5,407.20
Total Expenditure		**$17,545.23**
Balance of Cost Centre as at 30.06.2012	**$0.00**	

ARAC REVENUE AND EXPENSES – 1 July 2011 to 30 June 2012 *Note: this is an accrual accounting report for WBS 119-1 (Aquaculture [non-oyster] Research Levy)		
Revenue:	Credit	Debit
Balance carried forward 30.06.2011:	$37,009.10	
Research Contributions billed 01.07.2011 to 30.06.2012	$22,962.60	
Total Revenue	**$59,971.70**	
Expenses:		
Internal Transfer to Committee Account		$5,848.41
Bad Debts		$400.08
FRDC Contribution (reduced by fee waivers for research)		$13,162.66
Total Expenses		**$19,411.15**
Balance of Cost Centre as at 30.06.2012	**$40,560.55**	

Levy Collection

Billing is conducted on the financial year and permit holders have the option of paying in full by 30 September or by quarterly instalments at 30 September, 31 December, 31 March and 30 June of that year.

Money held in the NSW Department of Primary Industries Crown Trust Account does not receive interest.

Forward Budget

ARAC REVENUE AND EXPENSES – 1 July 2012 to 30 June 2013 (Oyster Research Levy)		
Revenue:	Credit	Debit
Balance carried forward 30.06.2012	$39,265.09	
Research Contributions billed 01.07.2012 to 30.06.2013	$122,109.00	
Total Estimated Revenue	**$161,374.09**	
Expenses:		
FRDC Contribution (estimate)		$100,000.00
ARAC Committee Expenses (Internal transfer)		$8,000.00
Total Estimated Expenses		**$108,000.00**
Estimated Balance as at 30.06.2013	**$53,374.09**	

ARAC REVENUE AND EXPENSES – 1 July 2012 to 30 June 2013 (Aquaculture [non-oyster] Research levy)		
Revenue:	Credit	Debit
Balance carried forward 30.06.2012:	$40,560.55	
Research Contributions billed 01.07.2012 to 30.06.2013	$22,643.00	
Total Estimated Revenue	**$63,203.55**	
Expenses:		
FRDC Contribution (estimate)		$20,000.00
ARAC Committee Expenses (Internal transfer)		$4,000.00
Total Estimated Expenses		**$24,000.00**
Estimated Balance as at 30.06.2013	**$39,203.55**	

COMMITTEE REVENUE AND EXPENSES – 1 July 2012 to 30 June 2013		
Revenue:	Credit	Debit
Balance carried forward 30.06.2012	$0.00	
Internal transfers	$12,000.00	
Total Estimated Revenue	**$12,000.00**	
Expenses:		
Consumables		$1,500.00
Travel		$6,000.00
Committee fees		$4,500.00
Total Estimated Expenses		**$12,000.00**
Estimated Balance as at 30.06.2013	**$0.00**	

Recommendation on Level of Contribution

On 31 January 2007, the Committee agreed the oyster research levy should increase to $35.00/ha/yr from $29.00 as this amount was insufficient to maintain the contribution to FRDC at 0.25% of AGVP and operate ARAC. Letters were then written to lease-based farmers explaining the reasons for the increase. An amendment in the Regulation Review was prepared and approved to raise the levy to be in effect 2008/09. The Committee has agreed that levies be reviewed on an annual basis at the first meeting in the calendar year.

Aquaculture Permit Holders in NSW

In NSW, aquaculture occurs in fresh, estuarine and marine waters. There are several classes of aquaculture permits that are issued for the different types of aquaculture, with some farms having more than one permit. Most forms of aquaculture include Intensive farming; when the species being grown is given specially prepared feeds and Extensive farming; when the natural ecosystem of the water provides feed for the species grown.

As at June 2012 there were 327 oyster farming permits and 151 non-oyster businesses that have 225 permits between them authorising extensive and intensive (leases), fishout, hatchery and intensive land based activities.

List of Activities

- In April 2011, NSW Department of Primary Industries was reinstated under the NSW Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS). On 18 May, a number of changes to the structure of Primary Industries were announced that brought all fisheries-related activities within a single division. This new Fisheries division will provide a clear focus for fisheries stakeholders including commercial fishers, recreational fishers, aquaculture farmers, indigenous fishers, the science and research community and the NSW public. A new position of Executive Director, Fisheries has been filled by Dr Geoff Allan. Dr Wayne O'Connor is now acting in the position of Research Leader, Aquaculture.

- Anthony Zammit discussed the norovirus and possible land contaminant issue at the Kalang River. Belligen Council has a new General Manager as of 2011 and there has been a positive change in communication from Council staff providing information to move forward with remediation plans. The NSW Food Authority and the Office of Environment and Heritage are working with Belligen Council after major pollutants were identified with on-site sewage management systems (OSMS). Several government agencies are working with the Kalang River Working Group, but until water quality issues have been addressed the timeframe for reopening is unknown. The Kalang is an example of the importance of water quality issues and NSW Department of Primary Industries, together with the NSW Food Authority and the Peak Oyster Advisory Group, have produced a guide for Councils/land use planners and oyster farmers on best practice called 'Healthy Estuaries for Healthy Oysters'. ARAC will keep appraised of any research related priorities for the Kalang.

- Ian Lyall provided a copy of an information sheet posted to all oyster farmers in July 2011 advising detection of QX oyster disease in the Kalang River. This was not good news for the Kalang farmers who are still closed by norovirus. The Bellinger/Kalang Rivers share a common river mouth and are treated as one estuary. A quarantine order was implemented on 18 July 2011 which prohibits the movement of oysters and farming infrastructure out of the Kalang and Bellinger Rivers.

- Authorities have been testing oysters and water quality to explain what is being termed Pacific Oyster Mortality Syndrome. Investigations have confirmed the presence of a virus affecting Pacific oysters in both the Botany Bay and Port Jackson estuaries. Farmed and wild Pacific oysters in the Georges River, Botany Bay have been impacted and precautionary controls have been put in place to prevent movements of oysters and oyster farming equipment from the Georges River, Botany Bay to any other NSW river. ARAC agreed having the expertise in the Elizabeth Macarthur Agricultural Institute (EMAI) to analyse samples is a huge benefit to the Department. The EMAI laboratory continues to support research into the POMS event and staff are to be congratulated for their efforts.

- ARAC were advised some farmers are not completing oyster shipment log books which proves onerous when a disease outbreak occurs and movements need to be traced. NSW DPI have been advertising this problem for some time via the Aquaculture Newsletter and our web site, however, the practice continues.
- The FRDC Tactical Research Fund approved a national project to encompass a desktop study on all industry relevant issues associated with POMS, a field visit to France by a small group to engage their industry and up to date technical components of POMS and the development of a strategy to minimise the spread of the disease plus prepare the industry for management of any onset of the disease.

- Wayne O'Connor spoke about a two day workshop on POMS hosted by the FRDC Health Sub Group held in Cairns over 9 & 10 July 2011. The workshop saw oyster farmer representatives from NSW, SA, Tasmania and New Zealand come together with researchers, managers and biosecurity experts from Australia, France and the UK. Over two days participants discussed the progression and impacts of POMS in Europe and the southern hemisphere. Methods for sampling and testing were discussed. Potential management strategies were outlined and priorities for research were developed. A report from the workshop was circulated to workshop attendees and ARAC members in November 2011. This will be a good guide as to where research should be focused.

- The FRAB endorsed a detailed proposal to SIAC for industry to take on the responsibility of running the FRAB. In July 2011, ARAC endorsed the proposed structure and nominated Ms Milada Safarik (in November 2011) as the ARAC member to represent aquaculture, to ensure there is a strong and consistent link with our Committee. This appointment will be on an annual basis and will ensure the ARAC representative is a current member on ARAC and closely involved with discussions and decisions from ARAC. Milada has sought comments through the year on projects relevant to aquaculture and relayed those outcomes to the Committee.

- On 23 November 2011, ARAC held a special meeting day (in Port Stephens) to conduct a major review of the ARAC RD&E Strategic Plan to encompass the next five years (2012-2017). Strategic RD&E planning assists industry and funding agencies to understand the issues that constrain profitability and industry growth. It helps identify what projects are needed to address those constraints. The Committee wrote to all aquaculture permit holders, aquaculture associations and relevant committees (ie. LBACG & POAG) seeking input into the Strategic Plan that will benefit you and your industry. The Plan has now been finalised with a copy posted (in May 2012) to all aquaculture permit holders, aquaculture associations and research providers. We thank the 38 permit holders who provided suggestions for the RD&E plan that assisted us to reflect the needs of industry.

- ARAC is progressing with an oral history and photographic archive of the NSW Oyster Industry. In July 2010, Steve McOrrie prepared an invitation and registration form that was mailed to all oyster farmers in NSW seeking historical material. ARAC has created a register and collating this information as it comes in. It is hoped items such as photos, oral histories or equipment will be used to document the History of the NSW Oyster Industry - responses have been coming in intermittently. Steve will continue to encourage farmers to reply to the invitation and certainly generated further interest at the field day held in Port Macquarie during September 2011. NSW DPI had a scanner on site, to encourage famers to bring photos on the day which were scanned during the field day, but allowed farmers to take them home again.
- The oyster industry in upper Port Stephens (Karuah River) has experienced significant mortality and production is declining. The cause/s remain unexplained, but concerns have been raised over the potential impacts of mine effluent and leachate on oyster health. Geoff Diemar brought it to the attention of Dr Wayne O'Connor who approached Newcastle University researchers, with expertise in this field. The University of Newcastle had a PhD student looking at metal impacts in the Karuah River and liaising with farmers and collecting samples and comparing them with work in the Hunter River. The results are now being analysed in lab studies. Newcastle University has now devoted an honours student to investigating the impact of metals on metabolism in SRO. The metals used will be informed by the Hunter/Karuah study.

- A representative from NSW Department of Primary Industries' Aquatic Biosecurity and Risk Management team attend each ARAC meeting as an 'observer'. This has proven to be a valuable contribution to our meetings providing updates on aquatic biosecurity issues affecting the NSW aquaculture industry. Discussions included the Pacific Oyster Mortality Syndrome, Winter Mortality, the Pacific oyster closure, QX in the Bellinger/Kalang, FRDC funding opportunities for emergency aquatic animal disease response arrangements and a hygiene policy and procedure being developed by the Aquatic Biosecurity team which will be used by all DPI staff that work in the aquatic environment and will be included as a permit requirement in all relevant future permit conditions.

- ARAC are supporting an investigation into the impact of oyster farming activities on seagrass communities in NSW. Information to date is anecdotal with many reports of positive impacts. However, it is likely that oyster farming activities in seagrass areas will require a more rigorous assessment under NSW State planning legislation. To assist the oyster industry to mitigate potential negative impacts of existing oyster farming activities on seagrasses, and to assist in the development of best practice for farming activities undertaken in seagrass areas, it is essential that independent research is encouraged that a) describes the impact of existing individual cultivation methods (e.g. longline, floating, tray etc.) on seagrass communities, and b) assists the development of oyster farming practices that reduce any demonstrated oyster farming impacts on seagrass communities. NSW DPI is looking into potential collaborators and the experimental design which will also incorporate an assessment of the impact of removal of infrastructure on seagrasses.

- In August 2010, results of tests following oyster mortalities in the Macleay River indicated sulphide concentrations at levels that were sufficient to cause mortality. Sulphide is likely to have been the product of acid sulphate soil oxidation products mobilized following heavy rain. A working group including the Office of Environment and Heritage, NSW Department of Primary Industries and Kempsey Council progressed investigations, sampling and monitoring. A report by a consultant to Kempsey Council (who is also preparing the Macleay Estuary Management Plan) will be ready in early 2012.

- Anthony Zammit advised the NSW Food Authority is looking at what amendments can be made to the storage temperature requirements as a result of the Refrigeration Index project. Anthony also discussed the Biotoxins Capabilities Project and advised there is interest to provide a full service laboratory here in Australia (currently samples are sent to New Zealand). There are many benefits of one facility and building capacity and expertise to respond to threats. There is a need to convey to industry that this is a risk reduction technique.

- Ian Lyall advised the reformation of the inter-departmental consultative committee is due to commence the five year review of the NSW Oyster Industry Sustainable Aquaculture Strategy in April 2011. Added to the review will be estuary entrance management, OSMS management, land base leases, climate change adaption, signs and rafts best practice guidelines. It is hoped the review will be finalised in early 2013.

- After the 21 July 2011 meeting, ARAC wrote to Minister Hodgkinson about the On-site Sewage Management System project which was unsuccessful in gaining funding from the NSW Environmental Trust. The Committee believed this was a great project

to engage Councils to highlight the importance of management of OSMS in oyster harvest areas and sought guidance on other possible funding sources.

- Anthony Zammit advised of an Inquiry into the Regulation of Domestic Wastewater by NSW Parliament. This inquiry is a current Legislative Assembly inquiry conducted by the Environment and Regulation Committee. The terms of reference are:
  a) The adequacy of safeguards to ensure food safety, and to protect against the risk of localised contamination, in food production areas;
  b) The appropriateness of current regulatory arrangements in relation to the management of domestic wastewater;
  c) The adequacy of inspection procedures and requirements to report incidents; and
  d) Any other related matter.

  Tim Gippel (Senior Policy Officer, Aquaculture, NSW DPI) and Anthony gave evidence at the hearings in March 2012 and advised most of the submissions were about oysters. The report is expected mid 2012.

- At the July 2011 meeting, ARAC provided 'in principle' support for the proposal outlining the formation of Oysters Australia. However, the proposal raised a number of issues requiring consideration and ARAC formally requested further details of the OA structure and subsequent confirmation of industry support before a recommendation on financial support can be made to the Minister. In April 2012, Tony Troup provided an update on the formation of Oysters Australia and advised Shane Comiskey was no longer involved. An Oysters Australia Research Sub Committee meeting was held on 18 April 2012.

- In November 2010, ARAC approved a request for $5,000 for a testing program involving several farms to measure nitrogen, phosphorus and conductivity in pond, intake and effluent pond water. The aim of this project was to provide data to assist Councils when assessing land-based aquaculture applications for farms that don't require an EPA license. It covered intensive, extensive and recirc systems. The results from this program should speed up the DA process. The sampling took place in March/April 2011. The results have been collated into a paper 'Nutrients in pond based aquaculture discharge water used for irrigation' written by Graeme Bowley and Geoff Allan. The paper has been reviewed and approved by the Department and has been submitted to Austasia Aquaculture for their consideration to publish. Ian Lyall praised ARAC for funding this research and how beneficial it is to have the science available when assessing these applications from Council.

- SafeFish provided a copy of their latest comments to Codex Australia for consideration on the Proposed Draft Guidelines on Viruses in Foods in September 2011. ARAC noted there was not an Australian participant at the Codex meetings.

- In June 2011, the term of membership expired for Mr Nick Arena (ARAC land-based representative). EOIs were mailed to all land-based permit holders and aquaculture associations. Six applications were received and Mr Nick Arena did not seek re-appointment. The panel was unanimous in its recommendation for the appointment of Mr Russell Sydenham, a trout farmer and owner of Arc-en-Ciel Rainbow Trout, a well established business in Hanging Rock and five years experience in the aquaculture industry.
- NSW DPI lodged a project application with the Department of Planning and Infrastructure to establish a research lease off Port Stephens to extend our successful marine hatchery research. The key species proposed for this work include Yellowtail Kingfish and Southern Bluefin Tuna which are currently being cultured at

PSFI under a Seafood CRC program. The project would seek to establish a 20 hectare lease off Hawks Nest for a five year period. This environmental assessment and research will benefit prospective farmers and address issues confronting investors in making applications for offshore aquaculture research leases.

- Kept informed of the Seafood CRC research relevant to the aquaculture industry. The Seafood Cooperative Research Centre (CRC) is Australia's first entity to stimulate and provide comprehensive seafood-related R&D and industry leadership on a national basis. The Seafood CRC formed the Oyster Consortium to ensure the national oyster industry became a core participant in the Australian Seafood CRC. The Oyster Consortium consists of 6 representatives from NSW (currently including two members of ARAC), 6 from SA and 6 from Tas. The Consortium determines a national approach to R&D on edible oysters. Together the Consortium and the Seafood CRC determine what research and development proceeds. From here the Seafood CRC develops the program and decide the best institution/agency and project leader to conduct the research.

- Research into means to manage OsHV outbreaks continue. Following initial trials to investigate the potential to breed for OsHV resistance, the Seafood CRC has funded a second series of assessments. The Aquatic Animal Health team in the Faculty of Veterinary Science at the University of Sydney have set up a web site 'Oyster Health Sydney'. The site provides opportunity to view their research, and the means to offer advice, comments and suggestions to assist their research program.

- Wayne provided information on a new ARC project 'Adapting to climate change: does enhanced metabolism provide heritable protection against ocean acidification and increasing temperature in oysters?' Together with Macquarie University, University of Western Sydney and the Alfred Wegener Institute (Germany), DPI has been successful in receiving a $285,000.00 Discovery Grant from the Australian Research Council. This project will involve oysters from the breeding programs. It will develop improved technologies for the assessment of physiological performance in oysters, which will improve our understanding of the mechanisms underlying performance in selectively bred stock.

- A Federal Inquiry is underway into the role of science for fisheries and aquaculture. The inquiry will focus on scientific aspects of fisheries and aquaculture including knowledge, fisheries management, biosecurity, and research and development.

- Flyers on 'ARAC – meet your industry representatives' were prepared and taken to the Oyster Industry Field Days on 20 and 22 September 2011. The flyer has a photo of each of our industry representatives, where they are from and why they wish to represent industry on ARAC. Continue to update the ARAC homepage on the Department's website (www.dpi.nsw.gov.au/fisheries/aquaculture/committees) including the summary of discussions from previous meeting and contributing to the Aquaculture Update newsletter.

Aquaculture Research and Development currently being undertaken by NSW Department of Primary Industries

For the most up-to-date information on oyster research and development currently being undertaken by NSW Department of Primary Industries, please refer to its web site: www.dpi.nsw.gov.au/research/areas/production-research/aquaculture. The web site contains non-technical summaries of all research projects, scientific outputs and final reports.

Oyster Research and Development currently being undertaken in Australia

1	Project Title	Australian Oyster Industry Benchmarking Program Development
	Principal Investigator	Shane Comiskey
	Time Frame	2009 – 2010
	Funding Sources	Seafood CRC (2009/701)
2	Project Title	Differential accumulation of algal biotoxins within diploid and triploid Pacific oysters and Sydney rock oysters
	Principal Investigator	Dr Shauna Murray
	Time Frame	2011
	Funding Sources	UNSW, NSW DPI, ARC (LP1110516)
3	Project Title	Building Bivalve Production Capacity in Vietnam and Australia
	Principal Investigator	Dr Wayne O'Connor
	Time Frame	2007 – 2012
	Funding Sources	ACIAR
4	Project Title	CRC Oyster Consortium – communication, extension and management of R&D results
	Principal Investigator	Rachel King
	Time Frame	2007 - 2010
	Funding Sources	Seafood CRC (2007/715)
5	Project Title	Using genomic information to understand and improve the quality of the Australian South Sea Pearl
	Principal Investigator	Degnan, B.
	Time Frame	2009-2014
	Funding Sources	UQ, ARC, Autore Pearling Pty Ltd, Pearl Oyster Propagators
6	Project Title	Climate change research: Can Sydney rock oysters adapt to chronic multigenerational exposure to ocean acidification and temperature?
	Principal Investigator	Laura Parker
	Time Frame	2010-2011
	Funding Sources	ARC (DP1093395)
7	Project Title	Incorporation of selection for reproductive condition, marketability and survival into a breeding strategy for Sydney rock oysters and Pacific oysters
	Principal Investigator	Graham Mair
	Time Frame	2009-2013
	Funding Sources	Seafood CRC (2009/743)
8	Project Title	Oyster over catch: cold shock treatment
	Principal Investigator	Bob Cox
	Time Frame	2010 – 2011
	Funding Sources	TORC and Seafood CRC (Oyster Consortium) (2010/734)

9	Project Title	Protecting the safety and quality of Australian oysters using predictive models integrated with 'intelligent' cold chain technologies
	Principal Investigator	Mark Tamplin
	Time Frame	2008 - 2011
	Funding Sources	UTAS and Seafood CRC (2008/700)
10	Project Title	Proactive control of oyster spat production by controlling microbiological contamination
	Principal Investigator	Mark Tamplin
	Time Frame	2008 - 2011
	Funding Sources	UTAS and Seafood CRC (2008/761)
11	Project Title	Quality, shelflife and value adding of Australian Oysters
	Principal Investigator	Tom Madigan
	Time Frame	2009 - 2012
	Funding Sources	Uni SA and Seafood CRC (2008/763)9
12	Project Title	Development of tools for the sustainable management of genetics in polypoid Pacific oysters, *Crassostrea gigas*
	Principal Investigator	Anthony Koutoulis
	Time Frame	2010
	Funding Sources	University of Tasmania and Seafood CRC (2010/724)
13	Project Title	Aquatic Animal Health Subprogram: understanding and planning for the potential impacts of OHsV1 on the Australian Pacific oyster industry
	Principal Investigator	Dr Tom Lewis
	Time Frame	2011-2012
	Funding Sources	RDS Partners Pty Ltd and FRDC (2011/043)
14	Project Title	Adapting to climate change: does enhanced metabolism provide heritable protection against ocean acidification and increasing temperature in oysters?
	Principal Investigator	Prof Hans O. Portner
	Time Frame	2012
	Funding Sources	ARC (DP1211946) and Macquarie University
15	Project Title	Pearl Consortium IPA: Control of reproduction of the silver-lip pearl oyster, *Pinctada maxima*.
	Principal Investigator	David Mills
	Time Frame	2012 - 2016
	Funding Sources	FRDC (2011/248) and Paspaley Pearling Company
16	Project Title	Development and implementation of an industry Education and Market Awareness Program
	Principal Investigator	Bob Cox
	Time Frame	2007 - 2012
	Funding Sources	FRDC (2007/235)

17	Project Title	Aquatic Animal Health Subprogram: Development of a DNA microarray to identify markers of disease in pearl oysters (Pinctada maxima) and to assess overall oyster health
	Principal Investigator	Brian Jones
	Time Frame	2008 - 2012
	Funding Sources	FRDC (2008/030) and Fisheries WA
18	Project Title	Aquatic Animal Health Subprogram: Investigation of Chlamydiales-like organisms in pearl oysters, Pinctada maxima
	Principal Investigator	Brian Jones
	Time Frame	2008 - 2012
	Funding Sources	FRDC (2008/031) and Fisheries WA
19	Project Title	Aquatic Animal Health Subprogram: Development of a DNA microarray to identify markers of disease in pearl oysters (Pinctada maxima) and to assess overall oyster health
	Principal Investigator	David Raftos
	Time Frame	2008 - 2011
	Funding Sources	FRDC (2008/030.2) and Fisheries WA
20	Project Title	PIRSA Initiative II: carrying capacity of Spencer Gulf: hydrodynamic and biogeochemical measurement modelling and performance monitoring
	Principal Investigator	John Middleton
	Time Frame	2009 - 2013
	Funding Sources	FRDC (2009/046), PIRSA, Flinders University, UNSW, CSIRO
21	Project Title	FRDC-DCCEE: ensuring that the Australian Oyster Industry adapts to a changing climate: a natural resource and industry spatial information portal for knowledge action and informed adaptation frameworks
	Principal Investigator	Pia Winberg
	Time Frame	2011 - 2012
	Funding Sources	FRDC (2010/534), University of Wollongong, Bega Valley Shire Council, Hornsby Council, Hastings Council, Shoalhaven City Council, UTAS, NCCARF
22	Project Title	Aquatic Animal Health Subprogram: development of improved molecular diagnostic tests for Perkinsus olseni in Australian molluscs
	Principal Investigator	Nick Gudkovs
	Time Frame	2011 - 2014
	Funding Sources	FRDC (2011/004) and Fisheries WA
23	Project Title	Tactical Research Fund: Developing a dynamic regional brand – focus on flavour
	Principal Investigator	Heather Smyth
	Time Frame	2011 - 2013
	Funding Sources	FRDC (2010/228), Uni of Qld, Eyre Peninsula Regional Development Board

24	Project Title	Aquatic Animal Health Subprogram: Pacific oyster mortality syndrome (POMS) - understanding biotic and abiotic environmental and husbandry effects to reduce economic losses
	Principal Investigator	Richard Whittington
	Time Frame	2011 - 2012
	Funding Sources	FRDC (2011/053), University of Sydney, Hornsby Shire Council, Sydney Metro CMA
25	Project Title	Pearl Consortium IPA: improving reliability and efficiency of spat nursery and growout for the silver-lip pearl oyster (Pinctada maxima)
	Principal Investigator	David Mills
	Time Frame	2011 - 2015
	Funding Sources	FRDC (2011/236) and Paspaley Pearling Company

Aquaculture Research and Development currently being undertaken in Australia

Australian Centre for International Agriculture Research (ACIAR)

Active and Pipeline ACIAR Aquaculture Projects. NB. All ACIAR-funded Projects have an Australian component with the Commissioned Organisation [responsible for administering the funds] being an Australian University or State or Commonwealth Government Department or other Statutory Organisation. *More information visit* ***www.ACIAR.gov.au***

Active projects	
FIS/2005/169	Improving productivity and profitability of smallholder shrimp aquaculture and related agribusiness in Indonesia
FIS/2006/142	Developing new assessment and policy frameworks for Indonesia's marine fisheries
FIS/2007/124	Diversification of smallholder coastal aquaculture in Indonesia
FIS/2010/016	Application of aquaculture planning tools in Indonesia
SMAR/2008/021	Spiny lobster aquaculture development in Indonesia, Vietnam and Australia
FIS/2005/114	Building bivalve hatchery production capacity in Vietnam and Australia
FIS/2006/141	Improving feed sustainability for marine aquaculture in Vietnam and Australia
FIS/2009/041	Development of fish passage technology to increase fisheries production on floodplains in the lower Mekong and Murray-Darling River basins
FIS/2008/023	Increasing production from inland aquaculture in Papua New Guinea
FIS/2010/017	Building mariculture capacity in Papua New Guinea
FIS/2003/059	Sea ranching and restocking sandfish (Holothuria scabra) in Asia-Pacific
FIS/2009/054	Refinement and application of Cage Aquaculture Decision Support Tool (CADS_Tool) for freshwater systems in the Philippines
FIS/2009/059	Improved catch monitoring and stock analyses for pelagic fisheries in Indonesia
FIS/2010/058	Strengthening resilience of fishery dependent communities in Laos and Cambodia
FIS/2011/008	Development of land-based lobster production systems in Vietnam and Australia
FIS/2011/013	Enhancement of culture based fisheries in Lao PDR
FIS/2010/057	Aquaculture and food security in Solomon Islands - Phase II
FIS/2010/054	Mariculture development in New Ireland, PNG
FIS/2010/042	Expansion and diversification of production and management systems for sea cucumbers in the Philippines and Northern Australia
FIS/2010/030	Strategic plan for ACIAR engagement in developing Indonesia's capture fisheries research and management capacity
FIS/2011/038	Scoping study for fish health-mariculture in Indonesia, and rabbitfish aquaculture development
FIS/2011/068	Strategies for investment in fisheries in East Timor
FIS/2011/071	Scoping potential livelihood benefits and costs of sport fisheries in PNG
FIS/2010/056	Scaling-out community-based marine resource governance in Solomon Islands, Kiribati and Vanuatu

FIS/2011/052	Improving research and development of Myanmar's inland and coastal fisheries
FIS/2011/031	Coral reef restoration using mass coral larval reseeding
Recently completed projects	
FIS/2005/108	Freshwater prawn aquaculture in the Pacific: improving culture stock quality and nutrition in Fiji
FIS/2006/138	Developing aquaculture-based livelihoods in the Pacific Islands region and tropical Australia
FIS/2006/172	Winged oyster pearl industry development in Tonga
FIS/2010/035	Asia-Pacific tropical sea cucumber aquaculture research symposium
FIS/2009/014	Preliminary assessment of invasive and exotic fish species in Papua New Guinea

Australian Government
Australian Research Council

Australian Research Council (ARC)

New and ongoing projects and fellowships of the Australian Research Council. *For more information visit* ***www.arc.gov.au***

Project ID	Project Title
DP1110592	Stress transcriptomics: development of tests to reduce the incidence of summer mortality in abalone
DP1110695	Orientation in the pelagic environment: how do larval marine fish find their way home?
DP1114750	Can consistent individual differences in metabolic rate explain animal personality? Implications for fish and aquaculture in a warming climate
LP1110516	Differential accumulation of algal biotoxins within diploid and triploid Pacific Oysters and Sydney Rock Oysters
LE1110239	Small biological molecule tissue imaging mass spectrometry facility for Western Australia for spatial metabolomics and lipidomics
FT0991722	The resilience of marine ecosystems and fisheries to climate change: exploring adaptation strategies
FT0992310	Linkages between productivity and consistent behavioural traits in fish: implications for harvesting, climate impacts, and selective breeding for aquaculture
DP0985015	Catch me if you can: predator recognition and anti-predator behaviour in marine fishes
DP0987537	An Assessment of Social-Ecological Resilience in the Context of Marine Resource Management in Melanesia
DP0987892	Ecological consequences of hydrodynamic disturbances
DP0988818	Coastal cold core eddies of the East Australian Current and their fisheries potential
LP0989432	What drives recruitment variability in Snapper? Application of a novel theoretical and empirical approach to predict fluctuations in fisheries
DP0877742	Global climate change and the future for coral reef fishes
DP1110716	Changing perspective: using fish ear bones to counteract the shifting baseline syndrome
FT1010767	Using ancient fish ear bones to overcome the shifting baseline syndrome in freshwater fish populations
DP1093510	Ocean-reef interactions as drivers of continental shelf productivity in a changing climate
DP1094932	A mechanistic understanding of coral reef recovery
FS1010088	Resilience of Coral Reef Ecosystems to Climate Change
FL0992179	Adapting the sustainable exploitation of coral reef resources to provide for climate change
FT0990835	Enhancing coral reef resilience to climate change
LP0990568	Management of coastal lakes to minimise invasion
DI1010158	Climate change research: Can Sydney rock oysters adapt to chronic multigenerational exposure to ocean acidification and temperature?
DP1093395	Investigations of Australian Hematodinium species (sp.): a dinoflagellate parasite damaging major crustacean fisheries in Australia and worldwide

DP1093444	More than mud: how will disruption of soft-sediments threaten coastal biodiversity?
DP1093570	Triggering the dormant capacity of fish to make omega 3 fatty acids
LP0883806	An investigation of the underlying mechanisms that control gender and fertility in the Moreton Bay Bug, Thenus orientalis
LP0990606	Optimising barramundi production through early prediction of thermal tolerance and growth
LP0990664	Towards closing the life cycle of marine sponges: benefits for public aquarium display and coral reef conservation.
LP1010069	Enzymatic synthesis, microencapsulation and biological evaluation of a new class of omega-3 derived functional food ingredients.
LP1010153	Linking fish recruitment and habitat use to ecosystem processes
LP1010367	Feeding and breeding: Rainfall effects on connectivity and fidelity of iconic coastal fishes
LP1020409	Restoration genetics of five endangered fish species from the Murray-Darling Basin
DE1212459	The effects of sea-level rise on the feeding ecology of coral-reef fishes in shallow water, and the implications for reef-flat food webs
DE1212614	Monitoring coral reef health from space: how herbivore behaviour alters reef structure
DP1211946	Adapting to climate change: does enhanced metabolism provide heritable protection against ocean acidification and increasing temperature in oysters?
DP1211993	Warming up predator-prey interactions
DP1212415	What happens to coral reefs without cleaner fish?
DP1214133	Effects of invasive macrofauna on marine biodiversity and ecosystem function
FT1110724	Understanding phenotypes: contributions from studying mutations in a model organism
FT2220990	Decoding the rules of fate, attraction and cell migration in perciform fish
LP1120017	Genomics for persistence of Australian freshwater fish
LP1120211	Assessing the impact of habitat restoration on the rates of recovery of four native fish species using advanced statistical models
LP1120572	Immediate and delayed changes to survival, physiology, reproduction and movement of chondrichthyans following capture stress
LP1120793	Genomic tools for the emerging tropical rock lobster aquaculture industry
LP1120825	Closing the loop: understanding the relationships between recreational fishing surveys, fishing regulations and fisheries management objectives
LP1121008	Automation of species recognition and size measurement of fish from underwater stereo-video imagery
LP1210592	The trophic ecosystem of a purpose-built, offshore artificial reef: do coastal currents supply sufficient nutrients for the local production of fish?
LP1210652	Seascape genetics for shark management: an innovation in sustainable fisheries modelling

Australian Government
Fisheries Research and Development Corporation

Fisheries Research and Development Corporation (FRDC)

The Fisheries Research and Development Corporation plans, invests in and manages fisheries research and development throughout Australia. It is a federal statutory authority jointly funded by the Australian Government and the fishing industry. *For more information visit:* ***www.frdc.com.au***

Project ID	Project Title
2012/406	People development program: Review and future direction
2012/035	Bio-Security Awareness Workshop
2011/086	Atlantic Salmon Aquaculture Subprogram: macroalgal monitoring in Macquarie Harbour, Tasmania
2011/263	PIRSA Innovative Solutions: review of the aquaculture environmental monitoring program (EMP) in South Australia to inform a review of EMP regulations
2011/259	Tactical Research Fund: Conduct of a Seafood Incident Response Plan (SIRP) trial for the aquaculture industry in Melbourne as a prelude to the Skretting Australasian Aquaculture Conference (AA12)
2011/255	Tactical Research Fund: optimisation of treatment of Ichthyophthirius multifiliis in farmed trout
2011/525	Communicating sustainability to build aquacultures social license to operate
2011/410	People development program: A program to enhance membership participation, association health, innovation and leadership succession in the Australian fishing industry (Short title - Healthy Industry Associations and Succession)
2011/250	Southern Rock Lobster IPA: Assessing functionality and suitability of the iPhone application 'Deckhand' for on-board electronic data capture in Southern Australian Rock Lobster (Jasus edwardsii) fisheries
2011/249	Atlantic Salmon Aquaculture Subprogram: Innovative seal exclusion technology
2011/248	Pearl Consortium IPA: Control of Reproduction of the silver-lip pearl oyster, Pinctada maxima
2011/070	Atlantic Salmon Aquaculture Subprogram: Comparative susceptibility and host responses of endemic fishes and salmonids affected by amoebic gill disease in Tasmania
2011/071	Atlantic Salmon Aquaculture Subprogram: AGD resistance - learning from other species to bolster the natural Atlantic salmon response
2011/069	Atlantic Salmon Aquaculture Subprogram: The effects of AGD on gill function - use of a perfused gill model
2011/246	Opportunities and constraints on Australian wild fishing and aquaculture under a carbon economy
2011/245	Tactical Tesearch Fund: Aquatic Animal Health Subprogram: Research methods to manage pathogenic microbiological and biological organisms within a redclaw (cherax quadricarinatus) egg incubator hatchery to improve survival and reliability
2011/244	Towards a strategic relationship between CSIRO and FRDC
2011/241	Tactical Research Fund: Development of a commercial control treatment for sepulid tube worm fouling at Port Phillip Bay mussel farms

2012/300	Social Science Research Coordination Program (SSRCP) II
2012/301	Lets Talk Fish: Assisting industry to understand and inform conversations about the sustainability of wild-catch fishing
2012/500	To establish a forum (Common Language Group) for working with all stakeholders to reach agreement on issues which are contentious in the fishing and aquaculture sectors
2012/213	Developing jungle perch fingerling production to improve fishing opportunities
2012/211	Securing Trade & Market Access for the Australian Seafood Industry
2012/016	Demographic Performance of Brownlip Abalone: Exploration of Wild and Cultured Harvest Potential.
2012/208	The Tasmanian Freshwater Eel Industry - an industry development and directions plan.
2011/235	Atlantic Salmon Aquaculture Subprogram: design, testing and assessment of seal exclusion systems for salmon (Salmo salar) farm netpens and leases in Tasmania
2011/236	Pearl Consortium IPA: improving reliability and efficiency of spat nursery and growout for the silver-lip pearl oyster (Pinctada maxima)
2011/053	Aquatic Animal Health Subprogram: Pacific oyster mortality syndrome (POMS) - understanding biotic and abiotic environmental and husbandry effects to reduce economic losses
2011/234	Atlantic Salmon Aquaculture Subprogram: development of an automated mortality collection and net inspection system for use in aquaculture nets
2011/233	FRDC-DCCEE: growth opportunities & critical elements in the value chain for wild fisheries & aquaculture in a changing climate
2011/048	Tactical Research Fund - Aquatic Animal Health Subprogram: determining the susceptibility of Australian species of prawns to infectious myonecrosis
2011/225	Tactical Research Fund: using industry expertise to build a national standard for grading of live mud crabs
2011/224	Atlantic Salmon Aquaculture Subprogram: Aquareovirus (TSRV) vaccine development for the Tasmanian salmonid aquaculture industry
2011/223	Atlantic Salmon Aquaculture Subprogram: development of an RLO vaccine: Proof-of-Concept to commercial application
2011/041	Atlantic Salmon Aquaculture Subprogram: assessment of the environmental impacts & sediment remediation potential associated with copper contamination from antifouling paint and associated recommendations for management
2011/042	Atlantic Salmon Aquaculture Subprogram: clarifying the relationship between salmon farm nutrient loads and changes in macroalgal community structure/ distribution (Existing Student Support)
2011/040	FRDC- DCCEE: estuarine and nearshore ecosystems â€“ assessing alternative adaptive management strategies for the management of estuarine and coastal ecosystems
2011/037	RFIDS: implications of climate change for recreational fishers and the recreational fishing industry
2010/405	Facilitation of the FRDC Indigenous reference group (IRG) to progress RD&E outcomes
2011/508	Platinum partner for the 2012 International Abalone Symposium in Hobart, Tasmania
2011/035	Scoping current and future genetic tools, their limitations and their applications for wild fisheries management

2010/233	PIRSA Innovative Solutions: Investigations to address key policy gaps associated with the development of clam farming in South Australia: genetic and health issues aligned to translocation and stock identification
2011/505	Understanding Extension & Adoption in the fishing industry
2010/404	Tactical Research Fund: responding to the Working Together Strategy: creating a research partnership and coordinated planning approach to fisheries and aquaculture R&D in Northern Australia
2010/070	Tactical Research Fund: incidence and possible causes of saddleback syndrome in the fish species of south east Queensland
2010/403	People development program: Linking Australian schools with Australia's primary industries
2011/401	Marine Discovery Centres Australia annual network meeting
2011/205	Spencer Gulf Research Initiative: development of an ecosystem model for fisheries and aquaculture
2011/003	Aquatic Animal Health Subprogram: Investigations into the genetic basis of resistance to infection of abalone by the abalone herpes-like virus
2011/224	Atlantic Salmon Aquaculture Subprogram: Aquareovirus (TSRV) vaccine development for the Tasmanian salmonid aquaculture industry
2010/321	Development of National Extension and Adoption Framework for Fishing and Aquaculture
2010/401	Shaping advice for Indigenous fishing and aquaculture RD&E within the national strategy
2010/222	Tactical Research Fund: A study of the composition, value and utilisation of imported seafood in Australia
2010/219	Tactical Research Fund: Establishing regional indicators of social sustainability in the Tasmanian aquaculture industry - a pilot study
2010/319	People Development Program: Investment in AICD In-Board Governance Training
2010/565	FRDC-DCCEE: management implications of climate change impacts on fisheries resources of northern Australia
2010/542	FRDC-DCCEE: a climate change adaptation blueprint for coastal regional communities
2010/534	FRDC-DCCEE: ensuring that the Australian Oyster Industry adapts to a changing climate: a natural resource and industry spatial information portal for knowledge action and informed adaptation frameworks
2010/554	FRDC-DCCEE: effects of climate change on reproduction, larval development, and population growth of coral trout (Plectropomus spp.)
2010/521	FRDC-DCCEE: vulnerability of an iconic Australian finfish (barramundi, Lates calcarifer) and related industries to altered climate across tropical Australia
2010/051	PIRSA Innovative Solutions 3: biosecurity risk assessment and development of standardised mitigation for tuna and finfish aquaculture
2010/312	Ridley Aqua-feed Australian Prawn and Barramundi Conference
2010/218	Atlantic Salmon Aquaculture Subprogram: Hydrogen peroxide treatment of Atlantic salmon affected by AGD
2010/217	Atlantic Salmon Aquaculture Subprogram: Forecasting ocean temperatures for salmon at the farm site
2010/214	Investigating the development process of a large scale aquaculture farm incorporating Indigenous cultural considerations
2010/203	Atlantic Salmon Aquaculture Subprogram: oxygen regulation in Tasmanian Atlantic salmon
2010/201	Feasibility study for integrated multitrophic aquaculture in southern Australia

2010/063	Atlantic Salmon Aquaculture Subprogram: evaluation of approaches to improve sediment remediation (rate & function) under salmonid fish cages
2010/033	Atlantic Salmon Aquaculture Subprogram: characterisation of EST03G12 and elucidation of its role in Amoebic Gill Disease (AGD) severity
2010/032	Atlantic Salmon Aquaculture Subprogram: Tasmanian Aquabirnavirus vaccine development: Towards achieving pan-specific protection of cultured salmonids in Australia using multivalent vaccines
2010/212	Further development of commercialization of Artemia culture
2010/038	Improving the cost effectiveness of displaced fishing effort adjustment programmes using ex post socio-economic impact analysis
2010/208	Australian Fisheries Statistics (2009 - 2013)
2010/040	Developing and testing social objectives for fisheries management
2010/202	Tackling a critical industry bottleneck: developing methods to avoid, prevent and treat biofouling on mussel farms
2010/205	Identifying the key social and economic factors for successful engagement in aquaculture ventures by indigenous communities
2010/023	El Nemo South East: Quantitative testing of fisheries management arrangements under climate change using Atlantis
2010/301	Sponsorship for 2010 Australian Society for Fish Biology Conference and Symposium
2010/013	Towards understanding greenlip abalone population structure
2010/034	Aquatic Animal Health Subprogram: Investigation of an emerging bacterial disease in wild Queensland gropers, marine fish and stingrays with production of diagnostic tools to reduce the spread of disease to other states of Australia
2010/036	Aquatic Animal Health Subprogram: Improved fish health management for integrated inland aquaculture through Better Management Practices (BMPs)
2010/004	Passive acoustic techniques to monitor aggregations of sound producing fish species
2010/040	Developing and testing social objectives for fisheries management
2010/535	FRDC-DCCEE: management implications of climate change effect on fisheries in Western Australia
2009/070	El-Nemo SE: risk assessment of impacts of climate change for key species in South Eastern Australia
2009/319	Tactical Research Fund: Human capacity building for introduced marine pest monitoring in Western Australia
2009/056	El-Nemo SE: understanding the biophysical implications of climate change - project 1 & 2
2009/055	El-Nemo SE: adaptation of fishing and aquaculture sectors and fisheries management to climate change in South Eastern Australia Work Area 4, Project 1 Development and testing of a national integrated climate change adaptation assessment framework
2009/322	People Development Program: Building seafood industry representational capacity
2009/088	Tactical Research Fund: sustainable shark fisheries - a National Research, Development and Extension Framework
2009/336	Indigenous Aquaculture Workshop 2010 - Key Participant Travel Bursaries
2009/074	El Nemo National Fishing and Aquaculture Climate Change RD&E Coordination Program - Aquatic Biodiversity and Resources
2009/073	El-Nemo SE: identifying management objective hierarchies and weightings for four key fisheries in South Eastern Australia
2009/323	Scoping study to assess the potential to develop an Indigenous Fisheries Centre of Excellence (IFCoE)

2009/071	Utilising existing R&D to develop and document sustainability factsheets on key species
2009/327	Tactical Research Fund: Working on Water – a careers promotion program for marine-based sectors
2009/324	People Development Program: Nuffield Scholarship for an Aquaculture and/or Fish producer
2009/315	People Development Program: scholarship program for enhancing the skills of aquatic animal health professionals in Australia
2009/303	Australasian Aquaculture 2010 to 2014
2009/219	New and emerging Aquaculture Species Subprogram: review of FRDC investment policies and strategies and development of a management framework for new and emerging aquaculture research
2009/218	Atlantic Salmon Aquaculture Subprogram: ecological effects due to contamination of sediments with copper-based antifoulants – phase 2
2009/217	Capability audit and assessment for fisheries and aquaculture RD&E framework
2009/206	Development of octopus aquaculture
2009/211	Whose fish is it anyway? - Investigation of co-management and self-governance solutions to local issues in Queensland's inshore fisheries
2009/302	Linking careers, research and training - a pilot for the seafood industry
2009/300	Empowering Industry R&D: Developing an industry driven R&D model for the Australian fishing and seafood industry - partnerships to improve efficiency, profitability and performance
2008/233	Tactical Research Fund: Australian Fisheries Statistics 2008
2008/350	Tactical Response Fund: Status of the Worlds Sea Snakes - IUCN Red List Workshop
2009/085	Atlantic Salmon Subprogram: Mitigation of climate change effects on salmon broodstock: effects of estrogen therapy
2009/067	Tactical Research Fund: Nutrient and phytoplankton data from Storm Bay to support sustainable resource planning
2009/044	Aquatic Animal Health Subprogram: surveys of ornamental fish for pathogens of quarantine significance
2008/354	Tactical Research Fund: investigating the establishment of a national aquatic animal health industry reference group
2008/202	Towards reliable hatchery-produced quality blue mussels: an integrated approach to optimising supply
2009/220	Tactical Research Fund: development of the Eyre Peninsula Retail and Food Service Seafood User Guide
2009/208	Developing clam aquaculture in Australia: a feasibility study on culturing Donax deltoids and Katelysia sp on intertidal and subtidal leases in South Australia
2008/094	Primary Industries Standing Committee (PISC) and Research and Development Corporations National RD&E Framework
Oyster Projects	
2007/235	Development and implementation of an industry Education and Market Awareness Program
2007/309	Development of a National seafood industry representative body
2007/316	Capacity Building in the surveillance, diagnosis, and management of Disease issues of pearl oysters

2007/401	Change Management - Seafood Supply Demonstration Project
2007/406	Food safety validation of storage/transport temperatures for live Australian oyster species
2008/030	Aquatic Animal Health Subprogram: Development of a DNA microarray to identify markers of disease in pearl oysters (Pinctada maxima) and to assess overall oyster health
2008/031	Aquatic Animal Health Subprogram: Investigation of Chlamydiales-like organisms in pearl oysters, Pinctada maxima
2008/030.2	Aquatic Animal Health Subprogram: Development of a DNA microarray to identify markers of disease in pearl oysters (Pinctada maxima) and to assess overall oyster health
2008/328.11	People Development Program: FRDC Visiting fellows program Dr Alyssa Joyce
2009/046	PIRSA Initiative II: carrying capacity of Spencer Gulf: hydrodynamic and biogeochemical measurement modelling and performance monitoring
2010/534	FRDC-DCCEE: ensuring that the Australian Oyster Industry adapts to a changing climate: a natural resource and industry spatial information portal for knowledge action and informed adaptation frameworks
2011/004	Aquatic Animal Health Subprogram: development of improved molecular diagnostic tests for Perkinsus olseni in Australian molluscs
2010/228	Tactical Research Fund: Developing a dynamic regional brand - focus on flavour
2011/053	Aquatic Animal Health Subprogram: Pacific oyster mortality syndrome (POMS) - understanding biotic and abiotic environmental and husbandry effects to reduce economic losses
2011/236	Pearl Consortium IPA: improving reliability and efficiency of spat nursery and growout for the silver-lip pearl oyster (Pinctada maxima)
2011/043	Aquatic Animal Health Subprogram: understanding and planning for the potential impacts of OHsV1 on the Australian Pacific oyster industry

Australian Seafood Cooperative Research Centre (Seafood CRC)

The Australian Seafood Cooperative Research Centre is Australia's first entity to stimulate and provide comprehensive seafood-related research and development and industry leadership on a national basis. *For more information visit:* ***www.seafoodcrc.com.au***

Project ID	Project Title
2007/715	Oyster consortium - communication, extension and management of R&D results
2007/717	SBT Maturation and Sexing; develop and apply new technologies
2008/705	PDRS- Quantitative Genetics Scientist PD.02
2008/709	PDRS Larval & Early Juvenile Marine Finfish Rearing Scientist PD.01 and PD.04
2008/711	Addressing key aquatic animal health issues limiting production of Australian YTK and hatchery reared SBT industries
2008/713	PhD B1.03 - Understanding penaeid prawn sex determination and developing monosex induction strategies for commercial application
2008/715	Australian abalone industry R&D planning, implementation and extension
2008/736	PhD B2.01 Nutritional factors influencing the performances of yellowtail kingfish (Seriola lalandi) cultured at low temperatures
2008/739	PhD B2.04 Antiviral activity and resistance to Abalone Viral Ganglioneuritis
2008/741	PhD B2.08 Human enteric viruses in Australian bivalve molluscan shellfish
2008/745	The advancement of reproductive development in Southern blue fin tuna using hormonal manipulations of kisspeptin, the gatekeepers of puberty
2008/749	PhD B2.06 - Using the mucosal antibody response to recombinant Neoparamoeba perurans attachment proteins to design an experimental vaccine for amoebic gill disease
2008/750	AGD vaccine phase III; Sea-based trials, vaccine refinement and commercialisation
2008/761	PhD B3.01 Proactive Control of Oyster Spat Production by Controlling Microbiological Contamination (Top Up)
2008/763	PhD B3.04 Quality, shelf life and value adding of Australian Oysters
2008/771	Genotyping central lab scoping study
2008/772	Education and training exchange program with NOFIMA, a world leading aquaculture research institute
2008/773	Scope of options to establish gamete cryobanking services to genetic improvement programs in Australian aquaculture industry
2008/780	PhD: Determination and manipulation of reproductive status of the captive reared SBT (Thunnus maccoyii) SBT
2008/794.20	Retail Transformation:-Repositioning Australian farmed Barramundi in the domestic market
2008/902	Aquaculture Innovation Hub (2009/212)
2008/903	Understanding Yellowtail Kingfish (total project amount $798,849)
2008/905	Australian Seafood Compositional profiles portal
2009/700	PhD B3.02 - Improvement of YTK fingerling production efficiency through food & feeding management.
2009/701	Australian Oyster Industry Benchmarking Program Development
2009/722.10	Development and Evaluation of Yellowtail Kingfish Consumer Products (approved as part of larger concept approved by board for $900k)

2009/724	Genetic technologies to support a transformation to profitability & competitiveness in F merguiensis and P Monodon
2009/725	PhD B4.01 Sustainable aquaculture development through effective policies(Mark Oliver, USC)
2009/726	Southern Bluefin Tuna Larval/Juvenile Rearing
2009/728	Sustainable feeds and Feed Management for Yellowtail Kingfish
2009/730	Development of barramundi selective breeding entity II
2009/733	PhD B4.03: Body buoyancy and distribution of fish larvae: Exploring the mechanism of mass mortality in post-larvae
2009/738	Development of a business plan for Barramundi selective breeding entity
2009/743	Incorporation of selection for reproductive condition marketability and survival in oyster breeding strategies
2009/749	Improvements in Yellowtail Kingfish larval and juvenile survival and quality
2009/757	PhD B5.02 – Profiling host-parasite dynamics of AGD using molecular DNA methods – application to vaccine development, selective breeding and offshore aquaculture
2009/760	PhD B5.08 – Development of vision and first feeding behaviour of Southern Bluefin Tuna and Yellowtail Kingfish
2009/765	SCRC Masters M3.1 -Nutritional genomics and its application in aquaculture
2009/775	Prevention of "muddy" taints in farmed Barramundi
2009/787	The Whole Prawn - Prawn Market Access Defenders
2010/707	Loss minimisation in farmed prawns through improvements in shelf-life and colour
2010/722	PhD 6.02 – Optimising prawn nutrition for growth performance under suboptimal conditions
2010/724	PhD 6.05 - Development of tools for the sustainable management of genetics in polyploid Pacific Oysters, Crassostrea gigas
2010/725	PhD 6.06 - Capturing and maintaining genetic variation when initiating selective breeding programs for aquaculture
2010/726	PhD 6.07 - Towards a female P. monodon populations using endocrine manipulations
2010/727	PhD 6.08 - Molecular assessment of spawning cues in temperate abalone
2010/728	PhD 6.10 Development and optimisation of anaesthetics for use in the abalone aquaculture industry
2010/731	Discovery and manipulation of Neoparamoeba perurans aquaporins as a means to treat amoebic gill disease (AGD)
2010/734	Oyster over catch: cold Shock Treatment
2010/736	Development of formulated diets for cultured abalone
2010/747	National Oyster R&D – strategic R&D project commissioning, management and path to commercialisation
2010/750	Improving hatchery production of Southern Bluefin Tuna larvae and juveniles
2010/753	Improving hatchery production of Yellowtail Kingfish larvae and juveniles
2010/757	Master: Reducing the taint in Barramundi farmed in recirculating freshwater systems (Brian O'Neill,Student: Hathurusingha Arachchige Priyantha Indrajith)
2010/767	Prevention and control of maturation to address multiple key abalone production constraints
2010/768	Broodstock and genetic management for SBT and YTK
2010/771	Alleviation of Summer Gut Syndrome in Tasmanian Atlantic Syndrome (includes PhD student Christina Neuman)

2010/778	Optimising harvest practices for Yellowtail Kingfish
2010/780	PhD: Molecular and quantitative genetics studies to improve breeding programs for key Australian aquaculture species (Paul Whatmore)
2011/701	PhD: - Atlantic salmon gastrointestinal health and productivity
2011/702	PhD: - An investigation of pathogenic bacterial populations in Atlantic Salmon (*Salmo salar L.*)
2011/703	PhD: Tracking methyl mercury contamination pathways in key commercially and recreationally fished species (Catriona McLeod; Student Hugh Jones)
2011/718	PhD: Molecular analysis of the effects of stressors on oysters (Student: Nicole Ertl, University of the Sunshine Coast)
2011/721	Understanding and Minimising "Greying" of Farmed Barramundi fillets
2011/724	The development of an Australian Cobia aquaculture industry
2011/727	Oyster Product Development Innovation - Oyster Opening
2011/728	Enhancing survival in aquaculture (specifically P.monodon) by creating a Heterosigma algal identification unit
2011/729	Tackling microbial related issues in cultured shellfish via integrated molecular and water chemistry approaches
2011/730	Development of germ cell transplantation technology for the Australian aquaculture industry
2011/731	Optimising External Colour in Farmed Crustaceans, using Penaeus monodon as a model species.
2011/732	Market research in developing a new distribution channel for Tassal
2011/733	Evaluation of survival and pathology of juvenile yellowtail kingfish (Seriola lalandi) after injection with an autogenous, killed vaccine for Photobacterium damselae ssp. damselae at the Port Stephens Fisheries Institute
2011/734	Controlling biofouling of pond aerators on marine prawn farms
2011/735	An evaluation of the options for expansion of salmonid aquaculture in Tasmanian Waters
2011/740	Addressing the causes of early mortality in hatchery produced SBT larvae
2011/751	PhD: Improvement of abalone nutrition with macroalgae addition (Student: Matthew Bansemer)
2011/754	Development of finfish aquaculture in Western Australia: Removal of barriers to profitable production
2011/758	Development of an efficient diagnostic tool for assessing antiviral resistance in abalone and oysters
2011/761	Optimisation of viral clearance from broodstock prawns using targeted RNA interference
2011/765	Masters: Investigating barriers to Yellowtail kingfish culture in WA: Parasites affecting flesh quality
2011/771	Genetic selection for Amoebic Gill Disease (AGD) resilience in the Tasmanian Atlantic salmon (Salmo salar) breeding program
2011/772	Impacts and predictive modelling of coastal upwelling on the SA Oyster industry
2012/713	Understanding how to condition the Sydney Rock Oyster
2012/716	PhD Extension: RNA interference (RNAi) as a means to control Neoparamoeba perurans, the causative agent of amoebic gill disease (AGD) (Student: Paula Lima
2012/717	RTG: Attendance at the Economics of Aquaculture course, with a focus on salmonid aquaculture, University of Portsmouth, United Kingdom (PhD Student: Andrew King, UTAS)

2012/718	RTG: Targeted meetings with key research providers and industry personnel in the UK relevant to SCRC projects 2011/703 and 2011/735 (Researcher: Dr Catriona McLeod, IMAS)
2012/719	RTG: Hands-on operational experience and training at the Port Stephens Research Institute (PSRI) marine finfish hatchery, Port Stephens Fisheries Institute, Taylors Beach, NSW (Fisheries Technician: Trevor Borchert, DEEDI)
2012/720	RTG: Learning the practical aspects of using of clay particles to improve bacterial management during larval culture, University of Miami Experimental Marine Hatchery (Robert Michael, Australian Centre for Applied Aquaculture Research)
2012/722	IB: Development of Cobia hatchery capability for Australia, Port Stephens Fisheries Institute (PSFI), Taylors Beach, NSW (Aji [Archie] Bomanatara, Pacific Reef Fisheries)
2012/727	RTG: Visit by Dr. Standish K. Allen Jr. from the Virginia Institute of Marine Science (VIMS) to Australia and fluorescent in situ hybridisation training by SCRC PhD student Penny Miller prior to Dr Allen's visit (PhD student Penny Miller, UTAS)
2012/729	Biofloc research extension project
Recently completed projects	
2007/706	Establish the technical and market data to assess the feasibility of live bivalve mollusc (Australian oysters) access in USA - STAGE 1
2007/707	Resolving larval rearing, juvenile development and productivity constraints for propagated Southern Bluefin Tuna. Improvements to the production of Yellowtail Kingfish and Mulloway.
2007/719	Protecting the safety & quality of Aust oysters with integrated predictive tools
2008/700	PhD B1.14 - Protecting the safety and quality of Aust Oysters using predictive models integrated with "intelligent" cold chain technologies (Judith Fernandez)
2008/712	Second Generation Tuna Feeds
2008/725	PDRS - SARDI 0.5 FTE Aquatic Animal Health Scientist PD.03
2008/756	Increasing seedstock production of domesticated giant tiger prawns (Penaeus monodon) through improved male fertility
2008/757	Commercial production of all-female reproductively sterile triploid Giant Tiger prawns (Penaeus monodon): Assessing their commercial performance in ponds
2008/758	Development of a genetic management and improvement strategy for Australian cultured Barramundi
2008/762	PhD B3.03 The effect of temperature on reproductive development in maiden and repeat spawning farmed Atlantic Salmon: Understanding the molecular basis for improved egg quality and survival (Top up 2 years only)
2008/901	Product quality issues (Maturation and harvest stress)
2008/903.20	Understanding Yellowtail Kingfish
2008/904	Benefit-cost analysis marker assisted selection in Australian aquaculture species
2009/722	Development and Evaluation of Yellowtail Kingfish Consumer Products (approved as part of larger concept approved by board for $900k)
2009/759	Towards all female *P. monodon* populations using androgenic gland manipulations

2010/709.01	Cobia Consortium Management
2010/715	Cobia Market Analysis
2010/759	SCRC Hons H6.3 A novel method for producing sterile male fish and shellfish
2010/762	SCRC RTG: Study tour of Norwegian salmonid selective breeding establishments and research institutes
2010/763	SCRC RTG: Research training at AAHL, Geelong Vihn Dang
2010/786	Australian Prawn Farmers Association (APFA) Executive redirection Challenge project
2011/705	SCRC RTG 1.4 – Fish immunology workshop, Wageningen University
2011/707	SCRC RTG1.5 – Physiology and aquaculture of pelagic workshop, Panama, Central America
2011/709	SCRC IB1.1 – Fish Breeders Round Table Meeting, Norway
2011/713	SCRC RTG 1.3 - Shrimp pathology course: Disease diagnosis and control, University of Arizona, USA + visit to Shrimp Biotechnology Business Unit, Thailand
2011/759	SCRC IB - Visiting existing Seriola seacage operations in Japan.(Rowan Kleindienst and Erica Starling)
2012/712	RTG: Travel to Europe to meet with fish health professionals from Scotland and Ireland to review and analyse recent European AGD outbreak. Dr. Alistair Brown and Dr. Carlos Zarza (Tassal Fish Health Managers)