



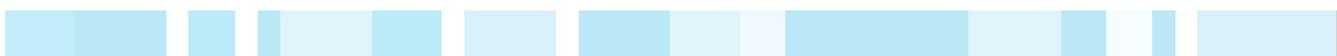
Department of
Primary Industries

Aquaculture Research Advisory Committee

Annual Report

July 2014 to June 2015

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



Title: Aquaculture Research Advisory Committee – Annual Report 2014/15

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Disclaimer

The information contained in this publication is based on knowledge and understanding at the time of writing (August/September 2015). However, because of advances in knowledge, users are reminded of the need to ensure that information on which they rely is up to date and to check the currency of the information with the appropriate officer of the NSW Department of Primary Industries or the user's independent advisor.

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Chairpersons Report



They say a picture is worth a thousand words. If so, the above photography of 4 year old Sydney Rock Oysters grown in an highly productive NSW estuary, expresses far more eloquently than I, what research in the NSW aquaculture industry is all about: sustainable production of a superb tasting, safe, environmentally-sound and nutritious seafood, which supports regional industry and communities.

Hidden behind this photo is a substantial, long-term collaborative effort between researchers, growers, regulators and industry associations that has seen the introduction of innovative growing systems, targeted selection and breeding programs, improved detection and understanding of pathogens, better knowledge of physiology and nutrition, improved regulations, and safer, better protected growing environments. That sustained effort is partly the result of continued strategic investment in research by Governments and industry and party due to the commitment of dedicated individuals determined to make a difference.

That commitment is clearly evident in the members of the Aquaculture Research Advisory Committee with whom it has been my privilege to serve. Despite major challenges and change, the focus has remained on productive, safe, profitable and sustainable industries, underpinned by high quality, applicable research. ARAC is committed to ensuring that both the Government and industry get value for the money they invest, that productive researchers are supported and that policy and management are built on reliable information.

I am extremely grateful to the farmer members for their outstanding contributions. I am also indebted to NSW Primary Industry staff who have contributed to ARAC. Their professionalism and dedication, have been exemplary. The FRDC and the now-closed Australian Seafood CRC have been generous supporters of the NSW aquaculture industry for which ARAC is very appreciative. Finally ARAC is grateful to the Minister and NSW Primary Industries for their support for and encouragement of aquaculture.

ARAC remains committed to increasing the sustainability, profitability and growth of aquaculture in NSW and its contribution to human health and regional communities through applicable, targeted, high-quality research and innovation. It is a great pleasure to present 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 August/September 2015

Preamble

This is the eighth 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 2012*, 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 a representative 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 2012*, 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 2014/15

Member	Representing	Date of Appointment	Expiry Date
Prof. Ian White	Independent Chair	Oct 2006	Sept 2015
Ms Milada Safarik	Industry	Oct 2009	Sept 2015
Mr Tony Troup	Industry	Oct 2006	Sept 2015
Mr Ewan McAsh	Industry	Oct 2009	Sept 2015
Mr Russell Sydenham	Industry	Mar 2012	Sept 2015
Mr Matthew Wassnig	Industry	Sept 2012	Sept 2015
Ms Jessica Zealand	Industry	April 2014	Sept 2015

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 (Research Leader, Aquaculture), Mr Ian Lyall (Manager, Aquaculture) and Ms Debra Doolan (Aquatic Biosecurity Officer, Aquatic Biosecurity and Risk Management) from NSW Department of Primary Industries sat as observers on the Committee for 2014/15. 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 2014/15:

Member	21 August 2014	20 November 2014	21 May 2015
Prof. Ian White	✓	✓	✓
Mr Tony Troup	✓	x	✓
Ms Milada Safarik	✓	✓	✓
Mr Ewan McAsh	✓	✓	x
Mr Russell Sydenham	✓	✓	✓
Mr Matthew Wassnig	x	✓	✓
Ms Jessica Zealand	✓	✓	✓
NSW Department of Primary Industries			
Dr Wayne O'Connor	✓	✓	✓
Mr Ian Lyall (or rep)	✓	✓	✓
Ms Debra Doolan (or rep)	x	✓	✓
Mr Anthony Zammit	✓	✓	✓
Ms Jo Pickles	✓	✓	✓

Disclosure of Pecuniary Interests

Schedule 1 of the *Fisheries Management (Aquaculture) Regulation 2012* 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 2014/15 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 2014/15 was \$125,706.00.

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 2014/15 was \$21,829.00.

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 2014/15 was \$72,189.00 (\$84,149.00 less the fee waiver of \$11,960.00). The contribution from the non-oyster aquaculture industry for 2014/15 was \$20,414.00 (\$21,268.00 less the fee waiver of \$854.00).

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 2014/15 financial year are outlined below:

ARAC REVENUE AND EXPENSES – 1 July 2014 to 30 June 2015		
*Note: this is an accrual accounting report for WBS E116-1 (Oyster Research Levy)		
Revenue:	Credit	Debit
Balance carried forward 30.06.2014	\$101,203.67	
Research Contributions billed 01.07.2014 to 30.06.2015 (with fee waivers from 2013/14 deducted)	\$118,538.00	
Interest earned on Trust account	\$6,577.00	
Total Revenue	\$226,318.67	
Expenses:		
Internal Transfer to Committee Account		\$8,646.36
FRDC Contribution (reduced by fee waivers for research)		\$72,189.00
Bad debts		\$1,014.16
Total Expenses		\$81,849.52
Balance of Cost Centre as at 30.06.2015	\$144,469.15	

ARAC COMMITTEE EXPENSES – 1 July 2014 to 30 June 2015		
*Note: this is an accrual accounting report for WBS D2492-1		
Revenue:	Credit	Debit
Balance carried forward 30.06.2014	\$0	
To be transferred from Oyster Trust account (E116-1)	\$8,646.36	
To be transferred from Non-Oyster Trust account (E119-1)	\$4,323.18	
Total Revenue	\$12,969.54	
Operating Expenses:		
Travel		\$7,087.26
Committee Fees		\$5,489.58
Consumables		\$392.70
Total Expenditure		\$12,969.54
Balance of Cost Centre as at 30.06.2015	\$0	

ARAC REVENUE AND EXPENSES – 1 July 2014 to 30 June 2015		
*Note: this is an accrual accounting report for WBS E119-1 (Aquaculture [non-oyster] Research levy)		
Revenue:	Credit	Debit
Balance carried forward 30.06.2014:	\$43,403.78	
Research Contributions billed 01.07.2014 to 30.06.2015 (with fee waivers from 2013/14 deducted)	\$20,975.00	
Interest earned on Trust account	\$2,635.00	
Total Estimated Revenue	\$67,013.78	
Expenses:		
Internal Transfer to Committee Account		\$4,323.18
FRDC Contribution (reduced by fee waivers for research)		\$20,414.00
Total Expenses		\$24,737.18
Balance of Centre Centre as at 30.06.2015	\$42,276.60	

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 2015 to 30 June 2016 (Oyster Research Levy)		
Revenue:	Credit	Debit
Balance carried forward 30.06.2015	\$144,469.15	
Research Contributions billed 01.07.2015 to 30.06.2016	\$125,874.00	
Interest earned on Trust account	\$10,000.00	
Total Estimated Revenue	\$280,343.15	
Expenses:		
FRDC Contribution (estimate)		\$90,000.00
ARAC Committee Expenses (Internal transfer)		\$8,000.00
Dr Kate Barclay, University of Technology, Sydney		\$10,000.00
Oysters Australia re ACIL Allen		\$10,000.00
Total Estimated Expenses		\$118,000.00
Estimated Balance as at 30.06.2016	\$162,343.15	

ARAC REVENUE AND EXPENSES – 1 July 2015 to 30 June 2016 (Aquaculture [non-oyster] Research levy)		
Revenue:	Credit	Debit
Balance carried forward 30.06.2015:	\$42,276.60	
Research Contributions billed 01.07.2015 to 30.06.2016	\$25,350.00	
Interest earned on Trust account	\$2,000.00	
Total Estimated Revenue	\$69,626.60	
Expenses:		
FRDC Contribution (estimate)		\$22,000.00
ARAC Committee Expenses (Internal transfer)		\$4,000.00
Total Estimated Expenses		\$26,000.00
Estimated Balance as at 30.06.2016	\$43,626.60	

ARAC COMMITTEE EXPENSES – 1 July 2015 to 30 June 2016		
Revenue:	Credit	Debit
Balance carried forward 30.06.2015		
Internal transfers	\$12,000.00	
Total Estimated Revenue	\$12,000.00	
Expenses:		
Consumables		\$500.00
Travel		\$7,000.00
Committee fees		\$4,500.00
Total Estimated Expenses		\$12,000.00
Estimated Balance as at 30.06.2016	\$0	

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 which came into 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 2015 there were 294 lease-based permits (primarily involved in oyster production) and 135 land-based aquaculture businesses that have 207 permits between them authorising extensive and intensive (leases), fishout, hatchery and intensive land based activities.

List of Activities

- The NSW Oyster Conference, Catch-Up and Tradeshow 2013 was an initiative of NSW DPI, NSW Farmers Association and Oysters Australia. It was held at Port Stephens over 31 July and 1 August 2013. Over 300 participants were involved and it was a great way to promote the industry, get farmers together and display the trades. Three chefs from local restaurants presented oyster tastings to all delegates during the afternoon of the first day. A large social evening was held during the Conference for oyster farmers and their partners bringing together delegates from New South Wales, Tasmania, South Australia, Queensland and New Zealand – thoroughly enjoyed by all who attended. The whole event further strengthened the rapport between industry, NSW DPI and the NSW Food Authority.
- The Sydney Royal Fine Food Show advised that due to declining entries the Aquaculture Competition (usually held at the biannual Sydney Royal Fine Food Show in Spring and Summer) will be amalgamated, creating one overarching Aquaculture Competition to be judged during the Summer Show in February.
- The NSW DPI Aquatic Biosecurity team updated the Committee on a number of items, namely:
 - a) NSW DPI met with some Port Stephens Pacific Oyster growers and actions included providing information on archiving samples, providing environmental information on submission forms and liaise with South Australian farmers to look for similarities. Some growers are also looking at growing flat oysters.
 - b) The issue was raised of the Biosecurity Protocol regarding the exportation of oysters from NSW into Victoria.
 - c) POMS - the NSW DPI Pacific Oyster Mortality Syndrome Incursion Response Policy was finalised. The policy is available on the website at: http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0003/528015/poms-incursion-response-policy.pdf
 - d) Sentinal oysters, including ASI breeding lines have been deployed by DPI in an area of Port Stephens previously affected by the unexplained mortality of Pacific oysters, along with temperature loggers, for regular health monitoring.
 - e) Aquatic Biosecurity and EMAI staff delivered health workshops to oyster famers on the NSW South Coast and Port Stephens, which included information about the investigation into the unexplained mortality of Pacific oysters in Port Stephens.
 - f) QX Disease was confirmed in the Richmond River with positive lab results received on 16 April 2015. Oyster farmers reported mass mortality and very poor water quality following heavy rainfall prior to Easter. QX Disease has not been confirmed in this estuary since 2010.
 - g) Aquatic Biosecurity attended the Oyster Industry Field Days (25/26 and 28/29 May 2015) and presented a brief segment on how NSW DPI will respond to further outbreaks of OsHV-1 uvar in previously unaffected estuaries.
 - h) No reports of unexplained mortality in Pacific Oysters have been received in Port Stephens this summer season.

- ARAC provides a representative to the FRAB on a rotational basis. One of the FRAB's key roles is to provide advice to FRDC on research proposals. Ms Milada Safarik has very capably represented the interests of ARAC for the past two years. At the November 2014 meeting, Matthew Wassnig expressed an interest in representing ARAC and the Committee approved the nomination.
- NSW DPI received approval from the Department of Planning and Infrastructure for a 20 ha marine aquaculture research lease (MARL) off Port Stephens. The project will run for five years to extend the successful research work undertaken at the Port Stephens Fisheries Institute. Floating sea cages will be used and key research outcomes will include proving species suitability, diet development work, validating equipment and technology, and conducting environmental monitoring.
- Oysters Australia was discussed and Tony Troup advised the Oyster Retail project has been received well, a Sydney rock oyster breeding workshop is planned for September 2014. The National levy ballot and marketing proposed by Oysters Australia has been postponed to 2017.
- The 'Real Time Oyster Water Quality Project' is being piloted in the Shoalhaven in partnership with NSW Food Authority, NSW Office of Water, Shoalhaven Water, Sustainable Oyster Assessment Program (SOAP), Shoalhaven and Crookhaven Oyster Farmers, South East Local Land Services and Australia's Oyster Coast, based on the availability of a 12 month loan of cellular telemetry hardware and web hosting system from NSW Office of Water. The project is being managed by the Shoalhaven Council and was initiated by Australia's Oyster Coast and will provide 'at least hourly information on water quality parameters, including salinity, temperature, pH, turbidity, dissolved oxygen and chlorophyll-a (which could be used as a proxy for micro-algal biomass) is needed to provide a thorough water data set to correlate against measured oyster performance.' The project aims to collaborate with project partners to assist in their interpretation and statistical analysis of the real time water quality data and help find correlations with SOAP and SQAP data to identify cause and affect links to oyster performance and sanitary water quality conditions. ARAC are asked to keep an open mind to potential funding in the future as part of a wider industry research initiative depending on outcomes of the project.
- Updates on the LBACG and NSW Shellfish Committee were provided for the information of committee members.
 - a) NSW Aquaculture Association in collaboration with Arc-en-Ciel Trout Farm is holding a one day Trout Farming and fish processing field day at Hanging Rock, NSW on Saturday 30 August 2014. More information can be found at www.nswaqua.com.au
 - b) The Shellfish Committee met on 20 August 2014. Items discussed included raft culture suitability and criteria, the Pacific Oyster Management System is now fully operational and being administered by the Fisheries Officers, and a joint NSW DPI and NSW FA compliance project is checking permit holders who do not hold seafood licenses.
 - c) The LBACG held a tele-conference in September 2014. NSW DPI is working with the Office of Environment and Heritage to simplify license requirements for discharge. The Aquaculture Industry Directory will be updated in 2015. Electricity costs relating to the aquaculture industry and production standards for consumers and product sellers are also items of interest.
 - d) The Shellfish Committee met on 19 November 2014. A summary of discussions is available on the NSW Food Authority website:

<http://www.foodauthority.nsw.gov.au/industry/industry-sector-requirements/shellfish/nsw-shellfish-committee>.

- e) Anthony Zammit advised the Australian Shellfish Quality Assurance Advisory Committee (ASQAAC) held its 36th Annual General Meeting on 16 October 2014 in Hobart, Tasmania. Specific issues considered and discussed by the ASQAAC were the Review and re-write of the ASQAP Manual, Arsenic Testing: Inorganic vs Total Arsenic Levels, Bacteriophage testing and Review of Marine Biotxin Levels.
- The ARAC RD&E Strategic Plan 2012-2017 is under review. The Committee revised and updated the priorities where necessary and uploaded the final document to: <http://www.dpi.nsw.gov.au/fisheries/aquaculture/committees/arac>. The review included the most recent data in the total production and value tables at the end of the document.
 - OSHV induced losses were carried out in the Georges River and Hawkesbury River. Farmers were advised and a translocation policy was already in place preventing oysters from being moved to unaffected estuaries.
 - Peggy Schrobback (Queensland University of Technology) talked about her recently completed PhD thesis 'Economic analyses of Australia's Sydney Rock Oyster industry' at the PSFI on 5 Dec 2014. An open invitation to industry to attend was provided.
 - An Investment Strategy is being developed for the NSW Aquaculture Industry. This arose after two research papers by Peggy Schrobback highlighted the need to get young people into the aquaculture industry. NSW DPI is leading the development with help from ARAC representatives and experts from NSW DPI Business and Regional Development and NSW DPI Industry Investment and Export to target those looking to invest in the industry.
 - The FRDC Contribution for 2014/15 was discussed ie. the research levies that had been calculated for oysters and non-oyster aquaculture in NSW that are due to the FRDC. The money collected from these levies goes primarily to Oysters Australia, via FRDC to support aquaculture research in NSW. A small portion of the levy contributes to the running of ARAC and to fund other small research activities. The contribution to FRDC is calculated at 0.25% average gross value of production (AGVP), based on three year rolling averages. ARAC approved the dispersal of these funds to FRDC.
 - The Marine Aquaculture Research Lease (MARL) project was included in the new \$100 million 'Rural Research and Development for Primary Productivity' Plan announced by Senator Barnaby Joyce (Submissions closed December 2014). A consortium led by FRDC, including NSW DPI, South Australian Research and Development Institute (SARDI) and Cleans Seas Tuna Ltd, has been successful in securing funds. The application titled 'Growing a profitable, innovative and collaborative Australian Yellowtail Kingfish aquaculture industry: bringing 'white' fish to the market' has a total value of \$4.65 million with \$3 million being provided by the federal Department of Agriculture. The research will in part be carried out on the experimental MARL established by NSW DPI to promote marine finfish culture in NSW and the research will focus on diet development and production technology of YTK.

- The UTS application by Dr Kate Barclay to investigate the socio-economic value of the NSW aquaculture industry was supported by the FRAB and has been successful in obtaining funding of \$132,253.00 allocated by FRDC. ARAC are also contributing \$10,000.00 to the project. The NSW coastal aquaculture industry needs sound information about its economic and social contributions to coastal communities. This is important for its continued access to coastal resources and to address prevalent negative perceptions. Competing coastal uses, such as marine protected areas for conservation purposes or urban/industrial/tourism developments may compromise the viability of aquaculture. Currently there is no information available about the contribution aquaculture makes to NSW regional communities beyond the value of farm gate sales.
- The issue of Minor Use Permits (MUPs) is becoming an important issue nationally. The Australian Pesticides and Veterinary Medicines Authority (APVMA) administers a permits scheme that allows for the legal use of chemicals in certain ways that are contrary to the label instructions or, in certain circumstances allows for the limited use of an unregistered chemical product. There are differences between states at present and we are constrained in NSW regarding veterinary scripts as they only apply to one individual animal (not practical with a tank or pond full of fish). Industry requires MUPs and there are trade implications without them. NSW DPI and education facilities such as schools, TAFE's and Universities require MUPs. At present the National Aquaculture Council (NAC) are taking the approach of their approved MUPs only being available to their members. The issue is being represented to the national Aquaculture Committee to seek a resolution.
- At the World Aquaculture Society Meeting in Adelaide last year, the national Aquaculture Committee raised the issue of reviewing the National Aquaculture Policy Statement. The terms of reference for developing the National Aquaculture Strategy are now available on the Department of Agriculture's website: <http://www.agriculture.gov.au/fisheries/aquaculture/national-aquaculture-strategy>. The Commonwealth are committed to developing the strategy in consultation with stakeholders.
- The NSW Oyster Industry initiated, through a Steering Committee set up at the NSW Shellfish Committee meeting in May 2014, a strategic planning study to identify the critical impediments to improved profitability and growth of the NSW Oyster Industry and develop strategic actions to mitigate them. ARAC contributed \$10,000.00 to the project. The NSW Oyster Industry Strategy is now complete and includes a vision and 12 strategic priorities to improve the prosperity of the industry. The strategy was presented and discussed at the two Oyster Field Days in late May 2015. The strategy was widely supported and is already starting to generate interest and action across the industry. In developing the strategy it has become apparent that coordinated action with strong industry engagement is needed to implement the priorities.
- Wallis Lake oyster farmers are seeking research on why growth rates in their estuary are going backwards. NSW DPI is looking at an estuary workshop with Wallis Lake growers to ascertain if the problem is production methods, food source, water quality or dredging practices and effects on the commercial viability and productivity of Wallis Lake. NSW DPI is also obtaining the production data and trends over the past 9 years from Wallis Lake.

- ARAC were asked to look at making the Triploid Sydney rock oyster patent available to other commercial hatchery operators. The method was patented but has now expired.
- ARAC will start sending an SMS alert to all Aquaculture Permit holders after each of our meetings. Along the lines of 'ARAC just met' with the top 2 or 3 points and attaching a link to this Summary of Discussions. This arose from the NSW Oyster Industry Strategy that found industry engagement is lacking and extension is important.
- NSW DPI is continuing to support a range of post-graduate students investigating Aquaculture related questions in 2014/15. Projects include:
 - a) Jack O'Connor (PhD UTS and Australian Museum) Sensory ecology of orientation behaviour in larval Perciform fishes (Stewart Fielder).
 - b) Michael Lewis (PhD Deakin University Warrnambool) Comparative digestibility of in-vivo and in-vitro techniques (Mark Booth).
 - c) Stephan O'Connor (PhD UTAS) Improved rearing and settlement technology for flat oysters (Wayne O'Connor).
 - d) John Wright (PhD UWS) climate change and predator prey interactions with Pacific oysters (Wayne O'Connor).
 - e) Elliot Scanes (PhD UWS) The effects of multiple stressors including climate change on the oyster populations of Port Jackson NSW (Wayne O'Connor).
 - f) Vu Van In (PhD USC) Transcriptomic changes during reproductive development of Sydney rock oysters (Wayne O'Connor).
 - g) Nicole Ertyl (PhD USC) Transcriptomic responses to stress in Sydney rock oysters (Wayne O'Connor).
 - h) Olivia Goncalves (PhD MqU) Adapting to climate change: Identification of molecular markers associated with ocean acidification in oysters (Wayne O'Connor).
 - i) Thomas Regan (Hons Newcastle University) Gamete survival in Sydney rock oysters (Wayne O'Connor).
 - j) Mitch Gibbs (Hons UWS) Climate change impacts on lipid metabolism in Sydney rock oysters (Wayne O'Connor).
 - k) Laura Stapp (PhD Wageningen Netherlands) Variable responses between populations of the Sydney rock oyster: the role of acid-base and ion-regulatory capacities (Wayne O'Connor).
 - l) Vivian Cumbo (Post Doc MqU) Genetic solution or dilution: can selective breeding future-proof oysters? (Wayne O'Connor).

Information on any of these projects can be obtained by contacting the appropriate supervisor at the PSFI.

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	<p>Project Title</p> <p>Principal Investigator</p> <p>Time Frame</p> <p>Funding Sources</p>	<p>Differential accumulation of algal biotoxins within diploid and triploid Pacific oysters and Sydney rock oysters</p> <p>Dr Shauna Murray</p> <p>2011 - 2014</p> <p>UNSW, NSW DPI, ARC (LP110100516)</p>
2	<p>Project Title</p> <p>Principal Investigator</p> <p>Time Frame</p> <p>Funding Sources</p>	<p>Translating genomic discoveries into improved commercial outcomes for the South Sea Pearl Industry</p> <p>Degnan, B.</p> <p>2009 - 2014</p> <p>UQ, ARC, Autore Pearling Pty Ltd, Pearl Oyster Propagators (LP130100086)</p>
3	<p>Project Title</p> <p>Principal Investigator</p> <p>Time Frame</p> <p>Funding Sources</p>	<p>Reproductive condition, marketability and survival in oyster breeding strategies</p> <p>Graham Mair</p> <p>2009 - 2014</p> <p>Seafood CRC (2009/743)</p>
4	<p>Project Title</p> <p>Principal Investigator</p> <p>Time Frame</p> <p>Funding Sources</p>	<p>Aquatic Animal Health Subprogram: understanding and planning for the potential impacts of OHsV1 on the Australian Pacific oyster industry</p> <p>Dr Tom Lewis</p> <p>2011 - 2014</p> <p>RDS Partners Pty Ltd and FRDC (2011/043)</p>
5	<p>Project Title</p> <p>Principal Investigator</p> <p>Time Frame</p> <p>Funding Sources</p>	<p>Adapting to climate change: does enhanced metabolism provide heritable protection against ocean acidification and increasing temperature in oysters?</p> <p>Prof Hans O. Portner</p> <p>2012 - 2014</p> <p>ARC (DP120101946) and Macquarie University</p>
6	<p>Project Title</p> <p>Principal Investigator</p> <p>Time Frame</p> <p>Funding Sources</p>	<p>Pearl Consortium IPA: Control of reproduction of the silver-lip pearl oyster, <i>Pinctada maxima</i>.</p> <p>David Mills</p> <p>2012 - 2016</p> <p>FRDC (2011/248) and Paspaley Pearling Company</p>
7	<p>Project Title</p> <p>Principal Investigator</p> <p>Time Frame</p> <p>Funding Sources</p>	<p>Aquatic Animal Health Subprogram: Development of a DNA microarray to identify markers of disease in pearl oysters (<i>Pinctada maxima</i>) and to assess overall oyster health</p> <p>Brian Jones</p> <p>2008 - 2014</p> <p>FRDC (2008/030) and Fisheries WA</p>
8	<p>Project Title</p> <p>Principal Investigator</p> <p>Time Frame</p> <p>Funding Sources</p>	<p>Aquatic Animal Health Subprogram: Investigation of Chlamydiales-like organisms in pearl oysters, <i>Pinctada maxima</i></p> <p>Brian Jones</p> <p>2008 - 2014</p> <p>FRDC (2008/031) and Fisheries WA</p>

9	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 - 2014
	Funding Sources	FRDC (2010/534), University of Wollongong, Bega Valley Shire Council, Hornsby Council, Hastings Council, Shoalhaven City Council, UTAS and NCCARF
10	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 - 2014
	Funding Sources	FRDC (2011/053), University of Sydney, Hornsby Shire Council, Sydney Metro CMA
11	Project Title	Pearl Consortium IPA: improving reliability and efficiency of spat nursery and growout for the silver-lip pearl oyster (<i>Pinctada maxima</i>)
	Principal Investigator	David Mills
	Time Frame	2011 - 2015
	Funding Sources	FRDC (2011/236) and Paspaley Pearling Company
12	Project Title	People Development Program: Aquatic Animal Health Training Scheme – KBBE workshop on diagnostics for mollusc diseases
	Principal Investigator	Mark Crane
	Time Frame	2009 - 2014
	Funding Sources	FRDC (2009/315.24) and CSIRO
13	Project Title	Aquatic Animal Health Subprogram: Pacific oyster mortality syndrome (POMS) risk mitigation, epidemiology and OsHV-1 biology
	Principal Investigator	Richard Whittington
	Time Frame	2012 - 2015
	Funding Sources	FRDC (2012/032) and University of Sydney
14	Project Title	Workshop to facilitate epidemiological analysis of unexplained mortality of South Australian Pacific oysters
	Principal Investigator	Charles Caraguel
	Time Frame	2012 - 2013
	Funding Sources	FRDC (2012/051) and SAORC
15	Project Title	Aquatic Animal Health Subprogram: Development of a laboratory model for infectious challenge of Pacific oysters (<i>Crassostrea gigas</i>) with ostreid herpesvirus type-1
	Principal Investigator	Peter Kirkland
	Time Frame	2012 - 2014
	Funding Sources	FRDC (2012/052) and NSW DPI

16	Project Title	Tactical Research Fund: Assessment of heavy metals in tropical rock oysters (blacklip and milky) and implications for placement into the Australian seafood market and for Indigenous enterprise development in the NT
	Principal Investigator	Ann Fleming
	Time Frame	2013 - 2014
	Funding Sources	FRDC (2012/223) and NT Government
17	Project Title	Tactical Research Fund: Development and validation of effective and affordable oyster production systems in the face of POMS disease of Pacific oysters and QX disease of Sydney rock oysters – evaluation from a production, research and economic perspective
	Principal Investigator	Steven Jones
	Time Frame	2012 - 2013
	Funding Sources	FRDC (2012/229) and Aglign Consulting Pty Ltd
18	Project Title	PhD: Human enteric viruses in Australian bivalve molluscan shellfish
	Principal Investigator	Lynne Cobiac
	Time Frame	2008 - 2015
	Funding Sources	CRC (2008/741) and Flinders University
19	Project Title	National Oyster R&D – strategic R&D project commissioning, management and path to commercialisation
	Principal Investigator	Rachel King
	Time Frame	2012 - 2014
	Funding Sources	CRC (2010/747) and Oysters Australia Pty Ltd
20	Project Title	Masters: Impacts and predictive modelling of coastal upwelling on the SA Oyster Industry
	Principal Investigator	Clinton Wilkinson
	Time Frame	2012 - 2014
	Funding Sources	CRC (2011/772), University of Tasmania and Oysters Australia Pty Ltd
21	Project Title	Oysters Australia: Developing and facilitating regional grower groups to extend and build on SCRC outputs
	Principal Investigator	Tom Lewis
	Time Frame	2012 - 2014
	Funding Sources	CRC (2012/732), RDS Partners and Oysters Australia Pty Ltd
22	Project Title	Evaluating the impact of an improved retailing concept for oysters in Fishmongers
	Principal Investigator	Meredith Lawley
	Time Frame	2012 - 2015
	Funding Sources	CRC (2012/740), University of Sunshine Coast and Oysters Australia Pty Ltd
23	Project Title	Genetic selection for resistance to Pacific Oyster Mortality Syndrome
	Principal Investigator	Peter Kube
	Time Frame	2012 - 2014
	Funding Sources	CRC (2012/760) and CSIRO

24	Project Title Principal Investigator Time Frame Funding Sources	Oyster breeding program transition to full commercialisation Rachel King 2012 - 2014 CRC (2012/773) and Oysters Australia Pty Ltd
25	Project Title Principal Investigator Time Frame Funding Sources	Safe spat rearing experiment Rachel King 2013 - 2015 CRC (2013/708) and Oysters Australia Pty Ltd
26	Project Title Principal Investigator Time Frame Funding Sources	Piloting commercial scale supply of mass selected Sydney rock oysters Jane Clout 2013 - 2015 CRC (2013/709) and SOCo
27	Project Title Principal Investigator Time Frame Funding Sources	Enhancing bivalve production in northern Vietnam and Australia Wayne O'Connor 2014 - 2018 ACIAR (FIS/2010/100)
28	Project Title Principal Investigator Time Frame Funding Sources	People development program: 2014 FRDC International Travel Award Jill Coates 2014 FRDC (2008/314.40)
29	Project Title Principal Investigator Time Frame Funding Sources	People development program: 2014 FRDC Visiting Expert Award Associate Professor Dale Leavitt 2014 FRDC (2008/328.20)
30	Project Title Principal Investigator Time Frame Funding Sources	Survey of foodborne viruses in Australian oysters Valerea Torok 2014 - 2015 FRDC (2013/234)
31	Project Title Principal Investigator Time Frame Funding Sources	Identification workshop of marine invasive worm species. Such worms impact on the oyster industry, and other aquaculture activities as well as changing benthic habitats which can impact on wild stocks Pat Hutchings 2013 - 2014 FRDC (2013/402)
32	Project Title Principal Investigator Time Frame Funding Sources	Australian edible oyster RD&E investment via Oysters Australia Strategic Plan 2014-2019 Rachel King 2015 - 2019 FRDC (2014/405)

33	Project Title	PhD: Molecular analysis of the effects of stressors on oysters
	Principal Investigator	Abigail Elizur
	Time Frame	2011 - 2015
	Funding Sources	Seafood CRC (2011/718)
34	Project Title	Pearl industry development in the western Pacific
	Principal Investigator	Paul Southgate
	Time Frame	2013 - 2017
	Funding Sources	ACIAR (FIS/2009/057)
35	Project Title	Developing pearl industry based livelihoods in the western Pacific
	Principal Investigator	Paul Southgate
	Time Frame	2015 - 2020
	Funding Sources	ACIAR (FIS/2014/060)
36	Project Title	See page 32 of this report
	Principal Investigator	Melanie Bishop
	Time Frame	2015 - 2017
	Funding Sources	ARC (DP150101363), Macquarie University
37	Project Title	See page 34 of this report
	Principal Investigator	Laura Parker
	Time Frame	2014 - 2016
	Funding Sources	ARC (IN140100025), University of Sydney
38	Project Title	See page 35 of this report
	Principal Investigator	Kyall Zenger
	Time Frame	2014 - 2016
	Funding Sources	ARC (LP140101001), Jame Cook University
39	Project Title	ASI Quantitative Genetics Analysis and Training Services
	Principal Investigator	Matt Cunningham
	Time Frame	2015
	Funding Sources	CRC (2014/721)
40	Project Title	Overcoming technical constraints to Sydney rock oyster hatchery production
	Principal Investigator	Emma Wilkie
	Time Frame	2015
	Funding Sources	CRC (2015/706)
41	Project Title	NSW Oyster Industry Strategic Development Plan
	Principal Investigator	Rachel King
	Time Frame	2015
	Funding Sources	FRDC (2014/243)
42	Project Title	Oyster Australia IPA: Pacific Oyster Mortality Syndrome – closing knowledge gaps to continue farming <i>C. gigas</i> in Australia
	Principal Investigator	Richard Whittington
	Time Frame	2015 - 2018
	Funding Sources	FRDC (2014/040)

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/2013/015	Sustainable Management of Sport Fisheries for Communities in Papua New Guinea
FIS/2010/101	Improving fish health management and production protocols in marine finfish aquaculture in Indonesia and Australia
FIS/2009/059	Developing research capacity for management of Indonesia's pelagic fisheries resources
FIS/2007/124	Diversification of smallholder coastal aquaculture in Indonesia
SMAR/2008/021	Spiny lobster aquaculture development in Indonesia, Vietnam and Australia
FIS/2010/042	Expansion and diversification of production and management systems for sea cucumbers in the Philippines, Vietnam and northern Australia
SMCN/2010/083	Improving the sustainability of rice-shrimp farming systems in the Mekong Delta, Vietnam
FIS/2011-013	Culture-based fisheries development in Lao PDR and Cambodia
FIS/2009/041	Development of fish passage technology to increase fisheries production on floodplains in the lower Mekong and Murray-Darling River basins
FIS/2010/058	Assessing economic and welfare values of fish in the lower Mekong basin
FIS/2011/052	Improving research and development of Myanmar's inland and coastal fisheries
FIS/2010/055	Building research and project management skills in fisheries staff in PNG
FIS/2010/054	Mariculture development in New Ireland, PNG
FIS/2008/023	Increasing production from inland aquaculture in Papua New Guinea for food and income security
FIS/2012/074	Improving community-based fisheries management in Pacific Island countries
FIS/2009/057	Pearl industry development in the western Pacific
FIS/2010/097	Exploring options for improving livelihoods and resource management in Timor-Leste's coastal communities
FIS/2012/101	Developing technologies for giant grouper (<i>Epinephelus lanceolatus</i>) aquaculture in Vietnam, the Philippines and Australia
FIS/2010/100	Enhancing bivalve production in northern Vietnam and Australia
FIS/2012/100	Improving the design of irrigation infrastructure to increase fisheries production in floodplain wetlands of the Lower Mekong and Murray-Darling Basins
FIS/2012/102	Sustainable management of the shark resources of Papua New Guinea: socioeconomic and biological characteristics of the fishery
FIS/2012/076	Improving community-based aquaculture in Fiji, Kiribati, Samoa and Vanuatu

FIS/2010/098	Diversification of seaweed industries in Pacific Island countries
FIS/2010/096	Evaluating the impacts of improving postharvest processing of sea cucumbers in the Western Pacific
FIS/2014/019	Positioning Indonesian lobster farming for significant expansion and increased productivity
FIS/2011/008	Development of land-based lobster production systems in Vietnam and Australia
FIS/2014/059	Expanding Spiny Lobster Aquaculture in Indonesia
FIS/2014/062	Improving technologies for inland aquaculture in PNG
FIS/2014/060	Developing pearl industry based livelihoods in the western Pacific
Recently completed projects	
FIS/2011/031	Coral Reef Restoration using Mass Coral Larval Reseeding
FIS/2010/057	Developing inland aquaculture in the Solomon Islands
FIS/2010/056	Scaling-up innovation in marine fisheries governance in Solomon Islands, Kiribati and Vanuatu

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

Project ID	Project Title
DE130101089	Understanding masculinity, the crustacean way
DP130102859	Understanding fish-killing mechanisms by harmful algal blooms: towards the design of effective mitigation strategies
DE120102459	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
DE120102614	Monitoring coral reef health from space: how herbivore behaviour alters reef structure
DP120101946	Adapting to climate change: does enhanced metabolism provide heritable protection against ocean acidification and increasing temperature in oysters?
DP120101993	Warming up predator-prey interactions
DP120102415	What happens to coral reefs without cleaner fish?
DP120104133	Effects of invasive macrofauna on marine biodiversity and ecosystem function
IH120100032	Commercial development of rock lobster culture systems: the cutting edge of aquaculture
LP120100592	The trophic ecosystem of a purpose-built, offshore artificial reef: do coastal currents supply sufficient nutrients for the local production of fish?
LP120100652	Seascape genetics for shark management: an innovation in sustainable fisheries modelling
LP120200164	Understanding the stock-recruitment relationship to reverse the decline in the southern rock lobster
DP110100592	Stress transcriptomics: development of tests to reduce the incidence of summer mortality in abalone
DP110100695	Orientation in the pelagic environment: how do larval marine fish find their way home?
DP110100716	Changing perspective: using fish ear bones to counteract the shifting baseline syndrome
DP110104750	Can consistent individual differences in metabolic rate explain animal personality? Implications for fish and aquaculture in a warming climate
FT110100724	Understanding phenotypes: contributions from studying mutations in a model organism
FT110100990	Decoding the rules of fate, attraction and cell migration in perciform fish
LP110100516	Differential accumulation of algal biotoxins within diploid and triploid Pacific Oysters and Sydney Rock Oysters
LP110200017	Genomics for persistence of Australian freshwater fish
LP110200211	Assessing the impact of habitat restoration on the rates of recovery of four native fish species using advanced statistical models
LP110200572	Immediate and delayed changes to survival, physiology, reproduction and movement of <i>chondrichthyans</i> following capture stress
LP110200793	Genomic tools for the emerging tropical rock lobster aquaculture industry

LP110200825	Closing the loop: understanding the relationships between recreational fishing surveys, fishing regulations and fisheries management objectives
LP110201008	Automation of species recognition and size measurement of fish from underwater stereo-video imagery
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
FT100100767	Using ancient fish ear bones to overcome the shifting baseline syndrome in freshwater fish populations
FL0992179	Adapting the sustainable exploitation of coral reef resources to provide for climate change
DE140100701	Coral communities of the Great Barrier Reef are facing multiple disturbances, in particular the coral-eating crown-of-thorns starfish <i>Acanthaster planci</i> (<i>A. planci</i>) that can occur as large-scale outbreaks. This project aims to provide innovative guidance in support of the management of <i>A. planci</i> , based on a metapopulation modelling framework broadly applicable to the control of marine pests. Expected outcomes include the identification of the environmental triggers of <i>A. planci</i> outbreaks; the identification of target reefs and critical thresholds of management intervention needed to limit the impact of <i>A. planci</i> under different climate and land use scenarios; and future forecasts of coral and fish biodiversity under these scenarios.
DP140100122	In a world where few intact reefs remain, the goal of this project is to find ways to restore degraded reefs. Recent research has identified the species responsible for removing harmful algae from coral reefs, while advances in mariculture provide us with the capacity to rear these critically important reef fish species. Combining captive rearing, experimental manipulations, and a global analysis of the functional capacity of herbivorous fishes, in intact, degraded and human-modified systems, the research will explore the potential for restoring, or boosting, the capacity of reefs to withstand disturbance. The goal is to provide the scientific knowledge required to directly modify the key processes operating on coral reefs.
DP140100431	The power to recognise individuals of a species requires significant image and pattern discrimination abilities. Yet, individual recognition has been found in a huge range of species, from humans to invertebrates demonstrating its importance for social interactions. The project will investigate this ability in lower vertebrates (fish, with no visual cortex), so as to understand the underlying mechanisms of pattern discrimination. The project will also test how robust this ability is during changes in water quality (elevated carbon dioxide levels and increased turbidity). The outcomes will further our knowledge base in lower vertebrate vision and evolution, and also have implications for human vision, image analysis, and artificial vision.
DP140101377	Seafood production is an important part of Australia's economy and future food security. In a dual relationship, fisheries are both vulnerable to and a cause of changes in the marine environment. This project will identify the maximum limits to Australian seafood production and will determine the impacts of future perturbations. To achieve this, the project will: combine existing rich historical data sources with state-of-the art ecosystem and fisheries models; analyse environmental impacts that will complement national fisheries stock assessments that are essential for future competitive exports; and determine our growing seafood imports and their role in Australia's and the world's food security.

DP140101537	This project is a multifaceted, innovative cultural analysis of the crucial role of fish and fishing in feeding a growing global population. Estimates are that the world's population will be nine billion by 2050. It is imperative that innovative research strategies are developed to explore how to best respond to questions of food security in a sustainable manner. This brings challenges across numerous scales, including: changing consumer tastes, new State, Commonwealth and international regimes of marine governance, and adapting fishing communities to new forms of livelihood. This project will provide the first in-depth cultural account of the complex entanglement of the economy, the environment and the humans involved in fish and fishing.
DP140101800	Preserving biodiversity in the face of environmental degradation and climate change is the greatest challenge of our time. Although habitat fragmentation is considered a key cause of the current extinction crisis, the effects of changing habitat configuration on species persistence and recovery is almost completely unknown. Coral reefs are among the most diverse and threatened ecosystems on the planet and this project will provide the first insights into how coral reef fish diversity responds to increased subdivision and isolation of reef habitat. It will identify critical aspects of habitat change that either enhance local diversity or threaten populations with extinction and provide new ecological data to refine conservation strategies.
FT130100202	Primary productivity by marine phytoplankton directly controls global climate, supports fisheries and is an indicator of marine ecosystem health. Successful management of the world's marine ecosystems rests on improving the accuracy with which primary productivity is measured and monitored. This internationally collaborative research program will develop a new sensor-based approach – fast repetition rate fluorometry – to measure different phytoplankton groups that regulate primary productivity in Australia's complex marine environments. Application of these measurements will enable more accurate monitoring of the status of Australia's marine systems to inform ocean resource management decisions in order to safeguard marine ecosystem health.
FT130100505	The overarching aim of this project is to advance knowledge on the long-term impacts of ocean acidification on marine fish and fisheries. An interrelated set of projects will be developed that tests the capacity of marine fish to adapt to projected future rises in ocean carbon dioxide and will investigate the effects of ocean acidification on apex predators and key fisheries species. The research will address critical knowledge gaps in ocean acidification research and provide advice about the impacts of ocean acidification on marine biodiversity and fisheries productivity on time scales relevant to strategic management and policy decision-making in Australia and internationally.
FT130101068	This project will integrate comparative ecological genomics (in the wild and in the lab), phenotypic data and spatially-explicit modelling approaches to assess adaptation and vulnerability of aquatic biodiversity to environmental change. It focuses on a family of Australian freshwater fishes that evolved in response to hydrological disturbance and shows contemporary patterns of biodiversity shaped by hydroclimatic variation and anthropogenic pressures. The project expects to disclose a positive correlation between family-wide adaptive capacity and variance in ecological disturbance. This work will address fundamental and novel questions about factors shaping adaptation and resilience along naturally and anthropogenically disturbed ecosystems.

IH130200013	Project Seadragon will establish the world's largest black tiger prawn farm, significantly boosting the Australian aquaculture sector. To operate with maximum efficiency and maintain international competitiveness, Project Seadragon will require transformative technologies in advanced animal breeding to produce high-yielding, genetically improved, farm strains. The ARC ITRH will coalesce world-leading animal geneticists, research and service providers, and Australia's largest prawn farm, and gather the genomic resources, commercial phenotypic data, and apply cutting-edge genetic and genomic selection methodologies, leading to the most advanced and industry transformative improvement program for any aquaculture species globally.
LP130100007	Removing the impediment to large-scale selective breeding of Australian barramundi: deciphering and manipulating the genetic basis of sex change
LP130100040	Impacts of pharmaceuticals and personal care products on Australian aquatic ecosystems
LP130100118	Have we already lost the Australian lungfish?
LP130100242	A pan-genome reverse vaccinology approach to disease prevention in farmed fish
LP130100086	Translating genomic discoveries into improved commercial outcomes for the South Sea pearl industry
DE150100321	Climate variation will continue to impact biodiversity on our globe. Exciting new evidence has suggested that terrestrial ectotherms can minimise their vulnerability to changing temperatures by altering their thermoregulatory behaviour. Fish, unlike terrestrial ectotherms do not possess the same ability to thermoregulate and it is unclear how behavioural changes may reduce a population's vulnerability to climate change. This project aims to combine bio-logging technology, energy budget theory and climate models to predict the potential role that changing behaviours may have in reducing the vulnerability of fish populations to climate change.
DE150101266	This project aims to examine the effects of ocean acidification on coral reef fishes due to increasing atmospheric carbon dioxide (CO ₂). Physiological performance of fish vary under elevated CO ₂ , but behaviour is consistently, negatively impacted. This project aims to investigate evolutionary trade-offs between behaviour and performance, physiological mechanisms key to compromising, maintaining, or enhancing metabolic performance under elevated CO ₂ , and the importance of habitat in how fish respond to elevated CO ₂ . As fish play critical roles in marine ecosystems by structuring food webs and driving ecological processes, this information will be critical for predicting the effects of ocean acidification on marine ecosystems and biodiversity.
DP150100017	Coherent structures in geophysical flows play fundamental roles by organising fluid flow and obstructing transport. For example, ocean eddies strongly influence the transportation of heat, nutrients, phytoplankton, and fish larvae, in both the horizontal and vertical direction. Many coherent structures are very difficult to detect and track by direct measurement (for example satellite observations), and current mathematical techniques cannot provide an adequate global description. This project aims to create innovative new mathematical theory and numerical methods to discover and track coherent structures over time frames of physical importance, contributing significantly to our understanding of their role in the oceans' biosphere and climate.

DP150100608	Carp gudgeons are the most abundant, widespread and biodiverse freshwater fishes in southeastern Australia. The unacknowledged presence of many cryptic species and sexually-parasitic lineages severely taints all research on this cornerstone group. This project aims to provide unrivalled evolutionary, genomic, and taxonomic insights into this new instance of vertebrate sexual parasitism, which offers a unique mix of research advantages not displayed by any other sexual/unisexual complex. The knowledge gained could impact many research fields, including evolutionary theory addressing the unexplainable prevalence of sex, native fish ecology, and environmental monitoring of the Murray-Darling Basin, an ecosystem of world significance.
DP150100912	Thermal stratification is common in Australia's rivers due to our hot, drought-prone climate and high human demands relative to available supply, which has led to a significant reduction in flows relative to natural levels. Thermal stratification inhibits mixing, creating stagnant conditions characterised by low oxygen levels and increased concentrations of contaminants, leading to algal blooms, fish kills and systemic damage to ecosystems. The aim of this project is to develop predictive models for the effects of physical processes such as night-time cooling, wind, turbulence and currents on riverine thermal stratification. This is expected to enable a more accurate determination of the flow rates required to maintain the health of our river systems.
DP150101363	This project aims to test whether the flow of beneficial genes from farmed oysters into wild oysters can make natural oyster beds and the ecological communities that they support more resilient to environmental change. Wild oysters are critical to the function of coastal ecosystems. However, wild oyster populations are threatened by environmental change in Australia and around the world. Selectively bred oysters bearing stress resistance genotypes are now commercially farmed in many estuaries on Australia's east coast and may be used to bolster wild oyster populations. This project endeavours to develop novel genetic strategies to future-proof oysters. Thus, the outcome of this project has potential to benefit entire ecosystems that depend upon oysters.
DP150101491	Continual recruitment of young is fundamental to the replenishment of populations, especially when a stock is fished. Existing theory suggests that species with very long planktonic larval stages disperse widely, ensuring their genes are well mixed. However, recently identified genetic differences between populations of rock lobster challenge this paradigm and demonstrate that despite larvae mixing in the ocean for years, local recruitment and/or adaptation are at play. Recent developments in genomics and bioinformatics should allow this project to understand the ecological processes underpinning these genetic signatures and determine their evolutionary implications. Such findings could direct targeted rebuilding of depleted fisheries stocks.
DP150102656	This project aims to develop innovative numerical methods to understand the dynamics, carbon export, and trophic structure of zooplankton. The trophic links between phytoplankton, zooplankton and fisheries are unknown. The size- frequency distribution of zooplankton (size spectrum) is an innovative method for estimating their growth, predation and production as food for fish. Analysis of a global synthesis of zooplankton size distributions from tropical to polar environments are expected to reveal these vital rates of pelagic ecosystems. The zooplankton rates will reveal, for the first time, the link between phytoplankton and fisheries, and will significantly improve ecosystem models and global assessments of

	environmental change.
DP150102903	This project aims to use an evolutionarily young and ecologically important fish clade to understand adaptive resilience and to test predictions derived from the 'climatic variability hypothesis' for the major climatic regions of mainland Australia. Correlative surveys along landscapes and mechanistic experimental studies will be integrated to implement a comparative evolutionary genomics framework capable of assessing the genetic basis of adaptation and the evolutionary resilience of populations and lineages. This is expected to clarify climatic and geographic correlates of adaptation across a vast area of Australia and to disentangle responses to environmental change in an emerging model system for adaptation research.
DP150103820	The general aim of this project is to exploit the advantages of the zebrafish system and our access to the embryology of Australian shark species to generate an understanding of the basis for muscle fibre diversity and evolution. While there is some understanding of the fundamental genetic basis of how to make an individual muscle cell from a nascent myoblast there is far less knowledge on how individual muscle cells generate mature muscle types and patterns. The intended outcome of this research is to generate understanding of the complex molecular basis of muscle patterning in the simple paradigm of the zebrafish myotome that could be applied across the vertebrate phylogeny.
DP150104006	As humans modify the biosphere, many complex landscape-level problems are emerging. New methods are required to work on these large-scale problems. The aim of this project is to develop novel methods involving trace elements and isotopes, opening up new ways to explore the large-scale connections between terrestrial ecosystems and downstream estuaries. It is planned to use these new methods to test for unexpected positive benefits of floods for estuarine fisheries. The project is significant and innovative because it develops two fundamentally new types of tracer work, one at the sediment-animal level and one at the within-molecule level. The expected outcomes include a new toolkit for tracing the hidden connections between terrestrial and aquatic ecosystems.
FT140100383	In modern fish aquaculture, parasite infections threaten efficient production. Ecological problems also arise when fish farms amplify parasite populations and cause outbreaks in surrounding wild fish populations. Present control methods rarely integrate the behaviour of the host fish. This project aims to assess the behaviours of hosts and the mechanisms that lead to parasite outbreaks. It will develop behavioural approaches that separate host and parasite, reduce infection, and altering host behaviour to improve the effectiveness of treatments and minimise their environmental impacts. This project aims to create novel methods to control parasites in ways that limit their ability to evolve resistance.
FT140100964	Environmental endocrine disrupting chemicals (EEDs) from introduced plants, pesticides and wastewater are dramatically increasing in the Australian environment. EEDs have been shown to cause dramatic reproductive and developmental abnormalities in vertebrates ranging from fish to humans. This project plans to investigate the impact that these chemicals might have on marsupial development. Marsupials have a unique reproductive strategy and how this might affect their ability to respond to EEDs is unknown. This project aims to define the effects of three of the predominant EED risks for marsupials in the Australian environment; estradiol, genistein and atrazine.

IC130100009	A molecular technology platform for enabling the next revolution in the food industry. Society needs new approaches for solving the difficulties of providing enough food for the future. This Training Centre will train young scientists in the application of applying molecular analysis skills to solve specific problems that the food industry faces in the whole process of taking food production from “field to fork”.
IN140100025	This project will investigate the impact of environmental change on larval energetics of molluscs on the southeast (SE) coast of Australia. The SE coast of Australia is a climate hotspot characterised by rising ocean temperatures, fluctuations in salinity and we expect in the near future ocean acidification (OA). Mollusc larvae show extreme sensitivity to OA, but the impacts of other stressors remains unknown. It is predicted that OA will reduce the capacity of larvae to cope with temperature and salinity, particularly when food supply is low and in populations which have had no previous exposure to OA. Understanding the response of mollusc larvae to environmental change will support ecologically and economically significant mollusc populations over this century.
LP140100087	Estuaries are iconic recreational areas providing both ecological habitat and millions of dollars in revenue to the tourism and fisheries industries. How estuaries respond to human pressures is highly variable with some such as the Gippsland Lakes succumbing to algal blooms, whilst other heavily nutrient laden systems such as the Werribee Estuary support extremely high fish populations. This project aims to lead to an understanding of the links between freshwater flow, blue-green algal blooms, and recruitment of a key fishery species, black bream. The outcome of the project aims to give catchment managers greater confidence in setting levels of environmental flows that will both support fish populations but also mitigate against algal blooms.
LP140100225	Man-made in-stream structures (for example, dams and road crossings) have contributed to major declines in native fish numbers, with more than 6,000 barriers to fish migration occurring in New South Wales alone. Recognising this, Fisheries New South Wales led the development of national guidelines for the design and construction of fish friendly road crossings. Unfortunately, these guidelines have little empirical backing. This project will integrate data on the swimming ability of Australian fish species with culvert hydrodynamic modelling to better understand fish requirements in and around road crossings. These data will strengthen national design guidelines and provide the tools engineers and planners need to balance fish migration with effective water management.
LP140100319	Sharks are vital components of marine ecosystems and contribute significantly to ecotourism and fisheries. Due to their slow rate of growth and reproduction, sharks are susceptible to over exploitation. A lack of knowledge regarding their behaviour and movement patterns is a key impediment to effective management. This project aims to examine social interactions and migration patterns of Port Jackson sharks using a unique combination of genetic techniques, novel acoustic tag technology, behavioural manipulations and modern social network analysis. Once verified, the approach developed can be applied to other marine predators of particular management concern. The data generated will directly inform fisheries and conservation management policy.
LP140100327	The western and central Pacific Ocean supports the world’s largest tuna fishery with catches contributing up to 40 per cent of revenue for many Pacific communities. These nations are dependent on these fisheries for

	<p>livelihoods and economic development. Continued sustainable management of this valuable resource in the face of rapid population growth and climate variability and change is a challenge. Using observationally derived information of skipjack tuna, the project aims to develop a novel tuna behavioural model. This is intended to be integrated into a state-of-the-art biophysical model at resolutions capable of reproducing critical meso-scale processes, providing projections of tuna distributions that aim to aid in developing sustainable management practices.</p>
LP140100412	<p>Antarctic krill are an important species in the Southern Ocean supporting most of the Antarctic birds and mammals. A sustainable krill fishery is developing with krill products used in aquaculture and increasingly for human consumption. A new omega 3 krill oil industry has emerged and is rapidly expanding. The aim of the project is to predict the factors governing oil levels and the biochemical composition in krill which will help us understand growth, reproduction and recruitment. The research aims to also assess the possible effects of climate change on krill. Outcomes of this research aim to be used to manage the expanding krill fishery.</p>
LP140100428	<p>The project aims to develop applied genetic strategies to eradicate <i>Gambusia</i>, a serious invasive pest fish species, from a Tasmanian estuary. The goal is to advance the Trojan Y chromosome model from theory to an applied solution. The project aims to employ an integrated ecological, physiological, behavioural, genetic and genomics approach, within the unique island-within-an-island status of <i>Gambusia</i> infestation in Tasmania.</p>
LP140100722	<p>New and existing lipases will be applied to the concentration of omega-3 lipids from fish and algal oils. The primary aim of this project is to replace current chemical processes and high temperature distillation with milder enzymatic methods, providing high quality omega-3 concentrates for food and pharmaceutical purposes. The project aims to develop new immobilisation technology to enable multiple re-use of lipases for the cost effective production of omega-3 concentrates and to apply new microencapsulation strategies to the stabilisation of omega-3 concentrates, enabling the delivery of omega-3s and other bioactive ingredients to a range of food and beverage products.</p>
LP140100855	<p>As Australians migrate towards the coast, the demand for recreational boating facilities such as moorings and marinas is increasing rapidly. These structures can remove habitat and fragment the seascape in a similar manner to roads and clearings in forest and grasslands. Coastal infrastructure can also reduce the quality of existing habitats and their full impact must be assessed if the diversity and function of coastal seascapes is to be conserved. This project aims to use a combination of novel modelling, surveys, and large experiments to understand how threatened seagrass, fish, and sediment habitats are altered in human modified seascapes, and to assess the success of habitat restoration following the removal of boating structures.</p>
LP140101001	<p>The primary impediment to achieving rapid genetic progress in aquaculture is an inability to accurately and rapidly identify high-performance animals for selection as parents in animal breeding programs. This project aims to develop an innovative genomic selection breeding system for the silver-lipped pearl oyster to overcome current limitations associated with traditional animal improvement methods. The use of genomic selection will not only transform the Australian pearl oyster industry, but it will also showcase the potential of genomic selection in aquaculture globally. Furthermore, knowledge gained from this project can also be applied to a variety of other Australian aquaculture species to accelerate the uptake of this technology.</p>

Notes

1. The information shown below is limited to that which was current at the time research proposals were approved for funding and accordingly excludes any post-award variations that may subsequently have been approved.
2. Data were retrieved from the ARC database using the research classification codes specified on 'code' sheet to match the projects that contain such codes, which were nominated by researchers at the time applying for ARC grants. Keywords 'fish', 'oyster' and 'lobster' were also used to search project title, abstract, national benefit text, impact statement and project summary.
3. Only projects with a funding allocation in the financial year 2014/2015 are included in the list. New projects added are highlighted in blue.
4. Projects have not been vetted for relevance to aquaculture and fishery.

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
2006/235	Rocklobster Propagation Subprogram: commercially viable production of temperate rocklobster (<i>Jasus spp.</i>) puerulus from eggs
2007/319	Implementation of FRDC People development program
2008/031	Aquatic Animal Health Subprogram: Investigation of <i>Chlamydiales</i> -like organisms in pearl oysters, <i>Pinctada maxima</i>
2008/039	Aquatic Animal Health Subprogram: Strategic planning, project management and adoption
2008/041	Aquatic Animal Health Subprogram: Tools for investigation of the nodavirus carrier state in marine, euryhaline and freshwater fish and control of NNV through integrated management
2008/202	Towards reliable hatchery-produced quality blue mussels: an integrated approach to optimising supply
2008/218	Atlantic Salmon Aquaculture Subprogram: extension funding application- AGD Vaccine phase III
2008/227	ASBTIA: SBT Research Program - Coordination, facilitation and administration
2008/228	ASBTIA: Maintaining SBT High Health Status - understanding SBT parasites and investigating ways to mitigate their influence on SBT production
2008/314.29	People development program: 2012 FRDC International Travel Bursaries - Dr Joy Becker
2008/318.15	People development program: 2012 FRDC governance scholarship for women - Claire Webber
2009/032	Aquatic Animal Health Subprogram: Characterisation of abalone herpes-like virus infections in abalone
2009/044	Aquatic Animal Health Subprogram: surveys of ornamental fish for pathogens of quarantine significance
2009/046	PIRSA Initiative II: carrying capacity of Spencer Gulf: hydrodynamic and biogeochemical measurement modelling and performance monitoring
2009/055	EI-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
2009/206	Development of octopus aquaculture
2009/208	Developing clam aquaculture in Australia: a feasibility study on culturing <i>Donax deltoides</i> and <i>Katelysia</i> sp on intertidal and subtidal leases in South Australia
2009/303	Australasian Aquaculture 2010 to 2014
2009/303.20	People Development Program: Australasian Aquaculture 2010 to 2014 (Bursary Sponsorships)

2009/315.12	People development program: 2011 Aquatic Animal Health Training Scheme - Cassandra Ypelaan
2009/315.15	People development program: Aquatic animal health training scheme - workshop on aquatic animal disease surveillance
2009/315.22	People development program: Aquatic Animal Health Training Scheme - Josiah Pit
2009/315.23	People development program: Aquatic animal health training scheme - Visiting Expert Dr Teruo Miyazaki
2009/322	People Development Program: Building seafood industry representational capacity
2010/036	Aquatic Animal Health Subprogram: Improved fish health management for integrated inland aquaculture through Better Management Practices (BMPs)
2010/051	PIRSA Innovative Solutions 3: biosecurity risk assessment and development of standardised mitigation for tuna and finfish aquaculture
2010/063	Atlantic Salmon Aquaculture Subprogram: evaluation of approaches to improve sediment remediation (rate & function) under salmonid fish cages
2010/201	Feasibility study for integrated multitrophic aquaculture in southern Australia
2010/202	Tackling a critical industry bottleneck: developing methods to avoid, prevent and treat biofouling on mussel farms
2010/212	Further development of commercialization of Artemia culture
2010/219	Tactical Research Fund: Establishing regional indicators of social sustainability in the Tasmanian aquaculture industry - a pilot study
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
2010/234	PIRSA Innovative Solutions 3: Feasibility study on the establishment of harlequin fish (<i>Othos dentex</i>) aquaculture in South Australia
2010/305	Extension of OH&S and Quality Index project outputs to seafood industry across Australia
2011/003	Aquatic Animal Health Subprogram: Investigations into the genetic basis of resistance to infection of abalone by the abalone herpes-like virus
2011/005	Aquatic Animal Health Subprogram: Investigation of inclusions in Australian prawns
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)
2011/046	Tactical Research Fund - Aquatic Animal Health Subprogram: Disease risk assessment for abalone stock enhancement program
2011/069	Atlantic Salmon Aquaculture Subprogram: The effects of AGD on gill function - use of a perfused gill model
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

2011/086	Atlantic Salmon Aquaculture Subprogram: macroalgal monitoring in Macquarie Harbour, Tasmania
2011/235	Atlantic Salmon Aquaculture Subprogram: design, testing and assessment of seal exclusion systems for salmon (<i>Salmo salar</i>) farm netpens and leases in Tasmania
2011/238	Feasibility study for establishing an APFA model prawn farm in Qld
2011/241	Tactical Research Fund: Development of a commercial control treatment for sepidid tube worm fouling at Port Phillip Bay mussel farms
2011/245	Tactical Research Fund: Research methods to manage pathogenic microbiological and biological organisms within a redclaw (<i>Cherax quadricarinatus</i>) egg incubator hatchery to improve survival and reliability
2011/246	Opportunities and constraints on Australian wild fishing and aquaculture under a carbon economy
2011/253	Innovative Solutions for Aquaculture: development of a sustainable South Australian macroalgal aquaculture industry
2012/001	Aquatic animal health subprogram: Strategic planning, project management and adoption
2012/002	Aquatic Animal Health Technical Forum
2012/024	INFORMD Stage 2: Risk-based tools supporting consultation, planning and adaptive management for aquaculture and other multiple-uses of the coastal waters of southern Tasmania
2012/030	Prawn Superpowers Summit - enhancing awareness of emergency aquatic animal disease response arrangements for the Australian prawn farming industry
2012/031	Australian abalone industry emergency disease response awareness workshop
2012/035	Bio-Security Awareness Workshop
2012/036	Revitalising estuaries and wetlands for carbon sequestration, biodiversity, fisheries and the community
2012/040	Tactical Research Fund: development of a risk management plan for marine biotoxins in Tasmanian abalone
2012/044	Aquatic Animal Health Subprogram: Exercise Sea Fox: testing aquatic animal disease emergency response capabilities within aquaculture
2012/047	Atlantic Salmon Aquaculture Subprogram: characterising benthic pelagic interactions in Macquarie Harbour - organic matter processing in sediments and the importance for nutrient dynamics
2012/048	Atlantic Salmon Aquaculture Subprogram: Culture and cryopreservation of <i>Neoparamoeba perurans</i> (AGD)
2012/053	Atlantic Salmon Aquaculture Subprogram: assessment of Orthomyxo-like virus pathogenicity in Atlantic salmon
2012/060	Review of the 2012 paralytic shellfish toxin non-compliance incident in Tasmania
2012/208	The Tasmanian Freshwater Eel Industry - an industry development and directions plan.
2012/213	Developing jungle perch fingerling production to improve fishing opportunities
2012/217	Atlantic Salmon Aquaculture Subprogram: trial of a stock protection system for flexible oceanic fish pens
2012/220	Tactical Research Fund: sea ranching trials for commercial production of greenlip (<i>Haliotis Laevigata</i>) abalone in Western Australia

2012/228	Atlantic Salmon Aquaculture Subprogram: UTAS Experimental Aquaculture Facility: Obtaining expert international governance, design and operational advice for the Atlantic salmon partners.
2013/004	Aquatic Animal Health Subprogram: the Neptune Project- a comprehensive database of Australian aquatic animal pathogens and diseases
2013/008	Movement, habitat utilisation and population status of the endangered Maugean skate and implications for fishing and aquaculture operations in Macquarie Harbour
2013/027	ASBTIA: Optimising the use of praziquantel to manage blood fluke infections in commercially ranched SBT
2013/222	Atlantic Salmon Aquaculture Subprogram: Innovative Seal Exclusion Technology
2013/410	RD&E capability audit and assessment for the Australian fishing and aquaculture industry 2013
2013/414	Aquatic Animal Health Subprogram: Review of vocational courses on aquatic animal health available to fisheries and aquaculture sectors in Australia
2014-503.20	Sector Overview Assessment for Fishing and Aquaculture RD&E Framework
2014-403	Aquatic Animal Health Subprogram: Development of a national aquatic animal health curriculum for delivery by tertiary institutions
2014-235	Evaluating the Performance of Australian Fisheries
2014-214	Investigating critical biological issues for commercial Greenlip Abalone sea ranching in Flinders Bay, Western Australia
2014-213	Developing new seafood opportunities in Victoria – scallop ranching
2014-031	Atlantic Salmon Aquaculture Subprogram: Predicting marine currents, nutrients and plankton in the coastal waters of south eastern Tasmania in response to changing weather patterns
2014-012	Tasmania's coastal reefs: deep reef habitats and significance for finfish production and biodiversity
2014-002	Aquatic Animal Health Subprogram: Development of stable positive control material and development of internal controls for molecular tests for detection of important endemic and exotic pathogens
2014-242	Commercialising the production of Cobia in Australia
2014-708	Stamping quality across the Australian farmed Barramundi industry
2014-241	Reassessment of intertidal macroalgal communities near to and distant from salmon farms and an evaluation of using drones to survey macroalgal distribution
2014-042	Atlantic Salmon Aquaculture IPA: understanding broadscale impacts of salmonid farming on rocky reef communities
2014-729	Seafood CRC: promoting marine finfish aquaculture in NSW
2015-302	Social and economic evaluation of NSW coastal aquaculture
2015-707	Seafood CRC Research Travel Grant: Veterinary student clinical rotation in Aquaculture Health Management

Oyster Projects	
2008/030	Aquatic Animal Health Subprogram: Development of a DNA microarray to identify markers of disease in pearl oysters (<i>Pinctada maxima</i>) and to assess overall oyster health
2008/314.40	People development program: 2014 FRDC International Travel Award - Jill Coates
2008/328.20	People development program: 2014 FRDC Visiting Expert Award - Associate Professor Dale Leavitt
2009/315.24	People development program: Aquatic animal health training scheme - KBBE workshop on diagnostics for mollusc diseases
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
2011/043	Aquatic Animal Health Subprogram: understanding and planning for the potential impacts of OsHV1 u Var on the Australian Pacific oyster industry
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 (<i>Pinctada maxima</i>)
2011/248	Pearl Consortium IPA: Control of Reproduction of the silver-lip pearl oyster, <i>Pinctada maxima</i>
2012/032	Aquatic Animal Health Subprogram: Pacific oyster mortality syndrome (POMS) - risk mitigation, epidemiology and OsHV-1 biology
2012/051	Workshop to facilitate epidemiological analysis of unexplained mortality of South Australian Pacific Oyster
2012/052	Aquatic Animal Health Subprogram: development of a laboratory model for infectious challenge of Pacific oysters (<i>Crassostrea gigas</i>) with ostreid herpesvirus type-1
2012/223	Tactical Research Fund: Assessment of heavy metals in tropical rock oysters (blacklip and milky) and implications for placement into the Australian seafood market and for Indigenous enterprise development in the NT.
2014-243	NSW Oyster Industry Strategic Plan
2014-040	Oyster Australia IPA: Pacific Oyster Mortality Syndrome - closing knowledge gaps to continue farming <i>C.gigas</i> in Australia
2015-706	Seafood CRC: overcoming technical constraints to Sydney Rock Oyster hatchery production
2012/229	Tactical Research Fund: development and validation of effective and affordable oyster production systems in the face of POMS disease of Pacific Oysters and QX disease of Sydney Rock Oysters - evaluation from a production, research and economic perspective
2013/234	Survey of Foodborne Viruses in Australian Oysters
2013/402	Identification workshop of marine invasive worm species. Such worms impact on the oyster industry, and other aquaculture activities as well as changing benthic habitats which can impact on wild stocks
2014/405	Australian edible oyster RD&E investment via Oysters Australia strategic plan 2014-2019

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
2011/706	Australian Seafood CRC Processors, Marketers and Retailers Magazine: Australian Seafood
2011/747	Maximising the quality of Australian wild-caught prawns (Quality Assurance)
2013/713	Understanding and reducing the risk of paralytic shellfish toxins in Southern Rock Lobster
2013/714	Establishing improved trade access and market development for Australia's Abalone and Rocklobster to China
2013/730	Refining Yellowtail Kingfish feed management and understanding their dietary requirements
2013/748.10	A best practice protocol and methodology for economic data collection in Australian fisheries
2013/748.20	Addressing roadblocks to the adoption of economics in fisheries policy
2013/748.40	Improved understanding of economics in fisheries harvest strategies
2013/753	A new refrigeration system reference design and demonstration prototype for fishing vessels - Expert
2014/704	Waste transformation methods for value added products for the catering market
2015/707	RTG: Vet Student Travel Grant
2015/708	ACPF Strategic and Business Plans

Recently completed projects	
2008/705	SCRC: AS-CRC PDRF Project - Quantitative Genetics Post-Doctoral Research Scientist (Flinders University and SARDI joint appointment)
2008/741	PhD: Human enteric viruses in Australian bivalve molluscan shellfish
2008/742	PhD: Processing of Sea cucumber viscera for bioactive compounds
2008/749	PhD: Using the mucosal antibody response to recombinant <i>Neoparamoeba perurans</i> attachment proteins to design an experimental vaccine for amoebic gill disease
2008/769	Review of commercialisation approaches and options for generic aquaculture genetics databases for Australian selective breeding programs
2009/710	Bioeconomic evaluation of commercial scale stock enhancement in abalone
2009/712	Future Harvest Theme Leadership
2009/714.20	Bioeconomic decision support tools for Southern Rock Lobster
2009/715	Optimising business structures and fisheries management systems for key fisheries
2009/723.30	Analysis of product differentiation opportunities for Australian Wild Caught Abalone in China—Stage 2 (ACA component)
2009/724	Genetic technologies to support a transformation to profitability & competitiveness in <i>F. merguensis</i> and <i>P. monodon</i>
2009/730	Development of barramundi selective breeding entity II

2009/743	Reproductive condition marketability and survival in oyster breeding strategies
2009/744	Propagation and sea-based growout of sea cucumber stocks in the Northern Territory
2009/744.10	Propagation and sea-based growout of sea cucumber stocks in the Northern Territory
2009/746	Could harvests from abalone stocks be increased through better management of the size limit / quota interaction?
2009/752.10	Seafood Trade Expert Panel (STEP)
2009/756	PhD : Managing fisheries to maximise profits by understanding and reducing variable costs of fishing
2009/775	Prevention of "muddy" taints in farmed Barramundi
2010/722	PhD: Optimising prawn nutrition for growth performance under suboptimal conditions
2010/724	PhD: Development of tools for the sustainable management of genetics in polyploid Pacific Oysters, <i>Crassostrea gigas</i>
2010/727	PhD: Molecular assessment of spawning cues in temperate abalone
2010/728	PhD: Development and optimisation of anaesthetics for use in the abalone aquaculture industry
2010/736	Development of formulated diets for cultured abalone
2010/745	Australian Council of Prawn Fisheries – R&D planning, implementation, extension and utilisation
2010/747	National Oyster R&D - strategic R&D project commissioning, management and path to commercialisation
2010/755	PhD: Development of sperm refrigeration and cryopreservation techniques in greenlip and blacklip abalone
2010/756	PhD: Collaborative competition: Understanding the characteristics, drivers, constraints and advantages of collaboration within the Australian wild-caught abalone industry (Student: Ben Manning)
2010/757	PhD: Reducing the taint in Barramundi farmed in recirculating freshwater systems
2010/768	Broodstock and genetic management for SBT and YTK
2010/770	Australian Seafood Apprentice Chef and Commercial Cookery Online Training Series (Curtin University and West Coast Training Institute)
2010/777	Identification of the core leadership group and network structure of East Coast Trawl to develop, implement and evaluate strategic opportunities
2010/779	The SCRC skills audit and articulation into the National Seafood Industry Training Package
2010/780	PhD: Molecular and quantitative genetics studies to improve breeding programs for key Australian aquaculture species
2010/781	PhD: Broodstock conditioning and maturation of sandfish (<i>Holothuria scabra</i>) and optimisation of spawning induction techniques
2011/701	PhD: Atlantic salmon gastrointestinal health and productivity
2011/718	PhD: Molecular analysis of the effects of stressors on oysters
2011/724	The development of an Australian Cobia aquaculture industry
2011/726	Wanted Dead or Alive: Novel Technologies for Measuring Infectious Norovirus Particles
2011/735	An evaluation of the options for expansion of salmonid aquaculture in Tasmanian Waters
2011/750	Bio-economic model for SA prawn trawl fisheries
2011/751	PhD: Improvement of abalone nutrition with macroalgae addition

2011/754	Development of Yellowtail Kingfish aquaculture in Western Australia: Removal of barriers to profitable production
2011/762	Recovering a collapsed abalone stock through translocation
2011/771	Genetic selection for Amoebic Gill Disease (AGD) resilience in the Tasmanian Atlantic salmon (<i>Salmo salar</i>) breeding program
2011/772	Masters: Impacts and predictive modelling of coastal upwelling on the SA Oyster industry
2012/700	Professional Fishing Certificate - A CRC legacy. Phase 1 - industry demand
2012/706	Student mentoring at Flinders University (Andrew Scholefield)
2012/708	Quantifying physiological and behavioural responses of cultured abalone (molluscs) to stress events
2012/714	PDRS: Use of next generation DNA technologies for revealing the genetic impact of fisheries restocking and ranching
2012/729	Biofloc research extension project
2012/732	Oysters Australia: Developing and facilitating regional grower groups to extend and build on SCRC outputs
2012/736	Student mentoring at University of Tasmania (Andrew King)
2012/738	Determination of the baseline levels of TPH and nutrient levels in a proposed aquaculture zone
2012/740	Evaluating the impact of an improved retailing concept for oysters in Fishmongers
2012/741	Market diversification opportunities for Southern Rocklobster
2012/746	Preliminary Investigation of internationally recognised Responsible Fisheries Management Certification
2012/755	Visiting Expert: Dr John Taylor visit to Tasmania
2012/756	Aquaculture production innovation hub: Phase II - communication, extension and opportunities (formerly 2008/902)
2012/758	Increase sustainable use of crab fisheries resources by recovering revenue from crabs currently rejected at market
2012/759	Student mentoring at Curtin (Felicity Denham)
2012/760	Genetic selection for resistance to Pacific Oyster Mortality Syndrome
2012/769	Seafood Executive Program Bursaries
2012/772	Ongoing Salmon research in the new UTas Aquaculture Research Facility
2012/773	Oyster breeding program transition to full commercialisation
2012/774.10	Implementation of the National Prawn Marketing Campaign
2013/700	Yellowtail Kingfish genetics: commercialisation strategies
2013/708	Safe spat rearing experiment
2013/709	Piloting Commercial Scale Supply of Mass Selected Sydney Rock Oysters
2013/710	Securing the future of SBT propagation R&D
2013/711	Centre of Excellence Science Seafood & Health (CESSH): Post Harvest Research Program
2013/716	Seafood Post Harvest Research Innovation Hub
2013/717	Developing a (Sea)Food Marketing Course
2013/726	Utilisation of improved varieties of soybean meal and poultry offal meal by barramundi (<i>Lates calcarifer</i>)
2013/729	Promoting marine finfish aquaculture in NSW
2013/731	Improving Fluke control in YTK and reducing risk through better farm management practices
2013/733	Interactive seafood packaging Master Class
2013/737	Propagation of South Bluefin Tuna - Addressing constraints to larval rearing
2013/744	Phase 2: Evaluation of the impact of TV and other forms of advertising and its effect on consumer behaviour for Tassal Tasmanian Atlantic Salmon

2013/746	Optimising the size and quality of sardines through real-time harvest monitoring
2013/748	Seafood CRC Future Harvest Master Class in Fisheries Economics - Revision & Extension
2013/748.30	Introduction to the use of bioeconomics in fisheries management for key decision makers
2013/748.50	Support to Future Harvest Extension
2013/750	Sydney Fish Market supply chain opportunities
2013/751	Implementing Australian QI schemes in three supply chains
2013/752	Setting directions for the Australian Barramundi Farmers Association
2014/702	Informing spatial and temporal management of the South Australian Northern Zone Rock Lobster Fishery
2014/703	RTG: Visit to Dr Maria DeRosa, Carlton University, Canada laboratory
2014/705	A guide for use by the shark and other fisheries for preparation of information for consumers
2014/706	Co-ordination of Fish Health and Nutrition Research for the WA Yellowtail Kingfish Trial 2
2014/708	Stamping quality across the Australian Farmed Barramundi Industry
2014/709	DNSW/SFM Joint Market Research Project
2014/712	Disease challenge testing at the Centre of Excellence - Scope for estimating the genetics of resistance
2014/714	Writing our History. The people and the achievements of the Australian Seafood CRC
2014/716	Implementation of Year Two of the Love Australian Prawns campaign
2014/719	Seafood CRC Product and Resources Mapping within the Seafood Industry and Hospitality Training Packages
2014/720	Initiation of a selective breeding program for South Seas Abalone
2014/721	ASI Quantitative Genetics Analysis and Training Services 2014-15
2014/722	APFA Web update to incorporate R & D and market development results for members
2014/725	Dynamics of growth in translocated lobsters
2014/726	Measuring condition of lobsters to improve management of harvesting around periods of high transport mortality
2014/727	Assessing histamine production in aquaculture Yellowtail Kingfish and determining the appropriateness of the predictive FSSP histamine model for Clean Seas
2014/728	Synthesis of Australian Prawn Farmers Association research for extension to industry and relevant stakeholders
2014/729	Improving the taste, bioavailability and efficacy of orally administered praziquantel for yellowtail kingfish with lipid nanoparticles and hybrid lipid carrier systems
2014/730	Supporting the Seafood Trade Advisory Group
2014/731	Market and Consumer Insights to Drive Innovation and Growth
2015/701.01	Seafood CRC Case Studies
2015/702	A Final Seafood Omnibus: Evaluating changes in consumers attitudes and behaviours
2015/704	National Seafood Industry Leadership Program 2015 Bursaries
2015/705	Seafood Executive Program Bursaries (3) for 13- 16 July 2015
2015/706	Overcoming technical constraints to Sydney Rock Oyster hatchery production