The Australian Seafood Cooperative Research Centre Annual Report 2008-2009

AUSTRALIAN SEAFOOD COOPERATIVE RESEARCH CENTRE

CRC AUSTRALIA

Established and supported under the Australian Government's Cooperative Research Centres Program

contents

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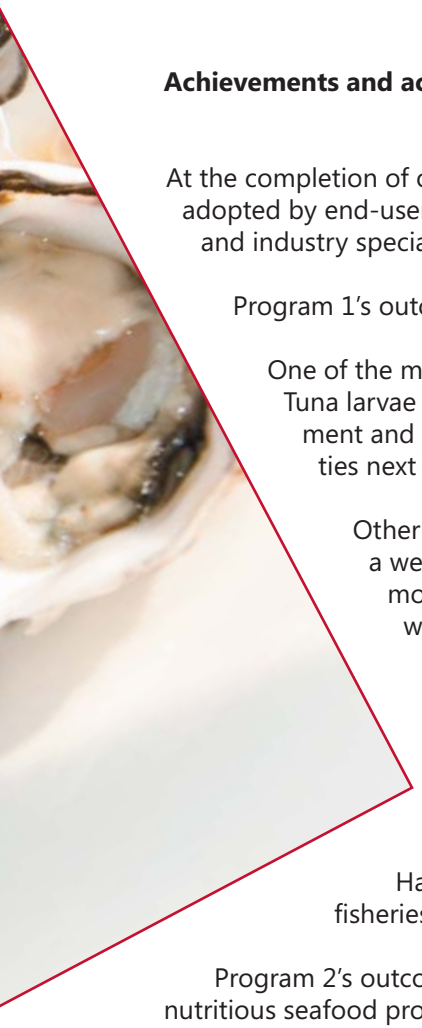
Australian Government

Fisheries Research and Development Corporation

The Australian Seafood CRC is established and supported under the Australian Government's Cooperative Research Centres Programme. The Fisheries Research and Development Corporation is a major investor in the Seafood CRC with other contributions made by Seafood CRC Company members and supporting participants.

executive summary

how we are tracking in the second year of the seafood crc



Achievements and activities of the CRC in relation to research, commercialisation / utilisation and education outcomes for the reporting period

At the completion of our second year of operation the Seafood CRC has the majority of our research programs in place and some research results have already been adopted by end-users. Our training and education program is well advanced with eighteen PhDs and three Honours projects underway. Ten post doctoral scientists and industry specialists have been appointed to provide the additional expertise needed across our programs.

Program 1's outcome is to achieve a substantial increase in the production and profitability of selected wild-harvest and aquaculture species.

One of the major outputs we hoped to achieve from Program 1 is now a step closer, with the repeat of last year's world-first, propagation of Southern Bluefin Tuna larvae in captivity. This year, several million larvae were produced and a proportion grown past three months of age; beyond critical points of development and diet changes. The specialised facilities needed for rearing large numbers of tuna were also tested, ready for the production of commercial quantities next season. These results enabled Clean Seas Tuna Ltd to raise additional capital to expand its operations.

Other projects in Program 1 are examining opportunities to increase yield and reduce constraints to production. Genetic improvement of broodstock is a well established technique for achieving this. We have prepared plans for the establishment of national breeding programs, use of gene markers and monitoring of genetic diversity with end-users of Yellowtail Kingfish, Abalone, Barramundi and Sea Cucumber. Each of these industries is now working with the Seafood CRC on methods of establishing or enhancing their breeding programs.

Additional outputs from our research into aquaculture production include delivery of improved methods of larval rearing of Yellowtail Kingfish and isolation of DNA sequences for the KISS (ligand) receptor which is known to influence the onset of puberty in fish.

Results from research into wild harvest of Southern Rocklobster have been so convincing that the Tasmanian industry is about to vote on implementation of management changes to the fishery that could boost revenue by $500 million over the next 15 years. The project, that examined translocation of small lobsters from deep water to shallow water, was brought into the Seafood CRC as part of the collaborative Future Harvest Theme in Program 1. Future Harvest aims to implement novel management strategies that increase economic yield from our wild harvest fisheries, by matching production with market needs.

Program 2's outcome is to achieve increased demand and access to premium markets for Australian seafood; fulfilment of consumer demands for safe, high-quality, nutritious seafood products; and increased profitability throughout the value chain.

Early success in this program was reported last year, in the form of Sydney Fish Market's new Market Pride range of value added products. This range has now been extended into more retail outlets, additional products and new formats.

The WA Centre of Excellence for Seafood (CIISC) at Curtin University, which is supported by the Seafood CRC, is now well established and has begun detailed studies of the impact of positive health messages on consumption of seafood. The CIISC project has completed the systematic review of evidence relating to the health benefits of seafood and gaps in clinical and consumer research identified. The report will be used to inform the development of resources and educational materials that support the regular consumption of seafood as part of a healthy diet. All materials developed as part of the CIISC Project will be piloted during 2010. A second major research outcome was a critical review of relevant resources available to General Practitioners (GPs) and Allied Health Professionals (AHPs) to use with patients as either a prevention or treatment measure for common lifestyle or medical conditions. All resources reviewed were in English and were designed to be used during a five to ten minute consultation. The most pertinent outcome from this research was that only 18%, of the resources critically reviewed were suitable for use with the general Australian population at the recommended reading level of Year Eight or lower. A suite of resources are currently being developed, in collaboration with GPs and AHPs, that will enable health professionals to assist patients with a number of specific health conditions to make changes to behaviours that can positively impact on their own health. In addition, point of sale consumer education resources based on the best available evidence around seafood and health are currently being trailed with consumers.

The Seafood Market Access Forum established by CRC participants has become a very active industry forum addressing trade barriers limiting market access and commissioning research into technical market access barriers. Prior to the formation of this forum there was no process for the industry to provide governments with collective, agreed positions on trade matters. The forum now directs CRC research on trade policy matters, having this year commissioned research papers on the proposed China – Australia free trade agreement, and abalone food safety testing for the EU.

The market access database has also been established providing CRC participants with secure on-line access to the technical market access requirements for key export markets. This is the first time such information has been collated.

Risks and Opportunities

The increasing worldwide supply of seafood using aquaculture has reduced prices paid to Australian companies. The point of difference for Australian seafood must therefore be quality as we cannot match the cost of production of many countries that export seafood. Consequently research into consumer preferences and market opportunities being conducted as part of Program 2 is increasingly important

Aquaculture production of Yellowtail Kingfish has reached the point where markets must be expanded. The Seafood CRC has therefore examined markets for the fish in Europe and established a project to examine consumer perceptions of the fish and develop value added products to suit identified consumer and market segments.

Development of a "fisher direct" supply chain to the USA market for Southern Rocklobster has not been as successful as hoped. Sales of Lobster have been below the level needed for ongoing commercial sustainability over the past two years. In conjunction with the industry, two reviews of the project were conducted and revised strategies approved for the remaining two years of the project.

Much of Australia's high value seafood is exported to China, through well defined and closely protected supply chains. However, competition is continually increasing, particularly for the Abalone industry that sells most of its production to China. The Seafood CRC has therefore initiated contacts with commercial market development agencies in China with a view to forming research partnerships with Seafood CRC researchers and the Abalone industry in the coming year.

Impediments to achievement of the CRC's objectives experienced during the year and strategies adopted to address these

There have been two significant impediments to achieving all of the Seafood CRC planned outputs, but strategies have been put in place to deal with them as described below.

Since the commencement of the CRC we have noted an increasing need for research into seafood processing, product development, packaging and market development. Our capacity to deliver this research to the market needs to be improved. A timely development in this area is establishment of the Australian Seafood Productivity Improvement Centre (ASPIC) in conjunction with the South Australian Food Centre. This centre will provide capability and capacity for trialling and adopting innovative technology in seafood processing, distribution and sales. Commercially experienced staff have been recruited to work with ASPIC and projects are due to commence in the coming year.

Some industry participants in the Seafood CRC are significantly behind schedule in the development of their R&D projects. We have found that some industries need a part time experienced manager to help plan, develop and implement projects with the individual businesses in each sector. Consequently for the Barramundi, Southern Rocklobster, Oysters, Prawn farming, Prawn fishing and Abalone industries, the Seafood CRC has provided funds from the commercialisation and utilisation budget to employ part time staff to prepare R&D implementation plans. The funds are limited to three years in most cases and the success of the investment will be measured by the degree to which Seafood CRC projects are supported by each industry.

80 day old propagated Southern Bluefin Tuna (Photo: Clean Seas Tuna)

context and major developments

seafood breakthroughs and initiatives

Industry Context in Which the CRC Operates

ABARE reports that in 2007-2008 the GVP of Australian aquaculture increased eight percent to $868 million while the GVP of the wild harvest fishing sector declined by six percent to $1.3 billion. This is a continuing trend globally and reaffirms the drivers for Program One. Since 2000-01 average prices for Abalone, Rocklobster and Prawns has declined by 50%, due to a range of factors such as exchange rate and competition from other countries. These facts emphasise the need for Australia to continue to improve the quality and market acceptance of our exported seafood products. Program 2 has this as its central objective.

The global financial crisis has had an impact on the seafood industry along with most other industries. This is particularly evident in the USA and Japan, where demand for Rocklobster and Prawns has declined significantly. This had an impact on one CRC project and as a result the project was extended another year, with the same budget.

Fortunately, the Chinese demand for Australian Abalone and Rocklobster has not reduced greatly, however competition from Chinese domestic aquaculture production of abalone increases each year. As a result, the CRC is conducting research into market development of abalone in China.

Value of Outcomes to Date as Compared to Expectations Outlined in the Commonwealth Agreement

The expected economic outcomes from Program 1 are an increase in Australian seafood company profits by approximately $240 million annually through a combination of anticipated savings in input costs and improved management practices. Additional profits were to be generated from the new or increased outputs of aquaculture industries, including Sea Cucumber, Trout from inland saline water and Yellowtail Kingfish.

The Seafood CRC is on track to achieve most of these outcomes. Examples include the estimated revenue increases from changes in management of the Tasmanian Southern Rocklobster fishery and production efficiencies arising from genetic improvement of Oysters and Prawns. The production of Kingfish is progressing according to plan. The Sea Cucumber projects have not yet started but are likely to commence in the coming year. The production of Trout from inland saline will not occur due to the withdrawal of Lonsec Ltd, however an application is to be made to DIISR to replace this investment with an initiative to support the fledgling tropical Cobia aquaculture industry.

Program 2 is expected to generate additional profit margins through improved market performance of Rocklobster, Abalone, Kingfish and Prawns and reduced spoilage of processed marine finfish of about $60 million annually.

These benefits are most likely to come from Seafood CRC projects currently underway that involve development of new consumer products, supply chain improvements and improved retail offering based on consumer research.

Major Developments and Initiatives

As highlighted in the impediments section, the unavailability of suitably experienced researchers has restricted progress in some areas of Program 2. To address this the Seafood CRC created a new position of Manager, Commercial Seafood Processing Research. Mr Bob Fleming was appointed to this position in April 2009. He is now working closely with staff in commercial seafood processing companies and research agencies to develop key projects in Program 2.

During the year the Commonwealth Agreement between the Seafood CRC and DIISR was varied to increase the provision for capital expenditure from $160,000 to $1,000,000. This was done to enable the purchase of prototype seafood processing equipment we anticipate will be required for Program 2.

The industry context in which the Seafood CRC operates has been subject to a change in market conditions; and these changes have impacted on the ability of the Seafood CRC to meet one key objective. As with many primary industries in Australia the ongoing drought has reduced business opportunities. Attempts to establish aquaculture on land utilising inland saline water have been significantly impacted due to the lack of water available from the Murray River and as such Lonsec Limited terminated their partnership with the Seafood CRC as they considered that the in-land saline aquaculture program was no longer viable.

Program Managers have appointed Theme Leaders during the 2008-2009 year and the Seafood CRC has appointed a new Office Manager Mrs Alison Connelly as a restructure resulted in Mrs Rebecca Wilson becoming the CRC's Business Manager.

During this reporting period the Seafood CRC was successful in establishing 39 new projects, 20 PhD projects and 3 Honours projects.

The Program Managers developed Research Theme Business Plans to guide the direction of research activity in their programs. The Board has approved all of the plans and they are currently being implemented. Participants are given the opportunity to comment and provide input in twice yearly forums.

The Research and Adoption Committee advises the CRC staff and Board on the contents of the plans and reviews each project prior to implementation.

The Southern Bluefin Tuna "Godfather" and Managing Director of Clean Seas Tuna Hagen Stehr, AO (Photo: Clean Seas Tuna)

national research priorities

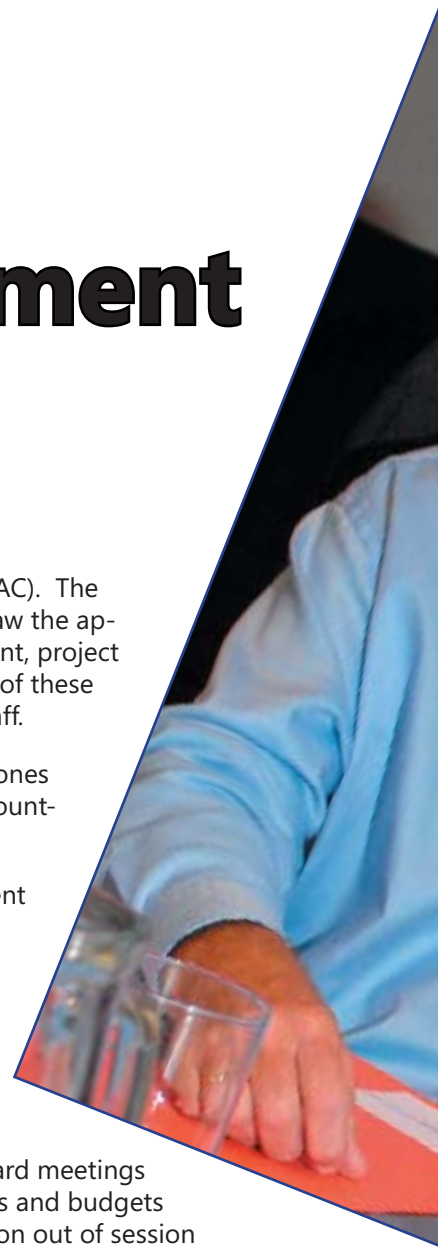
how seafood fits in to building a better australia

The CRC aims to achieve thirteen major outputs, as described in the Commonwealth Agreement. Most of these deal with improving the prosperity of Australia's seafood industry and a number of the outputs correspond to the national research priorities which are provided below:

National Research Priority	Seafood CRC Research (%)
1. AN ENVIRONMENTALLY SUSTAINABLE AUSTRALIA: Transforming the way we use our land, water, mineral and energy resources through a better understanding of environmental systems and using new technologies	
1A. Transforming exisiting industries	53%
1B. Sustainable use of Australia's biodiversity	2%
2. PROMOTING AND MAINTAINING GOOD HEALTH: Promoting good health and preventing disease, particularly among young and older Australians	
2A. A healthy start to life	1.5%
2B. Ageing well, ageing productively	3.5%
2C. Preventative healthcare	5%
3. FRONTIER TECHNOLOGIES FOR BUILDING AND TRANSFORMING AUSTRALIAN INDUSTRIES: Stimulating the growth of world-class Australian industries using innovative technologies developed from cutting-edge research	
3A. Breakthrough science	5%
3B. Frontier technologies	2.5%
3C. Advanced materials	1%
3D. Smart information use	17%
3E. Promoting an innovation culture and economy	2.5%
4. SAFEGUARDING AUSTRALIA: Safeguarding Australia from terrorism, crime, invasive diseases and pests, and securing our infrastructure, particularly with respect to our digital systems	
4A. Understanding our region and the world	0.5%
4B. Protecting Australia from invasive diseases and pests	6%

governance and management

the captains, the skippers and the deckhands of the crc



Management Structure

The Australian Seafood CRC Company Ltd's management structure comprises the Governing Board and the Research and Adoption Committee (RAC). The Seafood CRC has seven full-time staff employed with the three Program Managers supported by specialist Theme Leaders. The 2008-2009 year saw the appointment of a new Office Manager, Alison Connelly with a Business Manager Rebecca Wilson appointed to provide in-house financial management, project monitoring and reporting. These requirements were originally conducted by the Fisheries Research and Development Corporation. The transition of these management requirements to the Seafood CRC ran smoothly due to the support and efficient hand-over from the Fisheries R&D Corporation's staff.

At an output level, the Omnifish system (the Fisheries R&D Corporation's project management database) is used to report progress against milestones for all projects. In addition an annual project outputs report is used to monitor specific outputs from projects and to hold Program Managers accountable for their delivery.

Evaluation of the CRC at an outcome level has commenced with a number of consultant economists appointed to identify appropriate measurement parameters and baseline data required to measure against CRC program outcomes.

Seafood CRC Company Directors

The Seafood CRC Board has nine members including the Managing Director of which during this reporting period there was no change. There is a Board committee for Finance, Audit and Risk Management, a committee for Appointments and Remuneration and a committee for Commercialisation. A summary of the Board's skills set are provided on page 10.

The Seafood CRC Board met 4 times face-to-face (Adelaide and Brisbane) and held 2 teleconferences during this reporting period. During the Board meetings Directors receive reports of the Centre's progress and finances, determine investment in significant projects, progress against theme business plans and budgets and approve policies and procedures. The Board also approved four new policies concerning delegation, admission of Participants, Board resolution out of session and staff remuneration during this reporting period.

The Seafood CRC Research and Adoption Committee (RAC)

The RAC provides advice to the Board through the Managing Director on matters relating to implementation and adoption of research and the development of high quality projects. The committee also provides recommendations to the Managing Director on how projects and programs can be improved to better meet the Centre's outcomes and end-user needs. The Committee is also used to monitor program performance and provide feedback to Program Managers on the performance of their programs and themes. Twice yearly Planning and Reporting Forums are also held with CRC Participants by members of the RAC.

L to R – Board Directors Nick Moore (Gold Coast Marine Aquaculture) and Bob Cox (Marine Culture and Australian Seafood Industries) discuss CRC business

The RAC is also a forum for the Fisheries Research and Development Corporation to provide technical input into projects and to advise on likely levels of co-investment by the Fisheries Research and Development in each project. CRC Participants and Theme Leaders are also invited to attend on an as-needs basis.

Status of Participants

During the year, Oyster producer TASEA Enterprises Ltd was placed in receivership and withdrew from the CRC. The investment was taken up by other members of national consortium of oyster growers, which now includes Queensland Oyster Growers Association as a new member. The Commonwealth Agreement has been modified accordingly.

The withdrawal of Lonsec Ltd and Clear Water Marine Farms (through O'Donohue Sand and Gravel Pty Ltd) from the Seafood CRC created a gap in projects involved with new aquaculture systems and markets. However, replacement investors have now been found from existing Seafood CRC participants. A group of Barramundi and Prawn farmers have applied to conduct R&D into the newly emerging Australian Cobia aquaculture industry. Also, Clean Seas Tuna Ltd has applied to increase its investment in the Seafood CRC with a focus on product and market development for Tuna and Yellowtail Kingfish. Both of these proposals have been approved by the CRC Board and have been forwarded to DIISR for consideration.

2008-2009 Seafood CRC Staff

During this reporting year the Seafood CRC had seven full time staff with seven theme leaders to help Program Managers implement their research and education theme business plans.

Dr Len Stephens is the Managing Director of the Australian Seafood CRC and Program Manager for Commercialisation and Utilisation.

Dr Graham Mair is Program Manager for Production Innovation and is responsible for the implementation of Breeding for Profit, Finfish and Future Harvest theme business plans.

Ms Jayne Gallagher is Program Manager for Product and Market Development and is responsible for the implementation of OzSeaValue and SellFish theme business plans.

Mr Bob Fleming is the Manager of Commercial Seafood Processing and is responsible for the implementation of processing and product development projects within program 2

Ms Emily Downes is Program Manager for Education and Communications and is responsible for the implementation of the A,B, Sea theme business plan and communication of CRC outputs to participants and the public.

Ms Rebecca Wilson is the Business Manager and Company Secretary. Rebecca is responsible for the management of CRC contracts, project agreements, human resources and finances.

Ms Alison Connelly is the Office Manager and is responsible for the management of the CRC office, events and reception.

2008-2009 Seafood CRC Theme Leaders

Dr Geoff Allan is the Theme Leader for the theme business plan Finfish and is responsible with the Program Manager for consultation and implementation of projects within this theme as well as coordinating the Seafood CRC Aquaculture Production Hub. Geoff is from the New South Wales Department of Primary Industries.

Dr Nick Robinson is the Theme Leader for the Breeding for Profit theme business plan and with the Program Manager is responsible for consultation and implementation of projects with industry. Nick is affiliated to Flinders University.

Dr Caleb Gardner is the Theme Leader for the Future Harvest theme business plan is responsible with the Program Manager for the consultation and implementation of projects with industry that fit within this theme. Caleb is from the University of Tasmania

Mr Paul Graham is the Theme Leader for commerical market development and is responsible for the development and implementation of projects with industry that fit within the retail transformation theme. Paul is the Director of Market Strategy Innovation.

Dr Tom Ross is the joint Theme Leader for the theme business plan A,B, Sea and is responsible for the implementation of higher education projects. Tom is from the University of Tasmania.

Professor Mark Tamplin is the joint Theme Leader for the theme business plan A,B, Sea and is responsible for the implementation of higher education projects. Mark is from the University of Tasmania.

Mr Roy Palmer is the Industry Theme Leader for the theme business plan A,B, Sea and is responsible for the implementation of industry training and vocational education and training projects. Roy is the Managing Director of Tigrey

2008-2009 Seafood CRC Company Directors

Professor Colin Buxton is the Director of the Tasmanian Aquaculture and Fisheries Institute, University of Tasmania and has a research provider role on the CRC Board. Colin was the Director of Aquafin CRC (2001 - 2008), the Director of the Faculty of Fisheries and Marine Environment, AMC (1996 - 1998) and the Deputy of Department of Icthyology and Fisheries Science, Rhodes University. He has over 20 years experience in higher education (in South Africa and Australia) in research and research management and has expertise in science, research and development management and strategic planning. Colin holds a MSc (cum laude), PhD and is a Graduate of the Australian Institute of Company Directors. Colin also frequently consults to State and Federal Governments.

Mr Callum Elder is on the executive General Manager of Quality and Innovation for Simplot Australia and hence, Callum has an industry role on the CRC Board. Callum is an experienced food technologist.

Mr Bob Cox is the Director of Marine Culture and Australian Seafood Industries and is the Secretary of the Tasmanian Oyster Research Council Ltd and on the Board of the promotional body, Seafood Experience Australia Bob has an industry role on the CRC Board. In addition to his work with industry, Bob is a chartered accountant.

Ms Erica Starling has a solid commercial background in the seafood industry via the family company, Latitude Fisheries Pty Ltd, with active fishing interests in State and Commonwealth commercial fisheries including Rocklobster, Prawns, Tuna, Shark, finfish and other fisheries as well as interests in pearl and finfish aquaculture in Western Australia. Erica is currently the owner of Indian Ocean Fresh Australia Pty Ltd and is operating a finfish aquaculture operation in Geraldton. In 2003, Erica won the 2003 RIRDC Rural Women's Award for Western Australia and in 2007 completed her MBA.

Mr Nick Moore is the General Manager of Gold Coast Marine Aquaculture and he has an industry role on the CRC Board. Nick is the president of the Australian Prawn Farmers Association and was the General Manager for SeaFarm Pty Ltd for nineteen years.

Mr Peter Dundas-Smith is the independent chairman of the Seafood CRC. His role on the CRC Board is Board leadership, corporate governance and R&D. He is also a Director of OceanWatch Australia Ltd. He was the Chairman, CRC for the Sustainable Aquaculture of Finfish from 2005 until 2008 and the Fisheries R&D Corporation's inaugural Executive Director from 1992 until 2005.

Peter has extensive knowledge of the operations and interests of the commercial and non-commercial components of the fishing industry and of the research sector. Until October 2004 he was a Director of Seafood Services Australia Ltd and until 2001 he was vice-president of the Australian Fisheries Academy. He has also been a member of advisory bodies related to the fishing industry and the science community.

Mr Roger Cotton is the Chief Executive Office of the National Institute of Accountants and has an industry role on the CRC Board. Roger is the Chairman of Southern Rocklobster Limited and has longstanding experience in consulting. Roger's area of expertise lies in corporate business development, brand stewardship and market positioning.

Dr Patrick Hone is the Executive Director of the Fisheries R&D Corporation and his role on the CRC Board is corporate governance and research and development. Patrick has a PhD in marine science physiology and is a member of the Federal Coordinating Committee on Science & Technology and the Oceans Policy Science Advisory Group. He was also the Director of the Aquafin CRC (2001 - 2008).

Dr Len Stephens is the Managing Director of the Seafood CRC and has a corporate governance and research and development role on the CRC Board. Len has a BVSc, MSc and PhD from the University of Guelph, Canada. In the past Len was the Chief Executive Officer of Australian Wool Innovation Ltd (2003 - 2006) , the General Manager of Livestock Innovation with Meat and Livestock Australia (2000 - 2005), Senior Executive with Agriculture Victoria and founding Director of the Victorian Insitute of Animal Science. Len is also a Director of Dairy Australia Ltd

2008-2009 Seafood CRC Directors (Photo: Clive Huggan)

research programs

australian seafood research activities

Abalone research at the Tasmanian Aquaculture and Fisheries Institute (Photo: University of Tasmania)

Research Activities and Achievements - Program 1

Of the 39 new research projects established this reporting period, 18 of these fall within Program 1 (Production Innovation) with 4 completed during this reporting period.

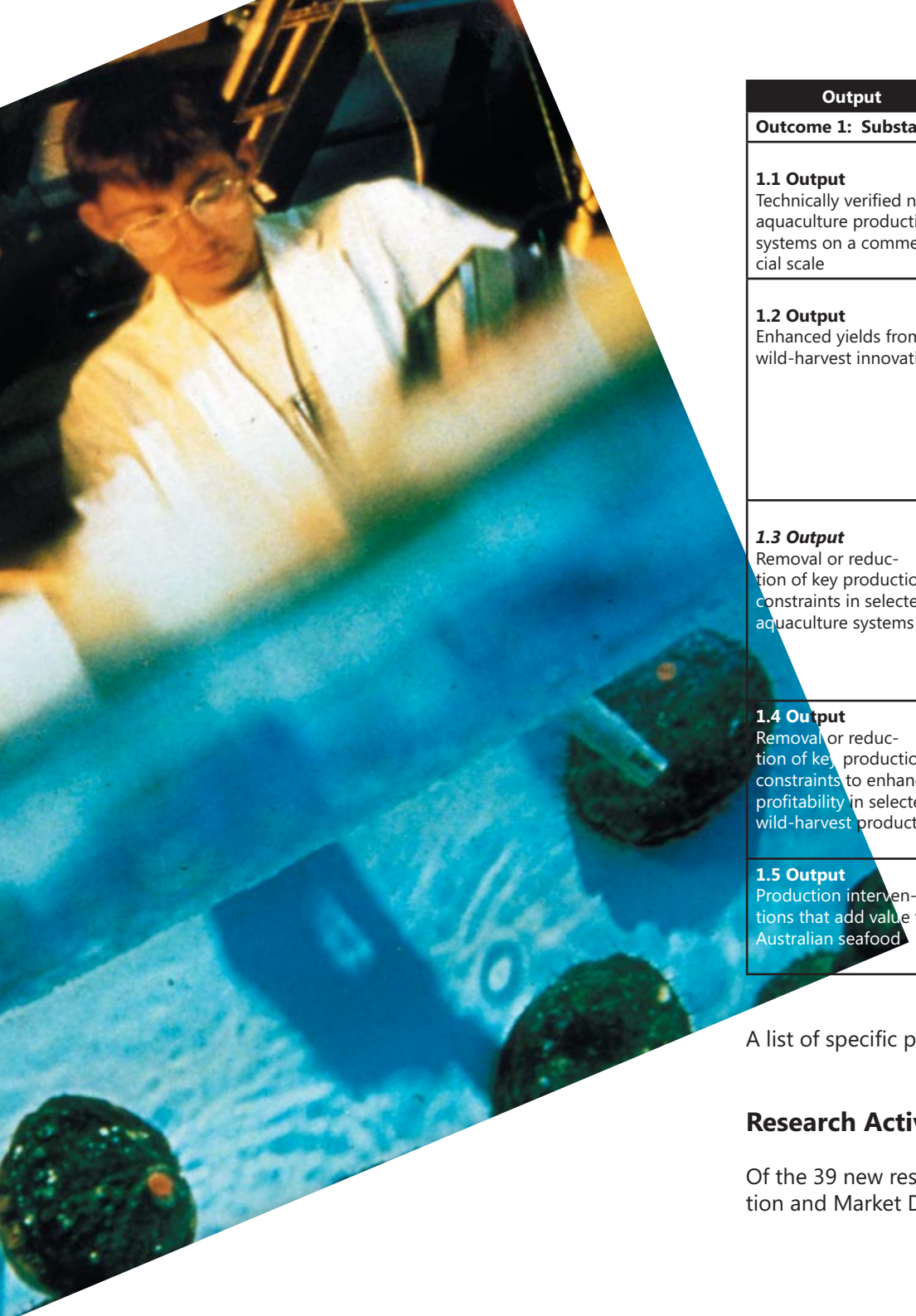
Program 1 continues to move forward with all theme business plans "Finfish – Aquaculture Production Innovation", "Breeding for Profit" and "Future Harvest" being approved by the CRC Board, including annual operating plans and budgets.

The major breakthrough in Program 1 has been the successful breeding and larval rearing of Southern Bluefin Tuna arising from projects with Clean Seas Tuna. This is a triumph for the company's vision but also for scientific collaboration with five Seafood CRC partners and several international collaborators involved. The development of a "new" aquaculture industry sector based on propagated tuna is now a very real prospect.

A number of projects are adding value to on-going breeding programs in several aquaculture sectors and scoping and planning projects have resulted in key industry decisions to initiate new breeding programs for Barramundi and Yellowtail Kingfish. Also an exchange program established with Nofima Marine, a world leading Norwegian R&D institute specialising in aquaculture genetics, is providing access to leading edge expertise and forming a catalyst for the development of training activities and enhanced communication and collaboration between those implementing breeding programs in our aquaculture industry.

Another significant achievement has been in the enhancement of the Rocklobster fishery with the industry in Tasmania being presented with a range of options, arising from Seafood CRC research, for better managing the fishery. The majority of these options have been approved by the industry for implementation in 2010 creating the very real potential for significant gains in sustainability and profitability in the fishery.

Program 1 is also tracking well with progress against CRC outcomes and outputs as shown in the following table:



Output	Approach	Progress
Outcome 1: Substantial increase in the production and profitability of selected wild harvest and aquaculture species		
1.1 Output Technically verified new aquaculture production systems on a commercial scale	The Finfish Aquaculture theme has been established to drive this output. 1. Expansion of the Southern Bluefin Tuna aquaculture industry using propagated tuna. 2. Establish commercial viability of a Cobia aquaculture industry	Significant breakthrough by successful spawning and rearing of larval Southern Bluefin Tuna. Pilot scale commercial culture planned for the 2009/2010 season. Cobia investment has replaced the in-land saline aquaculture project but is still in early stages.
1.2 Output Enhanced yields from wild-harvest innovations	The *Future Harvest* Theme has been established to drive this output. It includes: 1. Translocation of Rocklobster and Abalone to areas of improved growth. 2. Enhancement of the number of Abalone available for harvest by seeding with reared juveniles. 3. Commercial evaluation of Abalone and Sea Cucumber fishery enhancement through propagation and seeding of the seedbed for harvest.	New approaches to management of Southern Rocklobster fisheries have been accepted by industry and are soon to be implemented. Abalone and Sea Cucumber projects will be initiated in 2009/2010.
1.3 Output Removal or reduction of key production constraints in selected aquaculture systems	The *Finfish and Breeding for Profit* themes address this output with projects covering: 1. Genetic selection for disease resistance and growth rate in a range of species 2. Larval rearing 3. Fish health management and control (e.g. vaccines) 4. Feed and feeding	Genetics activities range from working on specific R&D issues with industries to developing national strategies, through to review the use of gene marker technology. CRC research is catalysing the development of three new breeding programs and adding value to existing programs. Early success in larval rearing has contributed to Output 1.1
1.4 Output Removal or reduction of key production constraints to enhance profitability in selected wild-harvest production	The *Future Harvest* Theme also applies to this output by devising and evaluating new fishery management approaches to better suit market needs	Work is just beginning.
1.5 Output Production interventions that add value to Australian seafood	Research towards achieving this output is primarily concerned with harvest techniques to minimize stress, genetics to select for quality parameters and nutritional influences on quality of harvested seafood.	Projects are under development or underway in Oyster condition and harvesting of Yellowtail Kingfish and Barramundi.

A list of specific project research achievements can also be found in this chapter.

Research Activities and Achievements - Program 2

Of the 39 new research projects established this reporting period, 21 of these fall within Program 2 (Production and Market Development) with 9 completed during this time.

Program 2 also continues to move forward with all theme business plans SellFish and OzSeaValue and their annual operating plans and budgets being approved by the CRC Board. A significant achievement this reporting period has been the appointment of a Manager for Commercial Seafood Processing. This now raises the CRC's capacity to help participants with product and processing development and offers an integral pathway to increase technical capacity in this area. In addition, the manager has been working on the creation of product development and processing hubs. The major hub in development is the establishment of a state of the art seafood processing capability here in Australia.

The retail transformation program, which focuses on improving the domestic market for CRC participants is now well developed and has been enhanced by the appointment of a theme leader in this area. Stage 1 of the project will conduct a gap analysis of Australian seafood manufacturers against nationally and internationally recognised standards which will lead to Stage 2 of the project where the development of a consumer tested range of fresh chilled seafood products can be presented to key retailers.

Program 2 is also tracking well with progress against CRC outcomes and outputs as shown in the following table:

Output	Approach	Progress
Outcome 2. Increased access to premium markets through fulfilment of consumer demands for safe, high-quality, nutritious Australian seafood		
2.1 Output Traceability technologies to assure seafood quality and integrity and to deliver value chain efficiencies	Technologies for tracking fresh seafood to be reviewed and tested in commercial facilities	Post doctoral scientists have been recruited to develop projects in conjunction with CRC participants. The technologies have been reviewed and work has begun on microbial predictive tools
2.2 Output Diagnostic systems to assure seafood quality and integrity	Review and evaluation of rapid technologies for detecting chemical and microbial contaminants and nutrient status to authenticate label claims	
2.3 Output Predictive tools to increase value chain efficiency	Development of tools that predict level of freshness and quality of seafood in specific supply chains	
2.4 Output Optimised technical market access	Facilitation of seafood exports by conducting technical and policy research to assist CRC participants and government in tariff/quota negotiations and responses to technical trade barriers.	The Seafood Trade and Market Access Forum (SAF) has been established and provides for the first time a high level forum for industry and government to develop specific seafood trade negotiation platforms. The SAF is supported by a Seafood Trade Experts Panel to provide the technical support for the development of trade negotiation platforms
2.5 Output Communication of consumer health benefits and risks	Research into consumers' understanding of seafood health benefits and methods of delivering information to consumers cost effectively.	The joint CRC WA Government Centre of Excellence for Seafood Science and Health has been established and is developing education and training materials for school children, industry and health professionals. These materials will be tested in a community based approach to raising awareness of the health benefits of seafood.
2.6 Output Market access database	Establishment of a service that can be used by all seafood exporters to identify commercial and technical requirements of each country that imports Australian seafood.	The Market Access Database has been launched to provide secure, on-line access to information about trade requirements for key export markets. This database is a collaboration between AQIS, SARDI and SSA and has been designed to be self sustaining after the CRC is finished.
2**.7 Output** Removal or reduction of barriers to seafood consumption	Consumer research that helps define changes in presentation, packaging and promotion required to lift seafood consumption and evaluation of new approaches in export and domestic markets.	Research is underway in the USA to enhance market opportunities for Southern Rocklobster. A longitudinal study has commenced to measure consumer responses to seafood product presentation in the domestic market. This will be supplemented by research to investigate domestic market positioning for Australian farmed Barramundi and Australian prawns. A major market development project has been commenced to investigate options for driving consumer demand for Australian wild abalone in China.

2.8 Output Smart processing technologies and practices	Development of innovative technologies for controlling spoilage, enhancing shelf-life, new product development, recovery of under-utilised product and responding to culinary practices.	A second range of the Sydney Fish Market's Market Pride was released in December. This innovative range of value added seafood products has been developed, evaluated and reformulated using CRC research on technologies for controlling spoilage and enhancing shelf life. This research is continuing and will be enhanced through the recruitment of specialist staff and establishment of a partnership with the SA Food Centre. which will form the basis for the CRC Australian Seafood Productivity Improvement Centre..

A list of all research achievements related to specific projects in this program can also be found in this chapter.

Contributions Received

With the support of the Seafood CRC, Curtin University received $500,00 from Western Australian government to establish the Centre of Excellence for Science, Seafood and Health (CoESSH). $100,00 of this contribution was used the 2008-2009 reporting period. The CoESSH will conduct research in to the methods of communicating messages about the health benefits of seafood.

CRC's Research Direction

The CRC's research direction remains unchanged.

Completed Projects During the 2008-2009 Reporting Period

CRC Research Project	Program	Project Outcomes	Key Research Achievements	Relation to CRC Outcomes	Industry Benefit
2007/700 - A critical evaluation of supply-chain temperature profiles to optimise food safety and quality of Australian Oysters (SARDI)	2	Project 2007/700 has evaluated Australian oyster cool chain processes to underpin food safety and optimise commercial quality. It has identified future research, investment, education and training priorities to implement best practice time temperature regimes for the Australian Oyster industry. Lastly this project has provided input to the development of an Australian Oyster Refrigeration Index to assist industry and regulators to optimise time temperature regimes that assure food safety.	Temperature profiling of problematic supply-chains has provided immediate capacity for reduced business risk from losses due to unacceptable food safety and quality risk. These losses have traditionally occurred in lengthy/complex supply-chains and represent a significant economic loss to industry. This work has developed a framework for Australian oyster industries (Pacific and Sydney Rock) to evaluate their cool-chains. This has provided the oyster industry with capacity to optimise its cool-chain management, which in turn will lead to both increased food safety and quality and position industry to negotiate premium prices in both the domestic and export markets.	Outcome 2 Output 2.2 Milestone 2.2.1	To optimise returns, fisheries need to increase product value. This can be achieved by ensuring that seafood is safe and of high quality which will increase trade and market access opportunities and allow producers to achieve higher prices. Consequently, a thorough understanding of the potential impact on product from inappropriate cool-chains is imperative, both in terms of food safety and product quality.

2007/703 - Intervention strategies to maintain the safety and quality in a range of value-added products made with under utilised southern and eastern scalefish and shark fishery species (Sydney Fish Market)	2	This project has led to new value-added products for Sydney Fish Market. The first step involved an assessment of the food safety risks associated and identification and resolution of the critical quality issues associated with primary processing. The next step was to assess the food safety risks and identification and resolution of the critical quality issues associated with the secondary processing of the proposed products. Ultimately, the project has contributed to the capacity building within Sydney Fish Market and Southlands Fish Supplies regarding the development of new value-added seafood product lines.	Results of this research remain commercial in confidence but a number of studies have taken place which include the kinetics of microbial growth in seafood mixes, the characterisation of spoilage organisms in seafood mixes and the determination of the kinetics of microbial growth and spoilage organisms in fish cakes. In addition, the levels and types of bacteria in fish cakes, fish sausage ingredients and spices were evaluated. Lastly, the efficacy of sanitising treatments for herbs, Prawns and Scallops were determined.	Outcome 2 Output 2.8 Milestone 2.8.1 Milestone 2.8.2 Milestone 2.8.3	This research has contributed to the launch and expansion of a new line of seafood products "Market Pride"(for Sydney Fish Market) using under utilised species.
2007/706 - Establish the technical and market data to assess the feasability of live bivalve mollusc (Australian Oysters) access in USA - Stage 1 (Corvell Management)	2	This project will lead to information about the USA commercial market opportunities and the technical requirements to accept Australian testing standards as equivalent to the USA for the Australian seafood industry. This will enable Seafood CRC participants to determine whether to pursue access to the USA market for Oysters.	It was determined that there are few technical barriers to gain entry into the USA and it is commercially feasible to enter the market if an investment is made to build the market - this is dependent on the exchange rate not continuing well beyond $1.00 AUD = $0.95 USD.	Outcome 2 Output 2.6 Milestone 2.6.2	A significant opportunity may exist for industry in the USA but significant issues regarding product quality, consistence and price points need to be addressed by developing a comprehensive market development strategy for the Australian product. Further work will depend on direct involvement by Oyster exporters.
2007/716 - "Passion for Prawns" - Benchmarking performance (Australian Prawn Farmers Association)	2	Establishment of a performance management evaluation program for the Australian farmed Prawn industry	This study identified 10 new areas for R&D development. These focussed on the major costs of production such as reducing feed, labour, electricity and gas, purchase of PL's, repairs and maintenance costs. Prawn BM software has been developed that will enable the collection of future data over the long term.	Outcome 2 Output 2.1 Milestone 2.1.2	Prawn farmers will be able to test both existing and future supply chains and business management strategies against a set of industry benchmarks as well as their own business benchmarks
2008/703 - Improving the erythrocyte omega-3 fatty acid profiles and health status in adults through increased consumption of canned tuna (University of South Australia)	2	Project 2008/703 aimed to demonstrate that regular consumption of canned fish leads to long-term increases in incorporation of long chain omega-3 fatty acids into erythrocytes.	This study has demonstrated that regular consumption of canned fish can modestly elevate erythrocyte DHA (with the potential to improve the health status of individuals with Metabolic Syndrome).	Outcome 2 Output 2.5 Milestone 2.5.3	The results did not show a large enough effect for use as a health claim.

2008/722 - Scope and economic analysis of options for a nationally unified breeding program that provides significant economic benefit to the Australian Abalone aquaculture industry (Australian Abalone Growers' Association)	1	This project allows the Abalone aquaculture industry to be able to make informed decisions on the best way to achieve their objectives for the long term development of national selective breeding programs to achieve significant economic wealth.	This project successfully prioritised the traits for abalone selective breeding programs as well as a benefit-cost analysis of realistic options for selective breeding demonstrating clear long term economic gains to the Abalone industry that would arise from the successful implementation of selective breeding. Lastly, a draft business concept for a stand-alone breeding program demonstrating clear benefits over farm based selective breeding was produced.	Outcome 1 Output 1.3 Milestone 1.3.1	This project will result in an increase in the production and profitability of Australian Abalone farming through the widespread availability of superior (genetically improved) abalone seed.
2008/723 - Development of a genetic management and improvement strategy for temperate marine finfish (Flinders University)	1	This project will develop a range of options for genetic improvement of cultured stocks and implement cost effective strategies that will achieve efficiency, productivity and market gains.	In order to achieve greater commercial efficiency and profitability, there was a need to evaluate a range of genetic options for possible future management and improvement of Yellowtail Kingfish, Mulloway and Tuna. The results of this project concluded that research to develop single pair mating and determine its commercial feasibility should be considered and. genetic markers or tagging can address some of the limitations imposed by the existing breeding systems.	Outcome 1 Output 1.3 Mmilestone: 1.3.1	This project will produce a range of options for CST to consider for cost effective genetic management and improvement of Yellowtail Kingfish, Mulloway and Southern Bluefin Tuna.
2008/753 - Review for the Australian Oyster Consortium on their strategic market direction (Ridge Partners)	2	The Oyster Comsortium will develop a consumer expectations summary document, identify strategies that may be implemented to meet those expectations with the ultimate outcomes being to achieve a price premium for quality and integrity guaranteed product in new/existing markets.	Goals and project opportunities were identified and included in the Consortium strategic market plans.	Outcome 2 Output 2.4 Milestone 2.4.2	This project will contribute to the improvement of the profitability of Australian oyster businesses through increasing penetration of innovative and existing oyster products into new and existing markets.
2008/758 - Development of a genetic management and improvement strategy for Australian cultured Barramundi (Flinders University)	1	This project will review existing barramundi-related genetic knowledge to identify relevant research and where the R&D gaps preventing instigation of Barramundi breeding programs presently exist. This review will include a genetic audit of available hatchery stocks, using established genetic marker systems, to provide a census of captured genetic variation and genealogical relationships among broodstock. This information will be useful for establishing commercial breeding programs, Lastly, a benefit cost analysis of the effective and appropriate implementation of genetic improvement strategies will be conducted	This study has identified and prioritized the research steps that need to be taken to establish a sound program for genetic improvement of Barramundi farmed in Australia. The study predicts that the continuously improved seedstock supplied by an industry wide selective breeding program for Australian Barramundi should stimulate expansion, raise profitability and improve international competitiveness of the industry.	Outcome 1 Output 1.3 Milestone 1.3.1 MIlestone 1.3.2	The Australian Barramundi industry have long appreciated the potential for improving the sustainability and profitability of production through the appropriate implementation of genetic management and improvement of the species. This project will catalyse efforts directed towards an industry wide approach to the sustainable and economically viable genetic management and improvement strategy for cultured Barramundi in Australia.

2008/776 - South Australian marine finfish to Europe market plan (SARDI)	2	Creation of a strategic market development plan for marine finfish in the EU Market.	This study showed that the success of a new species' introduction relies heavily upon the status of the species at the moment of its introduction on markets, its prices relative to substitutes, availability (volumes, all year through) and the overall appetite for seafood in the relevant country.	Outcome 2 Output 2.4 Milestone 2.4.2	Industry will develop market development strategies targetting identified opportunties.
2008/777 - Australian Oyster industry supply chain analysis and improvement strategy (Oyster Consortium)	2	This project's aims were to detail knowledge pertaining to the physical flows and volumes of Oysters that move along various chains to consumers and to determine the various supply chain models that the oyster supply chain from growers to consumers currently have in existence including information on the volume flows. Lastly the project aimed to provide recommendations to the Oyster Consortium pertaining to strategies, projects or other activities that are required for the growing sector of the industry to become more profitable and to suggest other activities that will in concert with other supply chain members, have the potential to increase the demand for Oysters by providing growers with a better understanding of the end users who supply consumers.	This project resulted in a list of general observations of the 2009 oyster supply and the determination of the largest end user customer base for Australian oysters. The study also detailed a financial breakdown of eight supply chains from grower to consumer and concluded that there was no general market failure occurring in the oyster supply chain. Lastly, the study identified a range of industry development issues that-should be addressed for industry to become more sustainable.	Outcome 2 Output 2.6 Milestone 2.6.2	This research will result in the Australian Oyster growers having a greater level of understanding about how their product moves through the supply chain from when they produce to when it is purchased by consumers. This knowledge will allow growers to be better informed and so allow them to make better business decisions in how they market their oysters and a better understanding of the factors that influence the purchasing decisions of others in the supply chain.
2008/901 - Product quality issues: Maturation and harvest stress (SARDI)	1	This projects aims to identify, characterise and quantify the effects of sexual maturity on defined product quality attributes and to determine the extent and nature of the impact of "dead haul" harvest processes and practices on product quality attributes of farmed Yellowtail Kingfish.	This preliminary study has determined the stress response of yellowtail kingfish harvested by a crowd, fish pump, pneumatic stunner and bleeding procedure. The information has been used to improve aspects of the process to ensure the fish are harvested as efficiently as possible with little deleterious impact on product quality and shelflife. The extent of impact by reproductive maturation on product quality and shelf-life has been assessed and the information will be used by producers to help decide if the limited deleterious consequences of male maturation needs to be mitigated through management approaches.	Outcome 1 Output 1.5 Milestone 1.5.3	This project will led to the improvement quality of the product at the time of year when mature males occur and when sea temperatures reach their peak. If mature males are shown to contribute significantly to product quality issues at this time, then remedial measures can be investigated which are proportional to the scale of the problem. In addition, information on the extent of the impacts of maturation and/or harvest stress on product quality of Yellowtail Kingfish will help all involved in growing, buying and selling Yellowtail Kingfish in domestic and overseas markets.

2008/913 - Project development for the retail transformation project (Market Strategy)	2	The purpose of this project is to outline the potential sub projects that could be contained within the Retail Transformation Project. It is intended that the sub projects most appealing to CRC Members and Retail Partners will then be developed in to more detailed projects.	This research identified the need for general socio economic, seafood trend and specific seafood performance information. Gaps in Australian research knowledge were identified in all these areas. Current research was found to lack currency, consistency and accuracy. It also lacked trended perspectives and structured recommendations of consumer responses to research results. This research provided over 15 lessons that are drawn as interpretations of the research. These key lessons showed that consumer focused programs are needed in product development; communications / marketing; packaging development; environmental sustainability; supply chain; and technical development. In addition 7 potential sub projects were identified for the CRC Retail Transformation Project.	Outcome 2 Output 2.5 Milestone 2.5.1 Output 2.7 Milestone 2.7.1	There is overwhelming evidence to suggest that if the seafood industry is able to raise the quality of the seafood retailing across Australia, there is a huge opportunity to be had. There are many hypotheses about what the industry is doing wrong in seafood retailing in Australia which include a poor product range, poor packaging options, unappealing retail environments, confused consumers and lack of training. The Australian Seafood CRC Retail Transformation Project is designed to inspire a revolution in seafood retailing in Australia.

Research Projects in Progress - Program 1 - Production Innovation

Research Project	Project Outcomes	Key Research Achivements	Relation to CRC Outcomes	Industry Benefit
2005/029 - Factors limiting the resilience and recovery of fishing Abalone populations (University of Tasmania)	This project will identify key ecological processes that limit standard recovery and will quantify the scale of spillover benefit from translocated Abalone populations. Lastly a cost benefit analysis of rehabilitated habitat will be undertaken.	This research has shown it is feasible and relatively cheap to undertake translocation of mature Abalone, with good survival over the first two years. It has demonstrated that Blacklip Abalone larval dispersal is highly restricted, and limited to 10's of metres. The scale of benefit of remedial activity such as adult translocation or juvenile reseeding is extremely limited, and "stock" rebuilding is a valid concept in Abalone fisheries. This research has also shown limited larval dispersal and size limits in Abalone fisheries are fundamental to the sustainability of fisheries, as populations will not recover from an external source.	Outcome 1 Output 1.2 Milestone 1.2.1 Output 1.4 Milestone 1.4.2	This project has successfully translocated Abalone between sites in Tasmania and has also begun undertaking larval dispersion analysis. Translocation of spawning stock may provide a mechanism to restore depleted reef.s The use of hatchery produced larvae as a re-seeding technology has previously been shown to be problematic and dependent on an understanding of the habitat type, existing abalone density, environmental conditions and the deployment methodology.

2006/220 - Spatial management of Southern Rocklobster fisheries to improve yield, value and sustainability (University of Tasmania)	This project will conduct field experiments and sampling to provide additional data required for alternative harvest strategy evaluation as well as on translocation to undertake economic evaluation. It will also determine the extent of ecological community change in deep water reef habitats in response to increased harvest rates of lobsters and will enable assessment reporting of trends in biomass and egg production by depth (model fitting).. A large part of this project will also evaluate alternative spatial management options in respect to yield and egg production and alternative spatial management options by economic analysis.	Translocation of Southern Rocklobster is progressing well and the lobsters moved from Maatsuyker Island are thriving in their new environs. The translocation of Lobsters is now complete and all effort is now directed at monitoring the growth, reproduction and long-term survival in their new habitat, and assessing the results as potential management options	Outcome 1 Output 1.2 Milestone 1.2.1 Output 1.4 Milestone 1.4.2	This project will ultimately develop functional management and monitoring recommendations for the Southern Rocklobster fishery
2006/226 - Protecting and enhancing the Sydney Rock Oyster selective breeding program (New South Wales Department of Primary Industries)	Project 2006/226 will establish par mating protocols necessary for the development of selectively bred oyster lines as well as confirming the association between PO and QX resistance using par matings to determine the performance of PO-selected family lines in QX- prone estuaries. It will also identify and characterise additional genetic markers of disease resistance and assess the value of cyropreservation to secure family lines for later use and will use non-chemical means for the induction of triploidy in Sydney Rock Oysters.	The final draft of the SOCo technical manual is now being amended to include the most recent findings and protocols for production of pair mated SRO families have been developed and 68 family lines are now available to SOCo for future selection. The performance of these is currently being evaluated in field trials. The association between PO (phenoloxidase) and QX resistance has been confirmed using pair mated families deployed into QX affected estuaries and additional genetic markers of disease have been identified. Evaluations of the potential for cryopreservation as a tool in SRO breeding have been completed and standard operating protocols for sperm cryopreservation have been developed and documented in SOCo technical manual. Eggs have been successfully cryopreserved, but further development of protocols is required to reduce variability in development success before practical application in a breeding program. Investigations of non-chemical means of triploid induction have now been undertaken using heat shock and pressure, individually and synergistically, to induce triploidy in SRO. Triploids have been produced, however to date triploid percentages in surviving larvae have not been as high as those previously achieved with SRO using chemical induction techniques.	Outcome 1 Output 1.3 Milestone 1.3.1	This project will result in the production of family lines which will be made available to Select Oyster Company for incorporation in future breeding plans.

2006/227 - Enhancement of the Pacific Oyster selective breeding program (Australian Seafood Industries)	A spreadsheet to calculate the economic values of traits for Pacific Oysters will be produced along with a breeding strategy that delivers the best genetic gains for the Pacific Oyster industry. Genetic gains will also be documented where possible with different oyster selective breeding strategies and the relative economic benefits of these different strategies will be determined. Specifications for a facility to produce the required number of families will also be developed along with specifications for a computer system to support the breeding program (i.e. best mate allocation and genetic evaluation). The development of a model for data capture and processing for further development by Australian Seafood Industries and consideration by other aquaculture sectors will also be produced.	Development of the Strategic Breeding Plan concept is complete. The interim breeding plan was used as the basis for selecting crosses for the 2008/09 hatchery run. Only 10 10th generation family lines were successfully produced (out of a targeted total of 30). These family lines now await distribution to progeny testing sites in South Australia and Tasmania. Specification of Hatchery Facilities for expansion of family line production is complete. Specification of the Genetic Evaluation System and Mate Allocation System are complete. The systems were successfully used to make selections and design matings for the 08 breeding season.	Outcome 1 Output 1.3 Milestone 1.3.2	This project will upgrade and refine the Australian Seafood Industries breeding program by developing a program that maximises economic gains and quantifies the relative importance of traits known to be significant for the Australian Pacific Oyster industry.
2007/224 - Increasing the profitability of *Penaeus monodon* farms via the use of low water exchange microbial floc production	This project will evaluate the effectiveness of different carbon sources for microbial floc formation in commercial ponds and determine the nutritional benefits of microbial flocs to *P. monodon* reared in ponds and the reduction in feed costs will also be quantified. Finally the effects of low water exchange, microbial floc production systems on the reduction in farm nutrient discharge and overall effects on farm profitability will be quantified.	Better floc densities in ponds are associated with the dominance of diatoms in the microalgal community. Data collected have indicated the importance of total ammonium nitrogen (TAN) in the establishment of a good microbial floc. The concentrations or relative proportions of TAN, phosphate and silicate in the pond are likely to affect the dominance of particular microalgal classes. Molasses has proved to be an effective carbon source and is probably the most cost-effective. Concerns that the use of molasses would encourage harmful Vibrio bacteria species have proved to be unfounded. Water exchanges have proved to be useful in helping reduce the strength of particular microalgal blooms, such as blue-green algae. Following the water exchange, another microalgal class will often become dominant. Feed conversion efficiency has been improved to the point where feed conversion ratios have been reduced to as low as 1.3 (Prawns at 30g). As a consequence, feed costs have been significantly reduced.	Outcome 1 Output 1.3 Milestone 1.3.5	This project will increase the Australian Prawn farming industry's profitability througha reduction in feed costs and less labour associated with pond maintenance

2007/717 - Southern Bluefin Tuna maturation and sexing: Develop and apply new technologies (Clean Seas Tuna)	This project will develop sedation, handling and sampling techniques for Southern Bluefin Tuna and apply tools for the characterisation of reproductive development and sex determination of captive Southern Bluefin Tuna. The project will also manipulate reproductive development of Southern Bluefin Tuna using environmental and hormonal interventions.	Two main alternative anaesthetic active ingredients, effective doses and compressed air dart delivery systems have been developed. Handling techniques have been tested which include retrieval of large fish by highly skilled divers after anaesthetisation, short term handling within in-water cradles, transport by sling and also examining in an "out of water" water tank while irrigating gills. Blood and mucous sampling have been conducted providing material from which important hormonal, stress and DNA assessments can be based. Endoscopy has been ruled out at this stage from further development. A large dataset has now been catalogued. An assay for measuring circulating levels of lutenising hormone has been developed. Results for testosterone (T), 11-ketotesesterone (11KT) and 17β –estradiol, have been produced. Once combined with results from a validated vitellogenin assay, these results will contribute to establishing a profile of these important reproductive hormones for SBT and may allow for accurate and reliable sex determination.	Outcome 1 Output 1.1 Milestone: 1.1.2 Milestone 1.1.3	This project will contribute to a new propagated Southern Bluefin Tuna industry in South Australia
2007/718 - Yellowtail Kingfish juvenile quality: Identify timing and nature of jaw deformities in Yellowtail Kingfish and scope the likely causes of this condition (University of Tasmania)	Project 2007/718 will evaluate the variation in the quality of Yellowtail Kingfish eggs and assess the use of ozone disinfection of Yellowtail Kingfish embryos and the quality of live feeds used in the production of Yellowtail Kingfish. It will also determine the onset and severity of malformations in cultured Yellowtail Kingfish and identify potential factors influencing the malformation to develop a plan for future research. Hatchery staff will also be trained in the identification of larval malformations and in ozone disinfection.	The project has quickly contributed to improvements made in commercial hatchery operations with demonstrated economic benefits associated with improved swim bladder inflation rates, higher survival and reduced jaw malformations, accompanied by a reduced requirement for labour intensive sorting and improved quality of juveniles stocked into sea cages.	Outcome 1 Output 1.3 Milestone 1.3.3 Milestone 1.3.4	This project is designed to reduce hatchery costs by the reducing the number of deformed juveniles produced
2008/217 - Effect of temperature on reproductive development of maiden and repeat spawning Atlantic Salmon: Understanding the basis for improved egg survival and quality (Tasmanian Salmonid Growers' Association)	This project will investigate differing temperatures and how they affect spawning levels and egg quality and survival in the Atlantic Salmon industry	Research to begin in the next reporting period	Outcome 1 Output 1.3 Milestone 1.3.1	This research is of value to industry as the project will work towards consistently improving fertility and survival rates from Atlantic Salmon hatcheries. The cost to industry of not solving this problem is potentially $15 to $20M per annum.

2008/218 - Amoebic gill disease vaccine: Phase III (University of Tasmania)	This project will develop techniques to successfully culture and cryopreserve virulent N. perurans as well as elucidating the role of saccharide-inhibitable lectins on the ability of the amoeba to attach to salmon tissue This project will also isolate, identify and investigate antigenicity of the lectin mediating N. perurans attachment and determine whether protection in salmon against AGD can be achieved using the identified N. perurans lectin	Work is progressing in the culture techniques for *N. perurans* and four in vivo experiments to assess attachment inhibitable have been completed. Recombinant proteins have been produced and injected into rabbits. Atlantic salmon have been injected with the same antigens. The infection tank is being maintained and continues to supply amoebae as required. The first vaccine efficacy trial commenced when 741 Atlantic salmon were vaccinated and then challenged with N. perurans. AGD progression was assessed at 16 and 21 days post challenge (dpc) and when the disease was evident in all tanks after visual examination the trial was terminated (at 29 dpc). Vaccine efficacy will be assessed by a reduction in pathology.	Outcome 1 Output 1.3 Milestone 1.3.3	This project will create an efficient commercial vaccination program against AGD for the Tasmanian Atlantic salmon industry reducing production costs and freeing up valuable resources that could be redirected toward continued growth and profitability and ultimately sustainability of the industry.
2008/705 - Quantitative genetics: Post doctoral research scientist (SARDI and Flinders University)	The postdoctoral position will focus initially on three projects, namely scoping and strategic planning projects for CST, ABFA and AAGA. Other areas where this PDR can contribute is in PhD supervision, genetic parameter estimation, breeding program design and implementation, education and training and software design.	Research in progress	Outcome 1 Output 1.3 Milestone 1.3.1 Milestone 1.3.2	The major outcomes of these three projects will be longer term breeding strategies for the three species including proposals to address the key researchable constraints in the implementation of these breeding strategies.
2008/709 - Larval and early juvenile marine finfish rearing: Post doctoral research scientist (SARDI and Flinders University)	Work in this project is being conducted with Clean Seas Tuna Pty Ltd to address their identified and/or potential Yellowtail Kingfish and propagated Southern Bluefin Tuna larval rearing issues, through research, education and training, and technology transfer. The focus is on larval developmental biology, early nutrition and feeding protocols, and system characteristics.	The design and set-up of a new 36 tank experimental system for YTK and southern bluefin tuna (SBT) larval rearing, was completed for initiation of the 1st YTK experiment at SARDI to evaluate 9 alternative larval live feed, feeding strategies. A literature review of larval rearing relevant to SBT and YTK is in progress.	Outcome 1 Output 1.1 Milestone 1.1.2 Milestone 1.1.3	This Post Doctoral Research Scientist engages with CRC participants seeking to address key production and marketing "bottlenecks" that can be addressed by targeted research on larval rearing issues.

2007/707 - Resolving laval rearing, juvenile development and productivity constraints for propagated Southern Bluefin Tuna and improvements to the production of Yellowtail Kingfish and Mulloway (Clean Seas Tuna)	Part of this project will be to establish protocols and methods for the commercial production of juveniles and to develop cost effective feed and sources for growing Southern Bluefin Tuna hatchery reared fingerlings to get them ready for transfer and grow out in sea cages. A cost effective feed pellet for grow out of wild caught and hatchery produced SBT that achieves an FCR of 4.5:1 or better without compromising flesh quality will also be developed and/or evaluated. This project will also conduct research to reduce deformity rates in Yellowtail Kingfish to less than 10% before hatchery grading and to improve average growth rates compared to established current models, by better feeds and feed management of Yellowtail Kingfish. Feed costs of Yellowtail Kingfish production will also be reduced through refining of feeds and feed management that lower FCR from 2:1 to 1.7:1. The project will also decrease the time from hatchery to market from 3.5 years to achieve 3kg size to 2.5years in Mulloway and to reduce production costs through improved fish health and disease management. It will also develop a range of options for genetic improvement of cultured stocks and implement cost effective strategies that will achieve efficiency, productivity and market gains in Southern Bluefin Tuna, Yellowtail Kingfish and Mulloway. A post harvest capability will also be established to take advantage of market driven cost effective value adding opportunities to increase profitability.	Clean Seas Tuna have been successful in spawning SBT two years running in 2008 and 2009, the second year of which CST produced 50 million fertilised eggs and over 35 million larvae over a 35 day period some of which were used to run research and development trials at collaborating facilities in Adelaide and Port Stephens. The SBT reached the 80 day old juvenile mark and were approximately 20 cm and about 100 grams in weight successfully weaned onto an artificial moist diet. Additionally, some of the initial barriers to commercial production of SBT juveniles have been overcome including egg incubation and transport, early feeding regimes, basic environmental parameters described, tank designs and operational procedures tested and weaning protocols established. SBT spermatogonia have been sourced and processed and injected into the larvae of a surrogate species (YTK) with aim of producing SBT eggs from a much younger, smaller and easier to handle species. Two commercial scale feed trials were conducted on a tuna diet. In these trials enough progress was made to give confidence for further commercial trials to be conducted in 2009. A research permit has been successfully used to test in sea cages a potential in-feed medicine to combat gill fluke parasites of YTK, namely, praziquantel. A research permit has also been issued to test the copper oxide based Hempanet product Tank trials have been conducted to further test efficacy of praziquantal and a second candidate in-feed medicine called fenbendazole. Results show promising acceptance by the fish and efficacy against flukes. Trials in tanks have also shown significant effects of hyper salinity which will instruct future site location decisions within the Spencer Gulf.	Outcome 1 Output 1.1 Milestone 1.1.2 Milestone 1.1.3	Project 2007/707 will produce quality fertilised Southern Bluefin Tuna eggs for use in larval rearing, weaning trials and for commercial production of juveniles and ultimately a propagated tuna aquaculture industry. This project will also contribute to the reduction in costs associated with Yellowtail Kingfish famring through feed and grow out processes and disease management.

2008/725 - Aquatic animal health: Post doctoral research scientist (SARDI)	The project aims to develop a novel strategy to treat fluke-infested Yellowtail Kingfish using one or more in-feed medications and improving the current practice of bathing in hydrogen peroxide. The project also aims to determine whether treating Kingfish cage nets with antifoulants reduces the rate at which infective fluke larvae settle on gills and skin. It will determine whether there is an existing difference in farmed Yellowtail Kingfish performance and whether it can be attributed to salinity differences and whether potential increases of salinity can exacerbate the situation. Lastly, the project will increase preparedness of industry staff and aquatic animal health scientists to rapidly respond to potential health issues affecting larval tuna.	Research in progress	Outcome 1 Output 1.3 Milestone 1.3.3	This project will contribute to the significant reduction in production costs associated with parasites and anti-fouling in finfish aquaculture
2008/733 - Population genetic structure of Sea Cucumber in Northern Australia (Flinders University)	This project will characterise the genetic population structure of Sea Cucumbers, *Holothuria scabra*, within the range fished by Tasmanian Seafoods. It will characterise the genetic diversity of the hatchery broodstock and progeny arrays relative to their original natural populations and will refine and/or recommend polices and strategies for sustainable management and enhancement, through ranching, of Sand Fish fisheries.	Research in progress	Outcome 1 Output 1.3 Milestone 1.3.1	This project will create a facility with associated services to meet the medium to long term need for maintenance of cryopreserved gene banks for aquaculture species.
2008/745 - The advancement of reproductive development in Southern Bluefin Tuna using hormonal manipulations of kisspeptin, the gatekeepers of puberty (University of the Sunshine Coast)	Project 2008/745 will develop the tools for the determination of the baseline levels of key reproductive hormones (including KiSS1 and its receptor) around the time of puberty and during reproductive development of Southern Bluefin Tuna to enable the design of an hormonal treatment for advancing puberty. It will also determine the development and optimisation of a hormonal manipulation procedure for the advancement of puberty in SBT and YTK.	The aim to isolate the KiSS receptor cDNA sequences from YTK and SBT was achieved. The engineering of the SBT KiSS receptor into the pcDNA3.1 vector is currently on-going. A real-time quantitative PCR has been developed both for YTK and SBT KiSS receptors from the brain and gonads of male and female fish. This molecular assay is necessary in order to obtain baseline information regarding the expression pattern of the YTK and SBT KiSS genes.	Outcome 1 Output 1.1 Milestone 1.1.1 Milestone 1.1.2 Milestone 1.1.3 Output 1.3 MIlestone 1.3.1	This project will use recent advances in mammalian and fish reproductive physiology, i.e the Kiss system, to advance pubertal development in SBT, with the aim of reducing the time it takes to reach sexual development. The success of this project would facilitate the availability of a larger number of SBT broodstock capable of reproducing, reduce the size of the reproductively active broodstock and thus ease their handling and will open the way for a sustainable production of SBT seed.

2008/750 - Amoebic gill disease vaccine phase III: Sea-based trials, vaccine refinement and commercialisation (CSIRO)	Project 2008/750 will determine whether vaccination success of Atlantic Salmon against amoebic gill disease in a controlled small-scale laboratory environment can be translated to the commercial environment. It aims to refine the experimental vaccine and produce the most effective commercial vaccine formulation and review the pertinent legislative requirements for the commercialisation of the vaccine and undertake the research to adequately address any concerns. Lastly it will identify a suitable partner and develop an agreement for the delivery of an efficient and effective commercial vaccine against amoebic gill disease.	The second sea trial has been completed using the original 6 clone DNA vaccine, the refined 3 clone vaccine and a further experimental DNA vaccine. At the first measure all vaccinated groups demonstrated statistically significant lower gill scores than unvaccinated or sham vaccinated controls. A laboratory trial to examine whether different doses of the vaccine (the optimized 3 clone version) result in greater efficacy and a trial using a formulation using 3 new clones has been completed. There were no significant differences in gill scores between groups in this trial. A further experimental challenge is in progress to determine whether a single or double vaccination is more efficacious and whether a DNA prime – protein boost strategy is also more efficacious.	Outcome 1 Output 1.3 Milestone 1.3.3	This project will create an efficient commercial vaccination program against AGD for the Tasmanian Atlantic salmon industry reducing production costs and freeing up valuable resources that could be redirected toward continued growth and profitability and ultimately sustainability of the industry.
2008/756 - Increased seedstock production of domesticated Giant Tiger Prawns (penaeus monodon) through improved male fertility (CSIRO)	This project will determine whether assessments of spermatophore development and sperm count must be standardised to the moulting cycle to allow accurate evaluation of male fertility and whether male fertility at the time of mating can be predicted by earlier fertility assessments. The project will also determine whether sperm count and/or morphology are objective measures (estimators) of male fertility and the results will develop a practical and predictive means to evaluate male fertility that can be used by industry. Lastly project 2008/756 will determine whether the reproductive development and health of tank-reared males differs significantly when males are fed a 'typical' pond diet with or without being exposed to a short term low temperature stress compared to males fed a 'typical' broodstock diet with or without being exposed to a short term low temperature stress and whether the reproductive development and health of males differs significantly when males are reared in outdoor ponds at different densities; transferred from ponds to tanks at different ages, and; in tanks maintained under ideal broodstock-rearing conditions from juvenile to adult.	Experiments quantifying correlations between sperm count / morphology and egg fertilisation and experimental techniques for reliably quantifying sperm count and morphology within inseminated spermatophores have been determined. Artificial insemination has also been improved with more than 40 spawnings obtained. Techniques for genotyping individual embryos have been optimised and assignment of parentage completed for 21 'first' spawnings and measures of male fertility with embryo fertilisation completed. Experiments to evaluate reproductive tract development & spermatophore development of males reared in tanks versus ponds and to evaluate spermatophore and sperm count during the moult cycle are currently underway. The siblings of first generation stocks have been maintained under different rearing regimes. Males and females have been repeatedly sampled since the earliest juvenile ages; for [males] reproductive tract development (morphological and histological evaluations), spermatophore development, sperm number and morphology, [females] mating success, [both sexes] growth and viral loading.	Outcome 1 Output 1.3 Milestone 1.3.1 Milestone 1.3.5	If the problem of male fertility is addressed and the fecundity of domesticated prawns improved it will have a major benefit to industry facilitating the extension of the benefits of domesticated and eventually genetically improved prawns to the whole industry thus benefiting all APFA's members.

2008/757 - Commercial production of all female reproductivity sterile triploid Giant Tiger Prawns (Penaeus monodon): Asssessing their commercial performance in ponds (CSIRO)	This project will develop P. monodon triploid heat shock induction systems that should allow all eggs spawned from any one female to be exposed to heat shock at the same time. It will also determine the performance (growth, survival, reproductive sterility and sex ratio) of triploid P. monodon when reared at commercial farms in earthen ponds relative to that of normal diploids. Additionally, the project will develop commercially relevant P. monodon triploid induction protocols for the Australian industry that accommodate constraints such as a natural spawning cycle (e.g. not reversed light as with experimental stocks), proximity of heated water to spawning tanks and systems available to add heated water to apply the shock). Ultimately, the project will transfer commercially relevant triploid induction technologies to one or more commercial hatchery.	The P. monodon triploid heat shock induction system has been developed The physical condition of triploid nauplii was noted to be compromised compared to controls in some spawnings, with rounded abdomens and a few other appendage abnormalities. The CRC has successfully improved on the physical fitness of the triploid nauplii and have also reared small batches of several triploid families through to protozoeal stage (with triploidy being assessed at nauplius and protozoeal stage.	Outcome 1 Output 1.3 Milestone 1.3.1 Milestone 1.3.2. Milestone 1.3.5	If triploidy is proven applicable on a commercial scale it will have two potential benefits. for industry. If triploids grow faster than diploids then the technology may be generally applicable across the whole industry. Secondly, if triploids are shown to be also 100% sterile then it can be used as a mechanism for protecting breeders rights facilitating the extension of the benefits of domesticated and eventually genetically improved prawns to the whole industry thus benefiting all APFA's members.
2008/773 - Scope of options to establish gamete cyrobanking services to genetic improvement programs in Australian aquaculture industry (SARDI)	This project will review the short, medium and long term requirements of gamete cryobanking for each CRC partner investing in genetic improvement including reviewing the system requirements according to existing cryopreservation protocols, expected sample sizes, quality control measures and management strategies. THis review will also identify the technical gaps in each priority species and identify the best or the most practical option(s) to develop gamete cryobanking services for genetic improvement programs in the CRC	Research to begin next reporting period	Outcome 1 Output 1.3 Milestone 1.3.1	The use of specialised cryobanking facilities could potentially speed up the application of cryobanking services to the aquaculture industry.
2008/900 - Improved profitability in the Western Rocklobster fishery using a Rocklobster trap (WAFIC)	This project will collect data on the catching efficiency of a 1.2m lobster trap which will assist policy makers and fishers (stakeholders in the fishery) in basing future decisions on whether to modifiy policy and behaviour. It will also calculate the potential cost savings which arise through the use of a reduced number of more efficient 1.2m lobster traps in tandem with a modified fishing behaviour.	48 inch / 1.2m traps have been sourced, constructed and subsequently distributed throughout the fishery. The traps were deployed in all zones of the fishery within the first week of December 2008. Variable results have been recorded across all zones, numerous amendments have been made to the 48 inch trap to ensure retention of animals with varying degrees of success.	Outcome 1 Output 1.4 Milestone 1.4.1 Milestone 1.4.2	The verification and adoption of a more efficient pot within an appropriately revised fishery management protocol applying conversion factors between exsting pots and the new traps will reduce fishing costs and improve the economic efficiency of Western Rocklobster fishermen without adversely affecting the exploitation rates.

2008/903 - Understanding Yellowtail Kingfish (NSW DPI, Flinders University, SARDI, University of Tasmania and Clean Seas Tuna)	This project will determine and quantify the interactive effects of fish sizes and water temperature on survival, weight gain, feed intake, feed conversion ratio and carcass composition of juvenile YTK and will characterise the occurrence of sexual maturation and identify the hormonal cues which initiate it. It will also provide detailed information on the nutritional and biochemical composition of YTK to improve market access and identify how flesh composition, post-harvest processing methods and cold chain management techniques influence the shelf-life stability of the processed product. Lastly the project will develop farm management strategies which will improve flesh quality attributes and production and increase market access.	Research in progress	Outcome 1 Output 1,5 Milestone 1.5.2	An "ideal production strategy" will achieve forecast production levels allowing informed decisions on what size and what time stocking YTK into sea cages can be made. It is anticipated that this will improve production through shortening the production cycle and will reduce the standing biomass in the water, ultimately increasing farm profitability. Lastly, as production is poised to increase, it is imperative that substantial markets are developed for YTK product. By attaining knowledge on the quality attributes, shelf-life and nutritional content of the product, producers will be able to tailor a product to specific market requirements.
2008/904 - Benefit cost analysis marker assisted selection in Australian aquaculture species (Flinders University)	Project 2008/904 will focuses on the relevance and benefit cost analysis of marker assisted selection for the abalone, Barramundi, Prawn, tuna, Yellowtail Kingfish, Mulloway, oyster and Atlantic Salmon aquaculture industries	Research in progress	Outcome 1 Output 1.3 Milestone 1.3.1 Milestone 1.3.2	The development and application of marker assisted selection, genomic breeding values and selection using gene expression profiling is a rapidly developing area and these techniques could greatly speed up the genetic progress in selective breeding programs and provide faster access and more benefit than conventional selective breeding techniques.
2009/212 - Aquaculture Production Hub (New South Wales Department of Primary Industries)	Project 2009/212 will lead to more effective collaboration within Seafood CRC programs and projects and an increased understanding of the Seafood CRC and the aquaculture industry among participants and capacity and communication among production industry companies and research providers. Therefore an accelerated development, initiation and performance of Seafood CRC research projects will occur.	Initiative in progress	Outcome 5 Output 5.1 Milestone 5.1.4	This project will benefit end users by improving the coordination and communication among CRC industry and research providers involved with finfish (and more generally aquaculture) production leading to faster uptake of research outputs.
2009/701 - Australian Oyster industry benchmarking program development (Oyster Consortium)	This project will develop a quantitative and qualitative software benchmarking tool for ongoing use by the Australian oyster industry which will ultimately report on and provide recommendations regarding key production & marketing practices as well as individual business financial performance within the oyster growing sector and key areas of focus for R&D activities in future	Research in progress	Outcome 1 Output 1.3 Milestone 1.3.5	By identifying those areas of business operation which have the greatest impact on business performance and what contributes to the variation in individual business performance, the industry will be able to identify the key areas of focus for future R&D activities

2009/726 - Southern Bluefin Tuna larval and juvenile rearing (Clean Seas Tuna Ltd)	This project aims to produce a small batch of healthy Southern Bluefin Tuna juveniles ready for transfer to sea cages and identify factors that would allow regular production of SBT larvae and juveniles. It will also compare best practice marine larval and nursery rearing techniques across a range of leading Australian marine finfish hatcheries using propagated SBT eggs and larvae and will define a successful set of larval rearing protocols, weaning strategies and nursery rearing techniques.	This project has produced incredibly successful results with the production of a regular supply of good quality fertilised eggs, successful initial stocking of larval tanks on a commercial scale, testing of various larval rearing regimes, tank designs, environmental and hydrodynamic conditions and rigorous monitoring of key biotic and abiotic factors. Testing and development of a range of weaning diets has also occured with the development of egg disinfection, inspection, transport, health sampling and biosecurity protocols to allow inter-state egg transfers. Some major breakthroughs in the area of tank design and hydrodynamics have been made.	Outcome 1 Output 1.1. Milestone 1.1.2. Milestone 1.1.3.	The need to sustain, build upon and diversify the existing investment into the wild-caught SBT industry which is currently limited to the availability of wild-caught SBT quota is crucial
2009/749 - Improvements in Yellowtail Kingfish larval and juvenile survival and quality (Clean Seas Tuna, SARDI, University of Tasmania and Northern Territory DPI)	Project 2009/749 will identify improvements to be made to commercial scale YTK larval and juvenile rearing systems and procedures resulting in higher survival, better growth, reduced levels and severity of malformations and more cost efficient juvenile production. It will also assess the suitability of some novel larval and juvenile rearing techniques for YTK: recirculating intensive larval rearing system with semi-automatic feeding, artificial light, algal paste, small rotifer, high prey density and early weaning and will test a range of key biotic and abiotic factors and rearing strategies on YTK larvae and juveniles in replicated tanks and identify optimal regimes for adoption in commercial scale hatcheries.	This research has achieved more accurate counting of larval densities, use of higher densities of rotifers as live feed, produced an out of season YTK broodstock for supply of eggs and use of probiotic products for improved management of bacterial populations. Tank hydrodynamics and light regimes to reduce mortalities and improve swim bladder inflation have been optimised and more stable water quality parameters, e.g. water temperatures have been partially implemented. The use of marble tanks to reduce walling behaviour and malformations and commercial pastes to reduce labour costs have been implemented. Protocols for egg transport, health testing and biosecurity have been agreed and implemented and trial egg batches have been sent and egg incubation protocols refined. The use of algal paste and high rotifer densities has already been adopted and replicated trials on rotifer densities concluded. This research has shown that survival rates of YTK larvae can be improved by feeding higher levels of rotifers and YTK larvae can be improved by feeding artemia nauplii at up to 25/ml. Artemia can be introduced as early as day 12 and rotifer feeding can be stopped by day 15.	Outcome 1 Output 1.3 Milestone 1.3.1 Milestone 1.3.3 Milestone 1.3.5	The direct benefit to Clean Seas Tuna Ltd. of reducing malformations in Yellowtail Kingfish is estimated to be $1 million p.a. In this example a reduction in malformations from 40% to 20% (on 2.0 M juveniles before quality grading) could produce a further 400,000 good quality juveniles @ $2.50 (market value) = $1,000,000.

Program 2 - Product and Market Development Projects in Progress

Research Project	Project Objectives	Key Research Achivements	Relation to CRC Outcomes	Industry Benefit
2004/401 - A market access guide for seafood exporters: International residues standards (SARDI)	This project aims to produce a web-based database on seafood contaminant standards in major export trading partner nations for Australian aquaculture and wild capture fisheries. A listing of veterinary medicines registered for aquaculture usage in Australia will also be produced and peak industry bodies and Australian Commonwealth agencies on importing country-specific residue standards will be informed of the project results.	This project has been terminated and key data transferred to project 2008/906	Outcome 2 Output 2.4 Milestone 2.4.3 Output 2.6 Milestone 2.6.1 Milestone 2.6.2	This project will contribute to an optimised market access for Australian seafood
2007/704 - Assessment of new market opportunities and development of effective market penetration strategies for Australian Southern Rocklobster in the USA, Middle East and Europe (Southern Rocklobster Ltd)	This project will develop a new supply chain system which guarantees consistent supply and quality of Australian Southern Rocklobster to the super premium, fine-dining sector specifications in the USA. It will develop a nice distribution and the most effective communication systems for Australian Southern Rocklobster to service and support the super premium, fine dining sector in the USA.	This project has established and implemented a development team in the USA, delivered a communication plan and has developed and sourced value-added products to increase the product portfolio of southern rocklobster. In addition, it has improved supply chain costs and efficiencies and has trialed an alternative Southern Rocklobster trading model and has engaged southern rocklobster processors across southern Australia	Outcome 2 Output 2.1 Milestone 2.1.1 Output 2.4 Mlestone 2.4.3	This project builds on previous R&D to identify new global markets for Southern Rocklobster, and then test and evaluate strategies for appropriate and efficient supply chain development aimed at market penetration – this includes evaluation of market requirements, product standards, shipping protocols, traceability, quality parameters, survival technologies, data management and information flow.
2007/719 - Protecting the safety and quality of Australian oysters with integrated predictive tools (University of Tasmania)	This project will produce a validated and robust *Vibrio parahaemolyticus* model that is approved by Australian and international regulatory bodies to manage the live oyster cold chain, control the risk of *Vibrio* diseases and provide greater access to national and international markets.	Early experiments involved validating bacterial species and virulence markers used to inoculate oysters Results showed that the preselected 6-strain V. parahaemolyticus mixture included the desired set of species and virulence markers. In addition, enumerating V. parahaemolyticus using a cost- and time-efficient direct-plating method produced results comparable to the US Food and Drug Administration (FDA) Most Probable Number (MPN) method. Vibrio parahaemolyticus growth, survival and inactivation were measured in Pacific oysters at selected storage temperatures. From these profiles, bacterial kinetic parameters were calculated including growth/inactivation rate, lag phase and maximum population density. This information formed the basis of a draft model describing how these parameters change as a function of storage temperature. The performance of the model was then measured against independent data.	Outocme 2 Output 2.2 Milestone 2.2.1 Milestone 2.2.2 Milestone 2.2.3	Molluscan shellfish are high-valued seafood products that require careful supply chain management to guarantee both product safety and quality. Storage time and temperature exert the greatest influence on microbial food safety and must be controlled during oyster production, processing, transport and storage. *V. parahaemolyticus* is the most common species which can cause human infection if present in high numbers. This risk can be controlled by proper cold chain management, but may reach unacceptable levels with the loss of temperature control. Producing a tool that allows companies to monitor real-time conditions of the cold chain and thus the safety and quality of a highly-valued seafood product will result in improved product safety,an optimised cold chain, higher product quality, greater access to export markets and a more cooperative regulatory environment.

2008/708 - Seafood processing (post doctoral research scientist) (SARDI)	This Post Doctoral Research Scientist will engage with CRC participants to help develop a strategic research and development plan for the OzSeaValue theme. The project will conduct a number of key result areas such as establishing alliances with other relevant research groups (e.g. New Zealand Crop and Food, FoodScience Australia) working in this discipline to integrate their activities with existing research projects requiring seafood processing expertise.	The Seafood Processing Scientist hasvisited five regions throughout Australia, targeting ten industries, and five R&D/industry association entities within the Seafood CRC. The Seafood Processing Scientist has continued South Australian activities, engaging with companies that are downstream processors of CRC companies' products (e.g. Australian Hiramasa, Angelakis, Cappo's). The information gathered has been used to determine priority areas requiring development need.	Outcome 2 Output 2.8 Milestone 2.8.1 Milestone 2.8.2 Milestone 2.8.3 Milestone 2.8.4 Milestone 2.8.5 Milestone 2.8.6 Milestone 2.8.8	This position will benefit industry by engaging with CRC participants to help develop a strategic research and development plan for the OzSeaValue theme, to establish alliances with other relevant research groups and to integrate industry activities with existing research projects requiring seafood processing expertise and to adopt worlds-best technologies, processes and practices to improve Australian seafood quality and marketability.
2008/710 - Benchmarking consumers physical and mental availability for seafood products and brands in different buying situations (post doctoral research scientist) (University of South Australia)	For seafood, mental and physical availability of the whole category of seafood remains an issue. With few specific seafood brands, there is considerable opportunity for CRC participants to benefit from even the most fundamental information in relation to how seafood competes for both mental and physical space with both other proteins (i.e. beef, lamb, chicken) and other forms of seafood (i.e. prawns, oysters, abalone). Making seafood products and brands physically available may be considered relatively 'easily' achievable, but the question remains as to whether current distribution systems are the form that buyers want, are the most effective and profitable options for producers and are in a form that will gain the most attention from buyers. There are many distribution options available to seafood producers - this research will aim to determine which options are likely to be most effective for producers.	Research in progress	Outcome 2 Output 2.7 Milestone 2.7.1 Milestone 2.7.2	This project will result in the consumption of selected seafood products sold by Australian Seafood CRC participants to increase, through an increased level of product satisfaction by existing customers and through the recruitment of new customers.
2008/717 - Improving post-harvest quality of Sardine through utilisation of flow ice technology (South Australian Marine Scalefish Sardine Industry Association)	This project aims to assess the utlity of flow-ice in reducing spoilage in Australian Sardines from the point of harvest to the consumer	This project has been terminated due to equipment issues	Outcome 2 Output 2.8 Milestone 2.8.1 Milestone 2.8.2 Milestone 2.8.6	The marketability of South Australian sardines is negatively affected by high volume of the nightly catch and the limited capacity of most sardine vessels to adequately chill fish on board. There is a need to trial technology that will remove heat from fish immediately postharvest more efficiently than current practices. This will reduce spoilage and extend the shelf-life for value-added grade fish. Therefore, the implementation of post-harvest technologies such as flow-ice at the point of capture will assist the production of a higher quality product which, in turn, should increase the GVP of the SASF.

2008/720 - A community intervention approach to increasing seafood consumption (Curtin University)	This project involved a systematic review and gap analysis to develop industry guidelines around health messages and seafood and to identify research gaps and priorities in seafood health benefits research. It also aims to develop, implement and evaluate a series of targeted seafood health benefits communication resources for educational institutions, medical professions and their clients, seafood consumers and members of the seafood industry. as well as developing and evaluating a seafood health benefits skills set for incorporation into relevant vocational training packages administered through TAFE institutions. Finally the project will trial and evaluate the seafood health benefits communication resources developed in a single community to determine whether seafood consumption in that community is significantly altered through access to the developed resources.	The review of health benefit research and development and the review of literature and resources relating to health benefits of regular consumption of seafood as part of a healthy diet has been completed. The Vocational Skills Set Training Package has been assessed and has found that existing courses and modules do not meet the needs of the seafood industry and require significant revision so development will continue in the next reporting period. A supermarket and media audit and a report of health messages around seafood has been completed and a marketing consultant has been employed to assist in the transfer of research findings into consumer resources. An overarching health message plus a series of by-lines were then developed. A review of resources currently available to general practitioners and allied health professionals has been completed.	Outcome 2 Output 2.5 Milestone 2.5.1 Milestone 2.5.2 Milestone 2.5.3 Output 2.7 Milestone 2.7.1	This project will translate the most up-to-date evidence around the health benefits of regular seafood consumption into a suite of resources and educational programs specific to the needs of various sectors within the community. The developed resources will be piloted and evaluated based on a number of evidence-based models and frameworks. These resources are expected to increase seafood consumption in target sectors thereby benefiting multiple end-user participants within the Seafood CRC.
2008/729 - Shellfish safety: Post doctoral research scientist (SARDI)	At the Codex Committee for Food Hygiene it was agreed that viruses are an important food safety concern, and a regulatory norovirus standard for shellfish is scheduled to be introduced within 5 years in the European Union. As test methodologies improve and become standardised throughout the world there will be increasing demands on Australian product (or growing areas) to be certified 'virus-free'. Australia is also reliant on being represented internationally (CODEX) by New Zealand. This project aims to address these limitations.	This Post Doc has developed a project addressing the issues surrounding virus contamination of shellfish and has obtained stakeholder and industry regulatory buy in and funding for the work. In addition, new linkages with providers of analytical seafood services has been established also providing opportunities for future collaboration.	Outcome 2 Output 2.2 Milestone 2.2.1 Milestone 2.2.2 Milestone 2.2.3	Viruses and marine biotoxins in shellfish are important from a public health perspective and they are increasingly attracting attention internationally, with the potential to result in technical trade barriers. Currently Australia has no capacity to test for the presence of enteric viruses in shellfish and relies on indicator organisms, which may not correlate well with virus presence in product. As test methodologies improve and become standardised throughout the world there will be increasing demands on Australian product (or growing areas) to be certified 'virus-free'. Therefore this Post Doc will benefit the industry participant by developing a diagnostic systems to assure seafood quality and safety.

2008/744 - Seafood productivity engineer: Post doctoral research scientist (University of South Australia)	This position will annually assist four CRC end user participants to identify and implement new technologies that will help resolve their seafood processing challenges. It will also document six case studies illustrating the benefit:cost of introducing new technologies in seafood processing for CRC end user participants and provide an advisory service to CRC participants in relation to seafood processing engineering challenges. Lastly the post doc will establish and manage an engineering technology hub as part of the Australian Seafood Productivity Improvement Centre (ASPIC)	Research in progress. Position filled late in the reporting period.	Outocme 2 Output 2.8 Milestone 2.8.1 Milestone 2.8.2 Miletone 2.8.3 Milestone 2.8.4 Milestone 2.8.5 Milestone 2.8.6 Milestone 2.8.8	By having a Seafood Productivity Engineer working with other researchers, a mechanisation and processing focus will be applied which will guide and resource the development of new products, make better utilisation of products, improve value chain performance, reduce seafood product wastage, extend shelf life, increase quality and integrity which will lead to improved profitability and sustainability of the Australian seafood industry.
2008/768 - Seafood molecular biologist: Post doctoral research scientist: Seafood innovation through molecular biology (University of Tasmania)	This position will identify specific microbial causes of oyster larval infection, determine microbial species that can reduce the presence and viability of these pathogens, and define environmental conditions that influence their presence in hatchery operations. It will also define SSOs that impact the quality of processed fresh fish, define processing conditions and intervention strategies that influence their presence, and identify microbial species that can competitively exclude spoilage organisms.	Research in progress. Position filled late in the reporting period	Outcome 2 Output 2.2 Milestone 2.2.2 Milestone 2.2.3 Milestone 2.2.6	Microbial species negatively impact animal health, product spoilage and safety. The best approach to reduce these unwanted effects is to precisely define the species that reduce product quality, determine the sources of contamination, and then target the best intervention strategy(s) where it is required. The reason this research is needed is that a well-tested direct-detection DNA-based method will provide a more complete profile of microbial contamination, identify the species that cause the problem, and assist in designing strategies to produce a solution.
2008/779 - Tracking seafood consumption and measuring consumer acceptance of innovation in the Australian seafood industry (University of South Australia)	This project will measure seafood consumption levels and patterns including consumers' knowledge and preferences for seafood (e/g/ benchmark and track changes over time) as well as measure consumer acceptance (in terms of consumers' willingness to pay, the expected market share, segmentation, importance of product features) and forecast the demand for a range of innovative seafood products, packaging, and services. Lastly, the project will determine the relative impact of different advertising, promotional messages (e.g., health benefits, sustainability and other environmental claims, etc), education programs and the extent those messages would be valued by the consumers	Research in progress	Outcome 2 Output 2.7 Milestone 2.7.1 Milestone 2.7.2	It has been acknowledged that the seafood industry is facing increased threats. Thus, the industry needs to attract more people to eat more seafood and on a more regular basis. To do this requires that the industry completely understand and anticipate what consumers value and demand, so that it can take advantage of changing consumer dietary preferences. Therefore, the industry will be better able to add value to seafood products to fulfil this demand, which will ultimately improve the industry's profitability.

2008/781 - Australian Seafood Productivity Improvement Centre (ASPIC) (all Seafood CRC participants)	The ASPIC will work with seafood processing companies linked to CRC participants and assist with identification of opportunities for new product development and new approaches to processing. ASPIC will also help solve problems associated with processing and assist companies to reduce the risk when establishing new processing initiatives. ASPIC will contribute to significantly improving the presentation of seafood at retail and food service levels and function as a leader and change agent in the national seafood processing sector.	Research in progress	Outcome 2 Output 2.8 Milestone 2.8.1 Milestone 2.8.2 Milestone 2.8.3 Milestone 2.8.4 Milestone 2.8.5 Milestone 2.8.6 Milestone 2.8.7 Milestone 2.8.8	In Australia's public research and development institutions, there are very few scientists with experience in seafood processing, packaging, new product development and retailing. As a consequence, most seafood processing companies import their staff or use staff from other food industries. In addition, there is very little support for seafood processors wishing to start new ventures, develop new products, install new machinery or solve processing problems. ASPIC will overcome these issues.
2008/790 - Coolfish Stage 1: Traceability and product sensor technologies to manage seafood cool chains (University of Tasmania)	Project 2008/790 will utilise commercial traceability and product sensor technologies to address current business impediments or coolchain business opportunities, that will result in increased profitability and sustainability for the seafood supply chains. Stage 1 will also establis the business case for continued investment	Research in progress	Outcome 2 Output 2.1 Milestone 2.1.1 Milestone 2.1.2	There is a need to integrate both traceability and freshness technologies into a single platform, so that all pertinent information can be collected as the product moves through the supply chain from processing to wholesale/retail, and to remedy unnecessary costly project rejection. Real research developments are occurring in the integration of sensor technology (which has a microbiological focus, and includes developments in food hygiene indexes for predicting the degree of seafood spoilage on the basis of time-temperature data), and traceability technology (which has a spatial focus and includes developments in geographic information systems).
2008/794 - Retail transformation: Identifying opportunities for creating consumer focused Australian Salmon value added products (Department of Fisheries, Western Australia)	Project 2008/794 will identify at least 3 concepts for a range of potential new retail added value Australian Salmon products and develop a model for the evaluation of consumer acceptability of low value species. Ultimately, it will improve the understanding of the nutritional and bio chemical profile of Australian salmon as the basis for product and process development	Research in progress	Outcome 2 Output 2.7 Milestone 2.7.1 Milestone 2.7.2	This project is important to the end-user as the development of low value Australian seafood options will give the Australian seafood consumer the chance to purchase local seafood at accessible price points.

2008/905 - Australian seafood compositional profiles portal (SARDI)	This project aims to establish a scientifically robust information platform with timely access to information about the nutritional and contaminant compositional profiles of traded seafood products.	The identification of industry needs questionnaire and a mini nutrient reference guide was circulated to Seafood CRC participants for consultation and to help end users grasp the the public health significance of nutrients that may be present in their products. Results have shown that Seafood CRC participants wish to generate nutritional panel information and minerals (e.g. iodine) content information for their products. A limited number have indicated interest in vitamins A national technical expert panel has been formed and the identification of previous investigations undertaken of the nutritional composition of Australian seafood species has been initiated. This process has only identified fatty acid compositional profile data sets. Taxonomic identification has been identified as a potential area of difficulty by FSANZ for the portal. Chinese market access issues have also been identified and will be investigated along with information procurement in China and Hong Kong.	Outcome 2 Output 2.2 Milestone 2.2.5 Milestone 2.2.6 Output 2.4 Milestone 2.4.2 Milestone 2.4.3 Output 2.6 Milestone 2.6.1 Milestone 2.6.2	The project will assist in meeting industry needs for promoting the public health benefits of seafood consumption more generally and allowing rapid access to credible information to counter negative media claims. This project will also benefit the end user by assisting in addressing current and future technical market challenges and allowing industry to quickly respond to market access threats.
2008/906 - Seafood trade and market access portal (SARDI)	This project's purpose is to establish a web portal service on trade rules of countries importing Australian seafood (existing and future potential markets) - information will include residue and contaminant standards, export certification requirements and tariff/ customs information for international markets of importance to Australian Seafood CRC members. Results will also inform the Seafood Access Forum on current and emerging trade issues affecting international trade of Australian seafood products.	This information for key markets is now available on-line with the next priority being markets in development	Outcome 2 Output 2.2 Milestone 2.2.5 Output 2.6 Milestone 2.6.2 Milestone 2.6.2	This project will address a core need of Australian Seafood CRC participants for timely, simple access to international residue and contaminant standards, export certification requirements, tariff and customs information to support export activities. Currently this information does not exist in an easily accessible, simple format to inform industry of its technical market access needs.
2008/907 - Seafood access forum (Seafood Services Australia)	This project aims to organise and maintain the operation of the SAF to enable it to develop an annual operational plan that details the agreed priority actions for trade and market access	Initiative in progress	Outcome 2 Output 2.2 Milestone 2.2.5 Output 2.6 Milestone 2.6.2 Milestone 2.6.2	The CRC has identified the need to prioritise trade and market access research activities and to have a forum where government and industry can agree on apropriate trade and market access negotiation strategies. The SAF provides this service for the CRC end user's. The SAF provides a solid, rigorous and inclusive process for systematically tackling-seafood trade and market access barriers

2008/909 - European Union market access for Abalone (SARDI)	This project will stipulate current requirements to meet the EC regulations for abalone and determine alternate risk management procedures that may be viewed as equivalent to the current EC regulations for abalone. In addition, it will define risk of biotoxin poisoning from consuming canned abalone and the depuration of biotoxins from abalone as well as identifying key information gaps that may influence the efficacy of risk assessment. 5 Provide industry risk management infor	Research in progress	Outcome 2 Output 2.4 Milestone 2.4.2	The abalone industry has recognised that the EU market access is a high priority issue for Australia. The potential CODEX abalone standard also introduces the strong possibility that other markets may also require production area classification and biotoxin-monitoring programmes. Australia should be ready to provide appropriate Australian based data to develop this Codex standard. The information generated will provide regulatory authorities and industry with the necessary data to support technical market access discussions to assist input into the development of the Codex abalone standard and for technical discussions with other key markets such as China.
2008/910 - Automation of Western Rocklobster processing (WAFIC)	The purpose of this project is to develop, trial and evaluate potential options for automation of Western Rocklobster processing and to make recommendations regarding future options for automation of Western Rocklobster processing.	Research in progress	Outcome 2 Output 2.8 Milestone 2.8.4 Milestone 2.8.6	There is a strong need for independant seafood engineering and technical experts to be available that industry can call upon to verifiy equipment suppliers' claims and provide,expert knowledge on the operation and limitations of any equipment This project will benefit the end user by investigating options for automation from a position of commercial and industry knowledge and scientific expertise to produce definitive cost/benefit assessments.
2008/911 - Using smart processing and packaging techniques to transform Australian seafood, including underutilised and undervalued species, into commercially viable products in the "Market Pride" product range (Sydney Fish Market)	This project will assist to transform Australian species, especially those under-utilised and under-valued, into 14 value-added seafood products. It will also contribute to the development and adoption of unique production and packaging approaches by utilising the knowledge gained through scientific partner collaborations regarding smart processing and packaging techniques.	Research in progress	Outcome 2 Output 2.8 Milestone 2.8.3	SFM's has identified the development of a branded SFM range as a critical component in the diversification of its activities. This diversification has come about, in part, due to the reduction in wholesale turnover caused by the restructuring of the SESSF and the introduction of new marine parks. This project also strengthens independent fishmongers business through the availability of unique value added products which compliment their traditional offer. To achieve the goals of a broad range of value-added convenient seafood products it is essential to understand relevant safety and quality issues on these potential products and to understand what novel strategies exist for the extension of their shelf life, There is also a critical requirement for processes which deliver cost effective recovery and transformation of Australian seafood (raw material) into useable formats to help drive NPD innovation.

2009/727 - Post doctoral research scientist: Integrated value chain performance benchmarking studies: Economics, logistics and product quality (Curtin University)	This project will develop a research capacity within the Seafood CRC to support industry participants in analysing and improving their supply chain performance as well as providing expertise to help analyse seafood supply chain performance and guide implementation of key performance improvement measures. The project will develop a suite of tools, resources and targetted training to assist seafood businesses analyse and improve their supply chain performance and will establish a supply chain technologies hub within the CRC's Australian Seafood Productivity Improvement Centre (ASPIC),	Research in progress	Outcome 2 Output 2.3 Milestone 2.3.3	This project will increase the capacity to provide Australian seafood businesses with assistance in analysing and improving their supply chains and thus improve their profitability and ability to meet and respond to their customer's needs.
2009/739 - Compositional profiles of Australian seafood: strategic analysis and method development (WA Chemistry Centre)	This project will develop certified analytical capacity for at least two high priority areas identified by an expert panel and will expand national analytical capabilities and capacity to meet current and future needs for Seafood CRC participants.	Research in progress	Outcome 2 Output 2.4 Milestone 2.4.3 Milestone 2.4.4	CRC end-users identified a need for accurate, consistent and scientifically sound baseline compositional data of commercially traded seafood species. The information generated from this project can be used to substantiate product label claims, including nutrition panel information and health claims; to promote the benefits of seafood and seafood consumption as part of a balanced diet, to inform dietary modelling activities and nutrition calculations, to gain and maintaining market access and to respond to bad publicity as well as to benchmark production processes

Research Activities and Achievements Outputs and Milestones

Research Program 1: Production Innovation

Output/Milestone No.	Description	Contracted Date	Achieved (Y/N)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
Output 1.1	Technically verified new aquaculture production systems on a commercial scale	June 2012	N	Not yet due	_
MS 1.1.1	Pilot-scale systems operational in at least two new production systems	June 2009	Partially achieved	A pilot scale commercial hachery has been achieved for Southern Bluefin Tuna but other aquaculture production systems have been compromised by the withdrawal of Lonsec.	A new project has now beend eveloped for Cobia aquaculture and another for Sea Cucumber aquaculture. This milestone should be met in full by mid 2011
MS 1.1.2	Key researchable constraints identified and characterised in at least two new production systems	June 2010	N	Not yet due	_
MS 1.1.3	Key researchable constraints successfully addressed in at least two new production systems	June 2012	N	Not yet due	_
Output 1.2	Enhanced yields from wild-harvest innovations	June 2012	N	Not yet due	-
MS 1.2.1	Key constraints to increased production characterised and research prioritised in at least one selected fishery	July 2008	Y	_	_
MS 1.2.2	Production interventions implemented in at least one fishery	July 2009	Partially achieved	Project 2006/220 has recommended 12 interventions for the Tasmanian Southern Rocklobster fishery. Industry bodies have agreed to implement nine interventions with a very significant impact on industry value anticipated.	Implementation of Southern Rocklobster interventions will commence in 2010. Other projects under development in Future Harvest Theme will deliver further interventions in Southern Rocklobster and other fisheries.
MS 1.2.3	Annual production characterised and interventions optimised in at least one fishery	December 2010, December 2011 and December 2012	N	Not yet due	_
Output 1.3	Removal or reduction of key production constraints in selected aquaculture systems	June 2013	N	Not yet due	_
MS 1.3.1	New genetic tools and/or appropriate breeding strategies developed for genetic management and improvement of at least two aquaculture species	December 2008	Y	_	_
MS 1.3.2	Genetic parameters estimated for key commercial traits; genetic improvement programs designed and implemented for at least two aquaculture species	June 2010	N	Not yet due	_
MS 1.3.3	Strategic disease management approaches and technologies developed for at least two aquaculture species	December 2009	N	Not yet due	_
MS 1.3.4	New low-cost aquaculture diets targeting improved feed conversion developed and evaluated	December 2010	N	Not yet due	_
MS 1.3.5	Production efficiency gains from genetic, health management and nutritional interventions quantified to inform long-term strategies and estimate commercial benefits	June 2013	N	Not yet due	_
Output 1.4	Removal or reduction of key production constraints to enhance profitability in selected wild-harvest production	June 2011	N	Not yet due	_

MS 1.4.1	Harvest technology innovations developed for at least two selected fisheries	June 2009	N	Lobster trap project not yet identified catch efficiency gains. The Future Harvest theme was te last to be approved by the Seafood CRC Board	One project on lobster trap design underway in Western Rocklobster fishery. Further projects being developed in Future Harvest. Likely to be met by end of 2011
MS 1.4.2	Gains in efficacy and efficiency from new harvest technologies quantified in at least two selected fisheries to inform long-term strategies and estimate commercial benefits	June 2011	N	Not yet due	–
Output 1.5	Production interventions that add value to Australian seafood	June 2012	N	Not yet due	–
MS 1.5.1	Diets contributing to enhanced product quality developed for at least two aquaculture species	June 2010	N	Not yet due	–
MS 1.5.2	Management systems for improved and more uniform condition of selected aquaculture species at harvest developed for at least two aquaculture species	June 2011	N	Not yet due	-
MS 1.5.3	Genetic strategies for improved product quality developed in at least one target aquaculture species	June 2012	N	Not yet due	-

Research Program 2: Product and Market Development

Output/ Milestone No.	Description	Contracted Date	Achieved (Y/N)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
Output 2.1	Traceability technologies to assure seafood quality and integrity and to deliver value chain efficiencies	June 2011 and ongoing	N	Not yet due	–
MS 2.1.1	Frontier traceability systems applicable to Australian seafood value chains identified and demonstrated in at least two seafood sectors	June 2009 and June 2011	N	Initial lack of committment from investors	Business case is being developed
MS 2.1.2	Technology and capability to support implementation of ongoing traceability systems developed	June 2010	N	Not yet due	–
MS 2.1.3	Commercial roll-out of traceability technologies commenced	June 2011	N	Not yet due	–
Output 2.2	Diagnostic systems to assure seafood quality and integrity	June 2014	N	Not yet due	–
MS 2.2.1	Rapid diagnostic needs assessed; commercially available rapid diagnostic tools evaluated for Australian value chains and technology gaps identified	June 2009	N	No projects planned	Projects expected to be established in 2009 -2010
MS 2.2.2	Novel rapid diagnostic systems developed for at least one seafood microbial hazard to support technical market access of Australian seafood	June 2010, June 2012 and June 2014	N	Not yet due	–

MS 2.2.3	Novel rapid diagnostic systems developed for at least one seafood spoilage process to ensure product quality	June 2010, June 2012 and June 2013	N	Not yet due	_
MS 2.2.4	Diagnostic technologies and capabilities developed for at least one chemical or residue hazard to support technical market access of Australian seafood	June 2009, June 2011 and June 2013	N	Suitable project not developed in reporting period	Project recently funded and expected to deliver
MS 2.2.5	Technology and capability developed to authenticate labelling of seafood to underpin integrity claims	June 2014	N	Not yet due	_
MS 2.2.6	Technology and capability developed to support industry access to timely diagnostic services underpinning quality and integrity claims	June 2014	N	Not yet due	_
Output 2.3	Predictive tools to increase value chain efficiency	June 2014	N	Not yet due	_
MS 2.3.1	Quality index method fpr 50 commercially important Australian species developed	June 2010	N	Not yet due	_
MS 2.3.2	Refridgeration index developed, validated and implemented to enable cost-effective, efficient temperature management in Australian seafood cool chain	June 2011	N	Not yet due	_
MS 2.3.3	Predictive tools developed, trialled and available to industry to better manage foos safety risks associated with microbiological hazards in the Australian seafood cool chain	June 2014	N	Not yet due	_
Output 2.4	Optimised technical market access	June 2014	N	Not yet due	_
MS 2.4.1	Technical market access panel established and intial work plan set	December 2007	Y		
MS 2.4.2	Two completed, internationally reviewed, integrated health benefit and risk assessments available for market access negotiations and for consumer risk advisories	June 2009	Y	No projects planned	Relevant projects expected to be implemented during the 2009-2010 reporting period
MS 2.4.3	Integrated health benefit and risk assessment methodology accepted internationally and available for use with standard-setting, market access negotiations and "clean and green" claims and for differentiating Australian product in premium price markets	June 2010	N	Not yet due	_
MS 2.4.4	Additional completed, internationally reviewed, integrated health benefit and risk assessments available for market access negotiations and for comsumer risk advisories	June 2012 and June 2014	N	Not yet due	_
Output 2.5	Communication of consumer health benefits and risks	June 2010	N	Not yet due	
MS 2.5.1	Key factors influencing consumers' behavioural responses to seafood health benefit and risk communication identified	June 2008	Y		
MS 2.5.2	Draft guidelines for health benefit and risk communication strategies issued for use by industry and government, based on an understanding of consumers' behavioural responses to risk advisories	June 2009	N	Work is underway and should be completed by 2010	Work is in progress

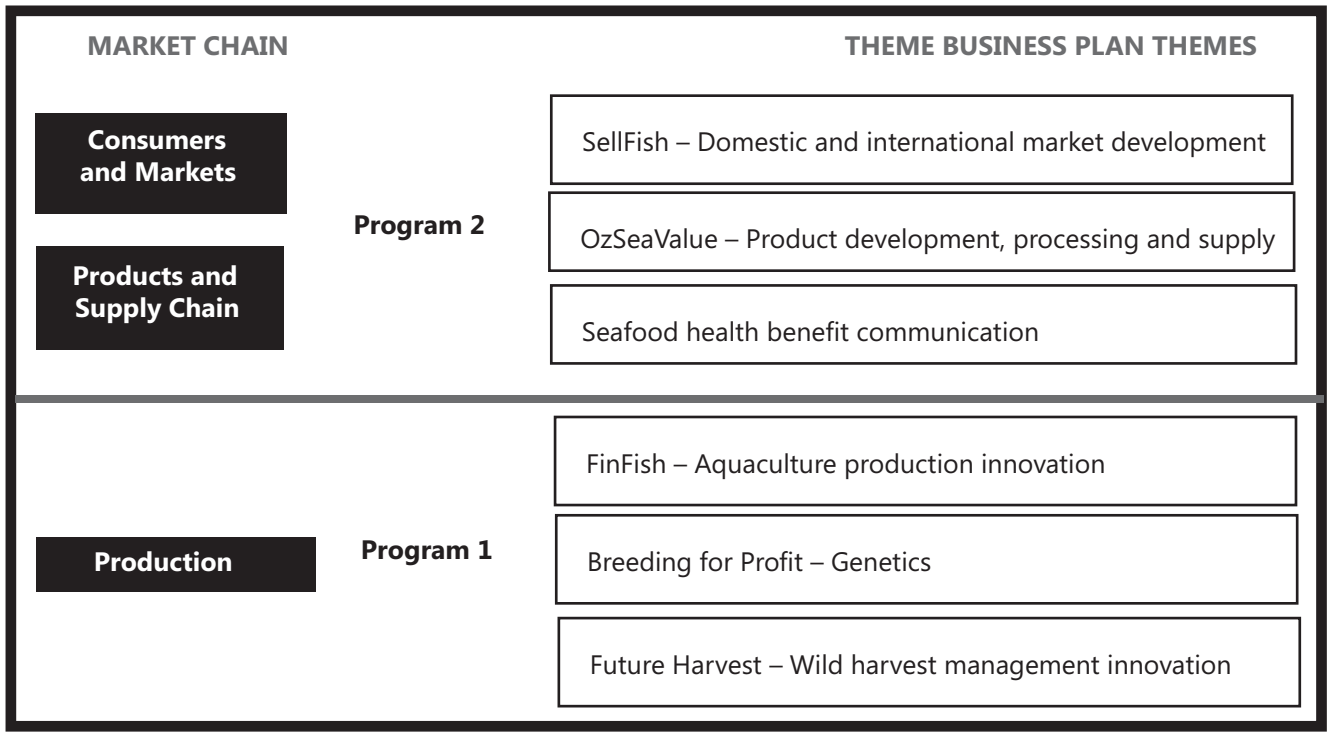
MS 2.5.3	Health benefit and risk communication strategies trialled for four sectors, consumer responses analysed and guidelines refined	June 2010	N	Not yet due	_
Output 2.6	Market access database	June 2009	Y		_
MS 2.6.1	Market access database established and maintenance program agreed	June 2008	Y		
MS 2.6.2	Market access database expanded to cover additional elements relevant to market access and available on secure website	June 2009	Y		
Output 2.7	Removal or reduction of barriers to seafood consumption	June 2010, then ongoing	N	Not yet due	_
MS 2.7.1	Barriers to and drivers of seafood consumption identified in at least two new domestic or overseas consumer groups annually	June 2008 and annually thereafter	N	Lack of research capacity	Program 2 international expert review planned for early 2010 to reconsider milestones
MS 2.7.2	Individually tailored approaches to overcoming barriers trialled and evaluated in at least two new domestic or overseas consumer groups annually	June 2009 and annually thereafter	N	Lack of research capacity or committment from investors	Program 2 international expert review planned for early 2010 to reconsider milestones
Output 2.8	Smart processing technologies and practices	June 2008 and ongoing	N	Lack of research capacity or committment from investors	Program 2 international expert review planned for early 2010 to reconsider milestones
MS 2.8.1	Microbiological, physical and biochemical spoilage mechanisms determined through chain for each of three types of seafood per annum	June 2008 and annually thereafter to June 2014	N	Lack of research capacity or committment from investors	Program 2 international expert review planned for early 2010 to reconsider milestones
MS 2.8.2	Innovative technologies for controlling spoilage to enhance shelf-life and marketability developed and evaluated for each of three types of seafood per annum	June 2009 and annually thereafter to June 2014	N	Projects planned to commence late 2009	Progress underway
MS 2.8.3	Innovative technologies and approaches to recover under-utilised product (by-catch and processing byproducts) trialled and evaluated from at least one sector per annum	June 2009 and annually thereafter to June 2014	Y		
MS 2.8.4	Innovative technologies to enhance the effectiveness of live seafood export practices evaluated in at least one value chain every two years	Every two years; June 2009, June 2011 and June 2013	N	Project in development to commence in late 2009	Progress underway
MS 2.8.5	Innovative technologies and practices to reduce the weight loss of seafood product from harvest to market, developed and trialled in at least one value chain every two years	Every two years; June 2009, June 2011 and June 2013	N	Post Doctoral Research Scientist appointed and projects developed for late 2009	Progress underway
MS 2.8.6	Harvest, post-harvest and processing practices evaluated and enhanced to maximise and protect quality attributes and nutritional properties for at least two seafood products every two years	Every two years; June 2009, June 2011 and June 2013	N	Lack of capacity in this topic	Manager for Seafood Commercial Processing appointed
MS 2.8.7	Culinary practices evaluated and enhanced to maximise and protect quality attributes and nutritional properties for at leat two seafood products every two years	Every two years; June 2009, June 2011 and June 2013	N	No projects planned	Projects expected to be developed for commencement during 2009-2010 period
MS 2.8.8	Technology and capability to support innovation of new seafood products developed	June 2009	Y		

research collaborations

working with others to achieve outcomes for the australian seafood industry

Collaborative Activities in the Seafood CRC

The theme business plans for each program topic allows the Seafood CRC to identify research and development providers as well as industry participant groups to collaborate on projects. This is further enhanced through specialised workshops used to consult industry and get approval of the business plans' concepts and research direction. The following diagram explains the theme business plan concept:



Harvesting a catch of aquaculture prawns (Photo: Gold Coast Marine Aquaculture)

Program 1 (Production Innovation) Collaborative Activities

The stakeholder engagement plan for Program 1 involves:

- An annual workshop for all Seafood CRC participants involved in production innovation. The planning and review forum is used to review progress with production projects, identify priorities for future research and training and facilitate greater collaboration by bringing participants together and exploring potential synergies and allows the Seafood CRC management to provide an update of key overarching issues.

- The initiation of a "Production Innovation Hub" which coordinates aquaculture research under the Seafood CRC, facilitates improved communication and assists in the development of new collaborative projects. The hub brings together industry participants and research providers and fosters a better understanding of the research challenges faced by industry and the capacity and potential for researchers to address these challenges. The hub arranges face-to-face meetings and helps people stay in touch through email, teleconferences, a hub website, text messaging and other forms of communication. In addition, the hub manages two hatchery networks, one for shellfish and one for marine finfish. The aim of the networks is to help hatcheries access and adopt the latest technology and identify key research, training and education priorities.

- The three business plans are circulated annually in hard copy to relevant participants (and are available on the CRC website). Each year, an Annual Operating Plan is prepared to document all approved and proposed projects, updates on the expected and achieved outputs and details the budget. The Annual Operating Plan also details the links between this each theme and all other CRC themes.

• A number of communal projects are planned or underway for the development of national services to support breeding programs such as development and commercialisation of generic data management purchases for breeding programs, national cryopreserved sperm gene banks and provision of cost-effective genetic marker analyses.

• A strategic partnership with Nofima in Norway, the world leaders in development and commercialisation of aquaculture genetic programs. Stakeholders in this theme will participate in an active exchange and training program which will commence in the 2009/2010 reporting period.

Program 2 (Product and Market Development) Collaborative Activities

The stakeholder engagement plan for Program 2 involves:

• All CRC participants having opportunity to benefit from improved trade and market access negotiation infrastructure and support services and have the capacity and capability to ensure rapid response to trade issues through the Seafood Access Forum (SAF)

• All CRC participants having the opportunity to benefit from product and market development iniatives at the Australian Seafood Production Improvement Centre (ASPIC)

• Enabling CRC participants, both end users and research providers to build capacity and capability by providing opportunities to co-invest with other seafood industry sectors (not members of the CRC) and with other food sectors.

• Building collaboration with the Grimsby Institute and the Humber Seafood Institute in the United Kingdom

• An annual workshop for all Seafood CRC participants involved in product and market development. The planning and review forum is used to review progress with projects, identify priorities for future research and training and facilitate greater collaboration by bringing participants together and exploring potential synergies and allows the Seafood CRC management to provide an update of key overarching issues.

• The two business plans are annually circulated in hard copy to relevant participants (and are available on the CRC website). Each year, an Annual Operating Plan is prepared to document all approved and proposed projects, updates on the expected and achieved outputs and details the budget. The Annual Operating Plan also details the links between this each theme and all other CRC themes.

Other Collaborative Linkages within the CRC Across Research Activities

During this reporting period, Seafood Services Australia continues to provide a number of administrative and communication support activities for the CRC as well as developing and taking responsibility for the Seafood Market Access Form and the Seafood CRC Bookshop.

The CRC has engaged a number of consulting groups during the 2007/2008 reporting period but only when the skills and capacity are not available within the CRC's participants. The consultants engaged have included Corvel Management, Vision Rural Services, DosAqua, Barneveld Nutrition, Ridge Partners, CDI Pinnacle, Market Strategy, Food Innovation Partners and Shearwater Consulting. The consultants provide specialist advice, independent reviews and commercial benchmarking.

Other details of specific collaborative acitvites with non-CRC participants that were undertaken in research projects are:

Program 1 (Production Innovation) Project Collaborative Activities with Non-CRC Participants

Project	Collaborative Organisation	Research Collaboration Activity
2008/722 - Scope and economic analysis of options for a nationally unified breeding program that provides significant economic benefit to the Australian abalone industry	The Norwegian Institute of Food, Fisheries and Aquaculture Research (Norway)	The project leader of this project (Dr Nick Robinson) was sub-contracted through SARDI under a service agreement with NOFIMA Marine
2008/723 - Development of a genetic management and improvement strategy for temperate marine finfish	National Institute of Water and Atmospheric Research - NIWA (New Zealand)	Information and biological samples were provided for this project by Seumas Walker of NIWA.
2008/901 - Product quality issues: Maturation and harvest stress	Southern Water Marine Products	Filleting, supply of packaging materials and knowledge on assessing Yellowtail Kingfish flesh quality attributes
2006/220 - Spatial management of Southern Rocklobster fisheries to improve yield, value and sustainability	Rocklobster fishers, Maine (USA)	This project has participated in an exchange with the Maine lobster fishing industry. From September until May 2009, US fishers have been collecting field data from translocated lobsters as well as observing fishing at different locations around Tasmania.
2006/226 - Protecting and enhancing the Sydney Rock Oyster selective breeding program	Queensland Museum (Australia)	Strong links have been established through the provision of QX resistant oysters to programs
2007/707 - Resolving larval rearing, juvenile development and productivity constraints for propagated Southern Bluefin Tuna and improvements to the production of Yellowtail Kingfish and Mulloway	American Tropical Tuna Commission (Panama) Kinki University (Japan) Hellenic Center for Marine Research (Greece) Heinrich-Heine Universität (Germany) SELFDOTT and REPRODOTT (European Research Consortiums) University of Maryland (USA) Stanford University (USA) Northern Territory Primary Industries, Fisheries and Resources (Australia)	A Memorandum of Understanding has been setup with the American Tropical Tuna Commission (IATTC) and a MOU and technical exchange program has been negotiated with Kinki University. A draft MOU is in discussion with the EU tuna research consortiums SELFDOTT and REPRODOTT. Members of IATCC have visited Clean Seas Tuna Hatchery in Arno Bay twice and Clean Seas Tuna staff have visited the IATTC in Panama to discuss propagation. In addition, Researchers from Kinki University have visited Arno Bay several times to provide advice on tuna propagation during January, February, March and April 2009 Clean Seas Tuna staff have also visited the European hatcheries involved in REPRODOTT.
2007/717 - Southern Bluefin Tuna maturation and sexing: Develop and apply new technologies	See project 2007/707	See project 2007/707
2008/733 - Population genetic structure of Sea Cucumber in Northern Australia	Dalian Fisheries University (China)	Information exchange of DNA extraction and microsatellite loci trails. Outcomes were the information about PCR inhibitors that are present in certain sea cucumber tissue types.
2008/903 - Understanding Yellowtail Kingfish	American Tropical Tuna Commission (Panama) Kinki University (Japan) and the Darwin Aquaculture Centre (Australia)	Members of the American Tropical Tuna Commission and Kinki University visited Clean seas Tuna to review the Yellowtail Kingfish broodstock and larval rearing plans. Researchers at the Darwin Aquaculture Centre received yellowtail Kingfish eggs for larval development
2009/726 - Southern Bluefin Tuna larval and juvenile rearing	See project 2007/707	See project 2007/707

Program 2 (Product and Market Development) Project Collaborative Activities with Non-CRC Participants

Project	Collaborative Organisation	Research Collaboration Activity
2004/401 - A market access guide for seafood exporters: International residues standards	New Zealand Food Safety Authority (New Zealand) Consiglio Nazionale delle Ricerche (Italy) South China Sea Fisheries Research Institute (China) Qingdao Qingdao Municipal Science and Technology Bureau (China) Vietnamese Department of Science and Technology (Vietnam) Vietnamese Ministry of Fisheries (Vietnam) Vietnamese Research Institutes for Aquaculture (Vietnam) Department of International Cooperation (Vietnam) Vietnamese Science and Technology for Economic and Technical Sectors (Vietnam) Vietnamese Ministry of Science and Technology (Vietnam) Truong Sa Marine Fisheries Company and 128 Company (Vietnam) The Vietnam National Fisheries Quality Assurance and Veterinary Directorate (Vietnam) Ministry of Agriculture and Regional Development (Vietnam)	(NZFSA) in Wellington, New Zealand to discuss New Zealand's regulatory approach to residues of agricultural and veterinary chemicals with no MRLs in foods of animal origin. The benefit of such a system applying in Australia would mean that trace amounts of agricultural and veterinary chemicals would not create restrictions on export. A meeting was held with visiting research administrators Dr Angelo Visconti at the request of South Australian Premier Mike Rann. The purpose of this meeting was to inform the Italian Government of research activities in the seafood field that are being undertaken in SA for consideration of development of joint international collaborative projects. A visit to Adelaide was conducted by two researchers from the South China Sea Fisheries Research Institute to discuss development of analytical methodologies for assessment of imported tunas for compliance with Chinese food regulatory standards. Qingdao Qingdao Municipal Science and Technology Bureau met with SARDI Food Safety Researchers to seek information on potential collaboration in a number of areas including seafood safety and testing. A Vietnamese delegation met with researchers to seek potential collaboration on seafood research projects. The Vietnamese visit was funded by the Danish Government.
2007/703 - Intervention strategies to maintain the safety and quality in a range of value-added products made with under utilised southern and eastern scalefish and shark fishery species	Centro Universitario, Colonia las Campanas (Mexico)	The Project Leader, Professor Mark Tamplin and Montserrat Hernandez Iturriaga visited the production facilities in Eden, Sydney and Newcastle during March 2008 to see the Market Pride production facilities

Western Rocklobster fisherman (Photo: Western Australian Fishing Industry Council)

commercialisation and utilis

the path to market for australian seafood products

Commercialisation and Utilisation Strategies and Activities

During the first two years of the CRC we have conducted several reviews of technology and industry priorities that have helped define areas for future R&D as identified by CRC participants. These activities have been supported by CRC commercialisation and utilisation funds because they engage end-users at the start of the R&D process, thereby maximising likelihood of adoption of the outcomes.

For example business benchmarking surveys have been conducted with prawn farmers and oyster farmers. R&D implementation plans have been prepared with the Barramundi industry, prawn farmers, prawn fishers, and the Western Australian Fishing Industry Council. These documents and others are listed on the CRC member's area of the website and association websites.

A number of key publications have also been published which include a number of reviews (predictive tools and rapid diagnostics, seafood market issues traceability and freshness, health benefit research, selective breeding programs, international trade negotiations, market developments technical market access) and benchmarking studies for farmed Prawns and Oysters.

Changes enacted as a result of participants taking up CRC results include:

- Alterations to larval rearing facilities by Cleanseas Tuna Ltd to reduce Yellowtail Kingfish juvenile jaw deformities
- Adoption of a new commercial feed for tuna
- Adoption by Cleanseas Tuna Ltd of techniques for induction and detection of spawning in captive Southern Bluefin Tuna
- Changes made by Cleanseas Tuna Ltd to harvesting techniques for Yellowtail Kingfish to improved quality of processed fish.
- Alterations to Southern Rocklobster fishing regulations to include translocation of lobsters from deep to shallow waters.
- Release of new, genetically improved Oyster lines
- Establishment of an internet market access guide on chemical residue standards for seafood exporters.

There have been no patents registered by the Seafood CRC and no spin off companies established. An intellectual property register has been established.

sation

The delicious range of Market Pride seafood convenience products (Photo: Sydney Fish Market)

Commercialisation and Utilisation Projects

The Seafood CRC has funded a number of projects that will ensure participants work collaboratively to implement research and development results from the CRC. These projects are:

CRC Research Project	Program	Project Outcomes	Key Achievements	Relation to CRC Outcomes	Industry Benefit
2005/209 - Industry management and commercialisation plan for the Sydney Rock Oyster Breeding Program (Select Oyster Company)	4	This project will establish the economic values of different SRO traits in order to determine the market sustainability of developing and marketing multiple lines and optimum breeding objectives of different lines. It will evaluate alternative methods for selection for the most desirable traits and will review the breeding program designs and apply the best approach for the development of a new 10 years breeding strategy	This project has developed and optimised four sets of microsatellite primers for Sydney rock oysters, three of which display appropriate levels of variation necessary for the confirmation of genetic diversity. Since producing them, a second genomic library has been produced and the primers will not only permit the assessment of diversity in SRO breeding lines but will present the opportunity for broader populations studies to be undertaken. A business plan has been written that outlines the risk of loss of broodstock and sets out steps to be implemented to avoid such loss.. It also defines the selection goals for the breeding program.	Outcome 1 Output 5.1 Miletone 5.1.1 Milestone 5.1.4 Output 5.4 Milestone 5.4.1 Milestone 5.4.4	Past breeding and hatchery programs funded by the FRDC for Sydney Rock Oyster have demonstrated that faster growing, disease-resistant Oysters can be bred and distributed. This porject contributes to the successful adoption of technology by developing cost-effective strategies and technologies for the maintenance of selected lines and their genetic integrity
2007/715 - Oyster Consortium - Communications, extension and management of research and development results (CRC Oyster Consortium)	4	This project will provide the resources to ensure that the outcomes of the research and development are adopted and commercialised quickly and extensively throughout the Australian oyster industry.	Working groups for Genetics, Benchmarking, Marketing, Education & Training and Animal Health have all been activated with the aim of developing future project concepts. The Oyster Consortium members also met to discuss project progress and the implementation of new project concepts. A workshop was held by Consortium members on the Business Plan project A simple Consortium newsletter style brief has been printed and has begun circulation.	Outcome 1 Output 5.1 Miletone 5.1.1 Milestone 5.1.4 Output 5.4 Milestone 5.4.1 Milestone 5.4.4	Without this level of coordination, communication of research results would be very difficult to achieve the change at the extent and rate necessary to achieve the growth targets for industry. The project also ensures collaboration within projects for the oyster industry are maintained.

2008/715 - Australian abalone industry research and development planning, implementation and extension (Abalone Council of Australia)	4	The aim of this project is to initiate and implement a Product Integrity and Quality Assurance Standards program involving at least 50% of the production of the Australian abalone industry by June 2011. Part of this initiative will involve undertaking market research to identify opportunities to improve product sales to consumers in new and existing markets, to introduce at least two new products/processing technologies to the market by June 2011 and to establish a mechanism by which the ACA can fund its own R&D coordination and communication activities.	Initiative in progress	Outcome 1 Output 5.1 Miletone 5.1.1 Milestone 5.1.4 Output 5.4 Milestone 5.4.1 Milestone 5.4.4	This project will enable the abalone industry to better be able to work collaboratively and improve the quality of products supplied to the market and to maintain market share in major exports.
2008/748 - Research planning, implementation, extension and consultation (Australian Council of Prawn Fisheries)	4	Project 2008/748 will coordinate the planning, implementation, and reporting of R&D projects. It will facilitate the prawn industry participation in Seafood CRC projects and the extension and utilization of the project results, particularly in relation to the development of new products and new markets. It will also establish a mechanism by which the ACPF can fund its own R&D coordination and communication activities.	Initiative in progress	Outcome 1 Output 5.1 Miletone 5.1.1 Milestone 5.1.4 Output 5.4 Milestone 5.4.1 Milestone 5.4.4	This project will fulfill two distinct needs required by the wild catch prawn sector to better co-ordinate their R&D. These are the strategic issues of R&D prioritization, funding and the linkages to (and support for) both industry development plans and Government objectives of industry development and the operational issues of facilitating effective communication and coordination at all levels
2008/741 - Business plan for the Australian Barramundi industry (Australian Barramundi Farmers' Association)	4	The purpose of this project is to develop a business plan that identifies the key strategic research priorities to be achieved.	A number of key areas have been identified pertaining to research priorities for Australian Barramundi farmers. These areas are animal health, quality accreditation and market access, genetics, study tours on benchmarking farm practices, feed performance and water quality and waste treatment research	Outcome 1 Output 5.1 Miletone 5.1.1 Milestone 5.1.4 Output 5.4 Milestone 5.4.1 Milestone 5.4.4	This Business Plan is needed to define the priorities and allocate the financial and human resources available to the Asutralian Barramundi Farmers Association.
2008/764 - Research and development planning, implementation, extemsion and utilisation (Australian Prawn Farmers Association)	4	This project will ensure that the Australian prawn farmers are driving the direction and utilising the outcomes of their R&D investment to achieve targetted growth	Planning for the Passion for Prawns Future Farmers Network Group (FFN) is being arranged. The Prawn Report (newsletter) was distributed in October, November & December 2008 and January, February & May 2009. A presentation of a Prawn Farmers User Guide was delivered at the Australian Prawn Farmers Association Conference	Outcome 1 Output 5.1 Miletone 5.1.1 Milestone 5.1.4 Output 5.4 Milestone 5.4.1 Milestone 5.4.4	Within the Seafood CRC, industry involvement in project planning and review is considered a must, as is maintenance of the relevance of the R&D strategy.

2008/791 - Economic evaluation of the Seafood CRC (University of Adelaide)	4	The purpose of project 2008/791 is to evaluate and report on the economic, environmental and social benefits of the Seafood CRC. It will also assist the Seafood CRC to evaluate the potential benefits from selected individual projects. Lastly, this project will develop the capacity and provide a service to Seafood CRC participants for analysis and evaluation of seafood business opportunities.	Initiative in progress	Outcome 1 Output 5.1 Miletone 5.1.1 Output 5.4 Milestone 5.4.1	It is imperative that the CRC is accountable for its expenditure and is able to measure any benefits derived against the triple bottom line. This involves collection of data at a macro level and estimating the impact of the CRC research on whole industry sectors. The other added beenfit is at a project level, where there is a need to evaluate the impact of projects as they are completed to determine their effectiveness and efficiency and to analyse some project proposals to determine their potential return on investmenst, to assist in the project selection process.
2008/915 - Research and development planning, implementation, extension and utilisation (Australian Barramundi Farmers Association)	4	This project will coordinate the planning, implementation, and reporting of R&D projects conducted by the Seafood CRC to achieve the outcomes specified in the ABFA Strategic Plan. It will also facilitate the Barramundi farming industry participation in Seafood CRC projects and the extension and utilization of the project results, particularly in relation to the development of new products and new markets. Lastly, this project will establish a mechanism by which the ABFA can fund its own R&D coordination and communication activities	Initiative in progress	Outcome 1 Output 5.1 Miletone 5.1.1 Milestone 5.1.4 Output 5.4 Milestone 5.4.1 Milestone 5.4.4	Although many aquaculture ventures across Australia have licences to grow barramundi, the industry comprises only 25 ventures that produce barramundi on sufficient scale to regarded as full time enterprises. These businesses have little or no capacity to coordinate investment in, and manage industry development. There is great difficulty in providing a whole of industry perspective on R&D and hence difficulty in capturing the benefits of scale arising from investment in innovation. Collective action on R&D will help capture the benefits of R&D and will deliver future growth.
2009/729 - Australian edible oyster industry business plan (Oyster Consortium)	4	This project will create a 5 Year Business Plan, encompassing Sydney Rock and Pacific Oysters in all oyster producing states, containing a series of national prioritised strategies and objectives in each of the key R&D areas. It will recommend actions to each of the prioritized strategies within the business plan to provide direction to facilitate industry growth, value and increase farm profitability through the 5 year Business Plan and prioritise actions for industry R & D, policy and advocacy work.	Initiative in progress	Outcome 1 Output 5.1 Miletone 5.1.1 Milestone 5.1.4 Output 5.4 Milestone 5.4.1 Milestone 5.4.4	The overarching objective is to facilitate industry growth, value and increase farm profitability, hence the reason for a Business Plan rather than a strategic plan.The Consortium will achieve profitability and growth goals and will propose models for conducting the future 'business' of the oyster industry, one of which is likely to be a new incorporated national entity.
2009/731 - Develop priority projects for the Australian Council of Prawn Fisheries (Shearwater Consulting)	4	This project aims have at least 3 high priority projects for ACPF and to establish the R&D planning and priority setting capability within the ACPF	Consultation has occurred with 10 of the main players and a R&D forum has been planned for 2010.	Outcome 1 Output 5.1 Miletone 5.1.1 Milestone 5.1.4 Output 5.4 Milestone 5.4.1 Milestone 5.4.4	This project will benefit the end user by identifying high priority R&D project areas.

Commercialisation Activities and Achievements Outputs and Milestones

Output/ Milestone No.	Description	Contracted Date	Achieved (Y/N)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
Output 4.1	Technology transfer leading to successful commercialisation and utilisation of CRC outputs	2013	N	Not yet due	_
MS 4.1.1	Commercial potential of all research projects evaluated; commercialisation and utilisation plans prepared for projects	December 2007 and ongoing	Y	Ongoing	_
MS 4.1.2	Research outputs evaluated by the Commercialisation, Utilisation and Communication Committee and large-scale commercialisation trials initiated for projects meeting commercial selection criteria	June 2010	N	Not yet due	_
MS 4.1.3	Large, commercial-scale trials demonstrating technical and economic viability of selected research outputs completed	June 2012	N	Not yet due	_
MS 4.1.4	Implementation plan to ensure rapid industry adoption completed for the selected research outputs	June 2013	N	Not yet due	_
Output 4.2	Intellectual property protected for the benefit of the Australian seafood industry and research community	September 2007	Y	IP registers for each project have been established	n/a
MS 4.2.1	Intellectual property strategy approved by the CRC Board	September 2007	Y	_	_
MS 4.2.2	A patent attorney contracted to work on behalf of CRC	September 2007	N	Not yet needed	n/a
MS 4.2.3	Intellectual property register established	September 2007	Y	_	_
MS 4.2.4	Intellectual property and status of existing intellectual property reviewed annually	June 2008 and annually thereafter	Y	Internal audits of IP are on-going	Reviews conducted of every project and IP registers updated
Output 4.3	Communication tools developed and delivered	June 2008	Y	_	_
MS 4.3.1	Communication strategy developed; CRC logo and brand launched	June 2008	Y	_	_
MS 4.3.2	CRC conference and trade show conducted	December 2008 and every two years thereafter	Y	-	_
MS 4.3.3	Communication tools, including media products, developed	December 2008 and annually, thereafter	Y	-	_
Output 4.4	Technology transfer leading to successful commercialisation and utilisation of CRC outputs	June 2013	N	Not yet due	_
MS 4.4.1	Commercial potential of all research projects evaluated; commercialisation and utilisation plans prepared for projects	December 2007 and on-going	Y	Ongoing	_
MS 4.4.2	Research outputs evaluated by the Commercialisation, Utilisation and Communication Committee and large-scale commercialisation trials initiated for projects meeting commercial selection criteria	June 2010	N	Not yet due	_

MS 4.4.3	Large, commercial-scale trials demonstrating technical and economic viability of selected research outputs completed	June 2012	N	Not yet due	_
MS 4.4.4	Implementation plan to ensure rapid industry adoption completed for the selected research outputs	June 2013	N	Not yet due	_
Output 4.5	Intellectual property protected for the benefit of the Australian seafood industry and research community	September 2007	Y	No protectable IP developed to date	n/a
MS 4.5.1	Intellectual property strategy approved by the CRC Board	September 2007	Y	_	_
MS 4.5.2	A patent attorney contracted to work on behalf of CRC	September 2007	N	Not yet needed	n/a
MS 4.5.3	Intellectual property register established	September 2007	Y	_	_
MS 4.5.4	Intellectual property strategy and status of existing intellectual property reviewed annually	June 2008 and annually thereafter	Y	Ongoing	Internal IP audits implemented
Output 4.6	Communication tools developed and delivered	June 2008	Y	_	_
MS 4.6.1	Communication strategy developed; CRC logo and brand launched	December 2007, strategy reviewed annually	Y	_	_
MS 4.6.2	CRC conference and trade show conducted	December 2008 and every two years thereafter	Y	-	_
MS 4.6.3	Communication tools, including media products developed	December 2008 and annually thereafter	Y	_	_

Intellectual Property Management

Soon after the Seafood CRC Company Ltd was incorporated, the Board approved changes to the intellectual protection policy, so that all new intellectual property generated during Seafood CRC funded projects is owned by the Seafood CRC Company Ltd. Participants have a non-exclusive, royalty-free rights to use the intellectual property for research and commercial purposes. Valuable intellectual property can be further protected by commercialisation agreements on a project by project basis. These agreements are used where there are proposals for exclusive licences, performance targets, royalties etc.

To date there have been no patents lodged by the Seafood CRC and no companies formed to commercialise R&D results.

Communication Strategy

Communication is a major component of a successful centre. One of the aims of the Australian Seafood CRC is to ensure that the results of research are made available to potential users and converted to outcomes for industry to support or drive commercial and economic growth. Without effective communication, our CRC participants may not receive vital information, which will ultimately affect awareness and adoption.

A communication plan for 2009-2010 has been developed and will establish effective two-way communication, to establish useful and relevant channels for flow of information, to build a meaningful rapport between participants with CRC staff and ensure ongoing commitment and support by all participants. The plan provided strategies which fostered improved collaboration, delivered knowledge and built and maintained company activities.

Some of the new activities conducted from the 2007-2009 communications plan have been the establishment of a yearly CRC Participant's Planning and Reporting Forum and the development of a Seafood CRC on-line bookshop.

The plan also provided a clear framework for communication activities by guiding decision making, ensuring effective resource use and encouraging the participation of participants and staff. Lastly, the plan provided the framework to deliver and aid the adoption of key messages and results of the Seafood CRC.

For the first year of the CRC's operation, it was identified that establishing effective communications with stakeholders, particularly its participants was the number one priority. This continues to be the number one priority for this CRC as the CRC brings together the interests of a range of stakeholder groups both externally and internally. These include staff, contractors, consultants, government, industry, research providers, industry participants and media. To ensure the differing nature and requirements of each group are achieved, four key target audiences were identified. These groups, in order of importance for 2009-2010 are:

1) Industry and Research Provider Participants -The CRC provided regular and ongoing updates about the Seafood CRC and its actvities to increase the profile and create recognition. This acted as a catalyst for regular information exchange and progress updates with the aim of developing strong internal rapport and relationships.

2) Other Stakeholders - Other stakeholders in the CRC covers many sectors including the producers, processors, transporters, marketers, associations, lobby groups, trainers and educators, DIISR, Federal Minister for DIISR and other relevant politicians and potential R&D providers. The plan creates external awareness of the Seafood CRC and its activities. Information was customised for specific sectors/stakeholders to increase the understanding of CRC research and outcomes while simultaneously increasing and gathering support. This ultimately will achieve successful adoption of research and findings and potential collaborative research and technology transfer arrangements.

3) CRC Staff, Contractors and Consultants - The 2007-2008 communications plan identified the need to keep all staff, contractors and consultants aware of activities happening in the CRC and to inform them of project and program progress. It was also important to recognise this target audience's significant achievements that led to the Centre's success.

4) Media - The plan also aimed to create and increase awareness of the CRC and aid in the delivery of key messages to the general public. Communication with the media will increase targeted understanding of the research benefits to the CRC Participants in the Australian seafood industry.

5) Community - The plan aimed to create and increase awareness of the CRC. Communication with the community about the benefit of Seafood CRC research will come from related extension and media activities.

Specific communication activities that the Australian Seafood CRC has also maintained includes a quarterly magazine called Seafood Stories, a public website, an intra-net for CRC participants, a NING website for students and post doctoral research scientists and a number of plain English research fact sheets summarising research results.

End-User Involvement and CRC Impact on End-Users

There are nine end user companies involved in the Seafood CRC in their own right. Also there are ten industry associations each with numerous member companies that are active participants and provide funds through their association. Each of these nineteen industry participants are directly engaged in the design and delivery of our R&D programs. Each industry sector also has its own R&D plan in which collaborative Seafood CRC projects are described. Many industry sectors have their own R&D committees that are attended by CRC program managers. These meetings ensure that CRC projects are directed linked to end users. Additionally, there are regular CRC planning and reporting forums involving all industry and research participants of the CRC to design projects, facilitate collaboration, review progress and plan delivery of project outputs. All this information is distilled into CRC Research Theme Business Plans which are updated twice per year and are used to guide investment in projects that meet the CRC milestones.

End User Benefits of CRC Research

End-User Name	Relationship with CRC	Activity and End-User Location	Nature/Scale of Benefits to End-User	Actual or Expected Benefit to End-User ($ terms)
Australian Abalone Growers Association Oyster Consortium Australian Barramundi Farmers Association	Industry Participant	Development of breeding plans, software and molecular tools to assist a national breeding program	Genetic improvement of stocks	Reduced cost of production through improved feed conversion, growth rate and fertility
Abalone Council of Australia	Industry Participant	Implement national quality assurance program	Products more suited to customer needs	Maintain markets in the face of competition
Abalone Council of Australia	Industry Participant	Market research in Asia	New market niche established in China for wild harvested Australian Abalone	Maintain markets in the face of competition
Australian Barramundi Farmers Association	Industry Participant	Domestic market research	Repositioning of Barramundi as an Australian icon product	Improved prices
Simplot Australia, Sydney Fish Market, Australian Prawn Farmers Association, Australian Council of Prawn Fisheries, Australian Barramundi Farmers Association, Western Australian Fishing Industry Council and Clean Seas Tuna Ltd	Industry Participants	Innovative chilled seafood product development	New product ranges suited to consumer preferences available in the domestic retail market	Improved returns along the value chain and protection of margins against imports. Increased seafood consumption in the community.
Clean Seas Tuna Ltd	Industry Participant	Commercialisation (South Australia)	Propagation of Yellowtail Kingfish and Southern Bluefin Tuna	Sustainable production of Southern Bluefin Tuna and Yellowtail Kingfish
Southern RockLobster Ltd	Industry Participant	Redesign of fishery management system	Introduce lobster translocation regulatory arrangements	$500 million over 15 years
Marine Scale Sardine Industry Association	Industry Participant	Pilot Trial (South Australia)	Evaluation of flow ice machine for preservation of Sardines for human consumption	Sales of Sardines for human consumption doubled from 100 tonnes to 200 tonnes per year
Tasmanian Salmonid Growers' Association	Industry Participant	Pilot Trial (Tasmania)	Sea-trial of vaccine to prevent amoebic gill disease	Potential saving to industry of $17 million per annum
All Participants	Industry and Research Provider Participants	International trade and market access research	Provision of research papers and technical data to support international trade negotiations at government and individual enterprise level	Ultimately, reduced tariffs and quota restrictions for exports to Asia and the EU. Enhanced capacity of companies to meet technical specifications for exports
Australian Prawn Farmers Association	Industry Participant	New "floc" system of environmentally friendly feeding farmed Prawns	Natural, algal sources of nutrients produced in ponds on farm as a feed source	Reduced cost of production. Reduced nutrient content of pond water discharges

The consumer enjoys freshly shucked aquacultured oysters in Tasmania

education and training

investing in the people of the australian seafood industry

Progress of Higher Education Theme

The CRC now has a total of 20 PhD projects that have been approved. Of the 20 PhD projects, 18 scholarships have been filled by candidates. The rest are currently undergoing an advertising process to appoint students ready to begin in the 2010 academic year. PhD students can become part of the Seafood CRC Higher Education program by one of two methods of entry - by a full CRC scholarship or become "top-ups" via students obtaining an Australian Postgraduate Award and the Seafood CRC "tops up" the stipend to the Australian Postgraduate Award Industry Award rate, adds an operational budget and funds towards supporting the student's relationship with their mentor. During this reporting year, the CRC ceased all CRC full scholarships and will now only offer "top ups".

The Higher Education theme also has provisions for a substantial Masters and Honours program but to date, uptake has been slower than anticipated with 3 Honours students for 2008-2009.

The fifth round for PhD, Masters and Honours projects were called during June 2009, with a due date for submissions during August 2009 for specific projects to fit within gaps currently in CRC themes (Finfish, Breeding for profit, Future Harvest, Sell Fish and Oz Sea Chain). The CRC is anticipating a further 7 PhD applications, 5 Masters by Research and a further 3 Honours applications based on communication with participants. It is expected that Round 5 projects will be approved and students appointed in time to start at the beginning of the 2010 academic year.

As students are appointed, they each receive an individually prepared CRC student pack which outlines about the CRC research area they fit in to, programs they can attend and ways the CRC will support their personal development throughout their candidature.,

Both full PhD scholarships, top up PhD students, Masters students and Post Doctoral Research Scientists participate in the Higher Education personal development activities. These are:

Seafood CRC professional Diploma (Entrepreneurship) Perth participants (Photo: Don Nicholls)

Industry Mentor Program (now call "SIPP" - Seafood Industry Partners' Program)

The SIPP program will ensure our graduates and young scientists obtain essential and pertinent knowledge about the seafood industry and specific seafood sectors. It will also ensure students and Post Doctoral Research Scientists are able to communicate with industry about R&D enabling industry to realise the benefits. They will also gain confidence and communication skills promoting industry ready graduates and ensure the retention of graduated students remaining in the Australian seafood industry. Additionally, industry mentors, or project partners, will have the opportunity to gain new skills.

Each PhD, Masters, CRC Post Doctoral Research Scientist and 10 identified early career scientists must have at least one industry project partner. Funding is available within the student scholarship or Post Doctoral Research Scientist operating costs ($1,000 per year each) as well as the actual SIPP project to facilitate the relationship. The first SIPP retreat will occur on the 27th - 28th October 2009 and will involve a number of personal development activities such as presentation training, how to be the best coach/mentor, a workshop run by postdoctoral researchers on "Top tips for a successful PhD" (which forms part of the Young Scientist Workshop Series), student presentations at the CRC forum and a field trip to a seafood processor and product manufacturer including a filleting display!

Other formal mentoring activities include the student or young scientists to spend up to one working week during their candidature working from the industry mentor's business to facilitate communications, information sharing and learning. Industry project partners will expand their knowledge by visiting their student or Post Doctoral Research Scientist in their labs and work in the lab or out in the field, sampling and recording and being an assistant. A networking facility has also been established on NING to encourage interaction.

Seafood CRC PhD, Masters and Honours Students

Name	University of Enrolment	Thesis Title	Project No.	Supervisors	Industry Project Partner
PhD Full Scholarship					
Judith Fernandez	University of Tasmania	Protecting the safety and quality of Australian Oysters using predictive models integrated with "intelligent" cold chain technologies	2008/700	Mark Tamplin (UTAS) and Tom Ross (UTAS)	Scott Parkinson (Shellfish Culture Ltd)
Miriam Fluckiger	University of Tasmania	Understanding quality in abalone	2008/701	Malcolm Brown (CSIRO) and Louise Ward (UTAS)	New project partner being appointed
Andrew Foote	Flinders University	Understanding penaeid prawn sex determination and developing monosex induction strategies for commercial application	2008/713	Graham Mair (Flinders/Seafood CRC) and Melony Sellars (CSIRO)	New project partner being appointed
Lily Chan	Flinders University	Development of a healthy high Australian seafood diet that will be acceptable to women of child bearing age: The Australian seafood diet for intergenerational health	2008/731	Lynne Cobiac (Flinders University)	New project partner being appointed
Jenna Bowyer	Flinders University	Nutritional factors influencing the performance of Yellowtail Kingfish cultured at low temperatures	2008/736	David Stone (SARDI) and Jian Qin (Flinders)	Chester Wilkes (Clean Seas Tuna Ltd)
Rachel Tonkin	Curtin University	An investigation of the microbiology and biotechnical properties leading to the extended shelf-life in Goldband Snapper	2008/737	Hannah Williams and Thomas Riley (Curtin University) and Steven Munyard (PathWest)	Richard Stevens (WA Fishing Industry Council)
Not yet appointed	Flinders University	Characterisation of selected fish processing co-products and development of novel integrated bioprocesses for value-added food and non-food products	2008/738	Wei Zhang (Flinders) and Chris Franco (Flinders)	Franca Curulli (Simplot Australia)
Vingh Dang	Flinders University	Antiviral activity and resistance to Abalone virus ganglioneuritis	2008/739	Kirsten Beckendorff and Peter Speck (Flinders)	New project partner being appointed
Vipul Pare	University of South Australia	Understanding and forecasting seafood suppliers and buyers behaviour trading at Sydney Fish Market	2008/740	John Dawes, Carl Driesener and Herve Remaud (University of South Australia)	Gus Dannoun (Sydney Fish Market)
Felicity Brake	University of Tasmania	Human enteric viruses in Australian bivalve molluscan shellfish	2008/741	Mark Tamplin (University of Tasmania) and Dr Cath McLeod (SARDI)	New project partner being appointed
Not yet appointed	Flinders University	Processing Sea Cucumber viscera for bioactive compunds	2008/742	Chris Franco and Wei Zhang (Flinders University)	Grant Leeworthy (Tasmanian Seafoods)
Victoria Valdenegro Vega	University of Tasmania	Using the mucosal antibody response to recombinant *Neoparamoeba perurans* attachment proteins to design an experimental vaccine for amoebic gill disease	2008/749	Barbara Nowak and Phil Crosbie (University of Tasmania) and Mathew Cook (CSIRO)	David Mitchell (Huon Aquaculture Company)
Tom Madigan	University of South Australia	Quality, shelf-life abd value adding of Australian Oysters	2008/763	Miguel de Barros Lopes (University of South Australia) and Andreas Kiermeier (SARDI)	Judd Evans (Kiwi's Oysters)
Zhenhua Ma	Flinders University	Improvement of Yellowtail Kingfish production efficiency through food and feeding management	2009/700	Jian Qin (Flinders University), Stewart Fielder (NSwWDPI) and Wayne Hutchinson (SARDI)	Morten Deichmann (Clean Seas Tuna)
PhD Top Up Scholarships					
Steven Cambridge	University of Tasmania	Methodologies for implementation of micro-mobile systems in the cold chain	2008/734	Paul Turner and Tom Ross (UTAS)	New project partner being appointed
Chris Chapman	University of Tasmania	Proactive control of oyster spat production by controlling microbiological contamination	2008/761	Mark Tamplin and John Bowman (UTAS)	Michael Bermudas (Shellfish Culture)

Kelli Anderson	University of the Sunshine Coast	The effect of temperature on reproductive development of maiden and repeat spawning farmed Atlantic Salmon: Understanding the molecular basis for improved egg quality and survival	2008/762	Abigail Elizur (University of the Sunshine Coast) and Ned Pankhurst (Griffith University)	Harry King (SALTAS Enterprises)
Erin Bubner	Flinders University	Determination and manipulation of reproductive status of the captive reared Southern Bluefin Tuna	2008/780	Philip Thomas (Flinders University and University of New England) and Abigail Elizur (University of the Sunshine Coast)	Craig Foster (Clean Seas Tuna)
Lindsey Woolley	Flinders University	Body buoyancy and distribution of fish larvae: exploring the mechanism of mass mortality in post-larvae	2009/733	Jian Qin (Flinders University) Wayne Hutchinson and Bennan Chen (SARDI)	Alex Czypionka (Clean Seas Tuna)
Mark Oliver	University of the Sunshine Coast	Paving the way for sustainable aquaculture development in Queensland's marine environment through effective policy based decision making processes	2009/725	Wayne Knibb and Johanna Rosie (University of the Sunshine Coast) and Kerrod Beattie Department of Primary Industries, Queensland)	Trevor Anderson (SeaFarm Prawns)
Masters by Research Scholarships - No projects or students to date					
Honours Scholarships					
Ying Ying Lee	University of the Sunshine Coast	Understanding the role of Kiss/Kiss1r system in controlling puberty in Yellowtail Kingfish and Southern Bluefin Tuna	2008/785	Abigail Elizur (University of the Sunshine Coast)	Mike Thomson (Clean Seas Tuna)
Matthew Osborne	Flinders University	Evaluation of a saline water cladoceran as new live food for fish larvae	2008/786	Jian Qin (Flinders University) and Wayne Hutchinson (SARDI)	Mike Thomson (Clean Seas Tuna)
Kerri Choo	Curtin University	Novel products from Blue Swimmer Crabs	2008/787	Hannah Williams (Curtin University) and Peter Jecks (Abacus Fisheries)	Richard Stevens (Western Australian Fishing Industry Council)

Post Doctoral Research Scientist Positions

Name	Participant	Project	Project No.	Co-Investigators	Industry Project Partner
Alex Safari	Finders University and the South Australian R&D Institute	Quantitative Genetics	2008/705	Graham Mair (Flinders University and Seafood CRC) and Xiaoxu Liu (SA R&D Institute)	New project partner being appointed
Mohan Raj	South Australian R&D Institute	Seafood Processing	2008/708	John Carragher (SA R&D Institute), Steve Slattery (Qld DPI) and Allan Bremner (Seafood Services Australia)	Mark Boulter (Sydney Fish Market)
Bennan Chen	South Australian R&D Institute and Finders University	Larval and early juvenile marine finfish rearing	2008/709	Wayne Hutchinson and Steven Clarke (SA R&D Institute) and Jian Qin (Flinders University)	Morten Deichman, (Clean Seas Tuna)
Nick Danenberg	University of South Australia and Flinders University	Bechmarking consumer physical and mental availability for seafood products and brands in different buying situations	2008/710	Byron Sharp, Rachel Kennedy and Hervé Remaud (University of South Australia)	Ian Nightingale (PIRSA Aquaculture(
Craig Hayward	South Australian R&D Institute	Aquatic animal health	2008/725	Steven Clarke (SA R&D Institute)	Craig Foster, (Clean Seas Tuna)
Cath McLeod	South Australian R&D Institute	Shellfish Safety	2008/729	Andreas Kiermeier (SA R&D Institute)	Pauline Mooney (SA R&D Institute)
Not appointed	University of South Australia	Seafood Processing Engineer	2008/744	John Fielke (University of South Australia)	Not yet appointed
Shane Powell	University of Tasmania	Seafood Molecular	2008/768	Mark Tamplin	Not yet appointed

Research Travel Grants

A formal system has been established to support CRC R&D providers and students to attend educational and personal development opportunities . The aim of this scheme is to enhance R&D providers to seek solutions and options for industry to improve production and reduce costs. The travel grants are not for the sole purpose of subsidising conferences etc (this is to come from project budgets) but rather for exchanges and academic travel in association with projects.

During this reporting period, the CRC funded a number of travel grants. These were:

Name	Participant	Activity	Objectives	Benefit to the CRC and/or Industry
Cath McCleod	SARDI	Development of international scientific partnerships and insights into technical market access for shellfish	• Deliver two presentations at the International Conference on Molluscan Shellfish Safety on the Seafood CRC project on human enteric viruses in shellfish and international guidance on the regulation of putativemarine biotoxins and present a bid for the 9th International Conference on Molluscan Shellfish Safety to be held in Australia in 2013 • Meet with the European Commission staff in Brussels to discuss technical barriers to trade including future market access for Australian abalone to the European Union; and potential new marine biotoxin requirements for bivalve molluscs. • Meet with bacteriological and virological representatives of the European Commission Community and National Reference Laboratories to discuss future regulatory and laboratory requirements for seafood. • Meet with oyster industry representatives and testing laboratories in Archachon and Sete to discuss current and past food safety issues and risk management approaches.	Specific outcomes from this travel that directly benefit the Australian shellfish industries include ascertaining the future direction of European shellfish food safety regulation, assisting in minimising technical barriers to trade and allowing ease of export of shellfish to Europe. This grant also identified potential export opportunities for Australian oyster producing companies and novel methods of marketing live oysters. Lastly, it raised the international profile of the Australian shellfish sector through disseminating current Seafood CRC research at an international conference; and securing Australia as the venue for the 9th International Conference on Molluscan Shellfish Safety as well as identifying potential new areas of international scientific synergy and collaboration between Australia, France and the UK.
Barbara Nowak	University of Tasmania	Research exchange to the University of Edinburgh and University of Stirling	• To investigate gene expression in early amoebic gill disease (AGD), including gene expression in different cell types to investigate AGD pathogenesis using metabonomics and assess further applications of metabonomics to fish health research. • To compare Neoparamoeba perurans strains in Scotland and Tasmania by obtaining N. perurans from Scotland to further study distribution and strain differences for this pathogen. • To develop collaboration with Dr Steve Feist and other CEFAS staff through joint research and investigating potential development of a research proposal to investigate host-parasite interactions in fish. • To develop collaboration with Intervet Schering Plough and University College Hospital Medical School in London in particular access to novel immunostimulants . • To develop collaboration with Dr Ted Hupp, University of Edinburgh.	Use of laser dissection microscopy facilities at CEFAS has enabled the dissection of microscopical lesions from salmon gills to study gene expression in AGD affected fish at an earlier stage of infection than it was previously possible. This means that CRC researchers can now understand the initial stages of the infection. So far researchers have mostly information about host response in the later stage of the disease. The understanding of host response in the early stages of the disease should offer better potential to control the infection. Also the Metabonomics learning component from this exchange will enable the determination of the potential applications of the metabolic profiling for parasitic disease investigation in fish.

Name	Participant	Activity	Objectives	Benefit to the CRC and/or Industry
Stephen Battaglene and Jenny Cobcroft	University of Tasmania	Increase understanding of malformations in hatchery produced marine fish by visiting the University of Patras and Mediterranean marine fish hatcheries in conjunction with attendance of Larvi 2009 and LARVANET workshop.	• Visit the aquaculture research laboratories of the University of Patras, Greece and collaborate research and commercial marine fish hatcheries in Greece. • Develop the existing relationship and to build research linkages between Australia, Greece and the broader European hatchery research community. • Attend Larvi 2009, the premier international larviculture symposium, and a LARVANET workshop demonstrate methods for assessment of fish samples for skeletal malformations, including rapid clearing & staining for larvae, reference guides for identification of different malformations and soft tissue x-ray for juveniles.	In addition to the expert appraisal of our scientific approach to understanding malformations in kingfish, this visit provides the opportunity for international peers to suggest 'most likely' factors that can be incorporated in ongoing Seafood CRC research on kingfish larval culture to increase survival and improve quality. Any relevant methods observed in the hatcheries could be applied at a research or commercial scale at CRC Participant hatcheries to assess the effects on larval survival and quality. We will also discuss opportunities for more formal collaborative research between Greece and Australia, with a view to making the most of the significant research investment developed in Europe by being trained in their methods and applying their results and expertise in Australia.
David Padula	SARDI	Visit to the People's Republic of China, the Australian embassy in Beijing and the Australian Consulate-General in Hong Kong.	• Laboratory familiarisation study tour of testing facilities at Chinese Government port of entry testing stations. • Identification of mainland Chinese and Hong Kong nutritional labelling and content claims standards. • Updating of trade and market access requirements for the Chinese and Hong Kong markets for new CRC projects. • Assist in collection of technical information to support national technical expert panel for new Seafood CRC projects. • Extension of collaboration with Yellow Sea Fisheries Research Institute and identification of potential international collaborators to support Seafood CRC projects. • Support to veterinary medicine and agricultural chemical registration activities in CRC projects.	New knowledge on potential changes to international regulatory standards for dioxins and PCBs in aquatic animal products will be acquired which will assist with the development of trade and market access skills. International trade negotiations will also be enhanced through building quality networks with various levels of the Chinese authorities including standards setting agencies, import control authorities and imported foods inspection laboratories.

Visiting Research Scientist Scheme

This scheme supports visiting specialists to assist the Seafood CRC participants with their problems and identifying potential solutions. The scheme also enhances collaboration with international institutions and exchange information between industry and research and development providers. During this reporting period, the Seafood CRC supported three visiting scientists.

Name	Organisation	Activity	Objectives	Benefit to the CRC and/or Industry
Doug Tocher	University of Stirling	Visit to Clean Seas Tuna, Lincoln marine Scinence Centre, Flinders University and the University of Adelaide with a presentation at the CRC lipid nutrition seminar	• To facilitate the development of a network of international research collaborations involving the Institute of Aquaculture at the University of Stirling (Scotland), Clean Seas Tuna, Flinders University, SARDI Aquatic Sciences, Adelaide University and Ridley's Aquafeed.	Dr Douglas Tocher is a world-renowned expert in both the practical aspects and the molecular biology of lipid nutrition in fish. His visit represents an excellent opportunity to visit CRC researchers and industry personnel to discuss possible international collaborative projects in finfish lipid nutrition.

Name	Organisation	Activity	Objectives	Benefit to the CRC and/or Industry
Clemens von Schacky auf Schofield	Ludwig-Maximil-ians-Universität (LMU) Munich	Presentation at the CRC and University of South Australia seafood health seminars in Adelaide, Perth and Sydney	• To facilitate the development of a network of international research collaborations involving the health benefits of seafood	Professor Schacky is a specialist relating to issues of heart diseases and has been working on a blood test, called the Omega-3 Index. Demonstrating the health benefits of seafood has a direct impact on the CRC's retail transformation projects.
David Hughes	Imperial College of London, Kent Busi-ness School and the Royal Agricultural College, UK	Presentation at the Seafood CRC and SARDI "Seafood Marketing Workshop"	• To create more diligence in the increasing need to focus on the demands of the consumer, rather than producing generic, undifferentiated products.	Professor Hughes is a renowned international marketing speaker with a focus on global food industry issues, particularly consumer trends. End user benefit is the building of vertical alliances between key chain members in the food industry - farmers, life science and input compa-nies, ingredient firms, food and beverage manufacturers, retailers and food service.
Clive Talbot	Specialist consultant	Visit to Clean Seas Tuna	• Review Yellowtail Kingfis farming activities with particular focus on feed management issues including identification of opportunities and constraints related to infrastructure, operating environment and human resources with recommendations for improvement, and an evalu-ation of diets currently used. • Recommendations for diet development research, including input into and review of a CRC project. • Analysis of historical growth and performance production data of Yellowtail Kingfish and production of a growth model incorporating size, temperature and seasonal effects and recommendations for implemen-tation of regular and periodic data gathering including template data formats. • An appraisal of facilities available for diet development work and rec-ommendations for potential funding models for a research farm. • Presentation to key staff of generic best feed management practices using some examples from Yellowtail culture in Japan and Europe. • Conduct a workshop at the Darwin Aquaculture Centre (DAC) with Bar-ramundi farmer members	Dr Talbot has a rare overview of the best practices employed by some of the world's leading aquaculture companies in overcoming these shortfalls which include improvements in feed management practices, diet improvements and growth and feed conversion ef-ficiencies resulting in improved production effiencies

Progress of the Industry Training Theme

Training Needs Analysis of CRC Industry Participants

A skills based CRC industry training needs analysis was conducted and successfully identified the priority and crucial training needs. The project also mapped needs against existing courses and workshops offered by training institutions within the CRC. The Seafood CRC will use the results of this research to customise training in the identified critical and high priority areas. Other benefits can include facilitation of the formation of regional 'training incubators' or 'benchmarking groups' for greater collaboration in training and other development initiatives.

Seafood CRC Industry Bursaries

The aim of the Seafood CRC industry bursaries is to develop the capabilities of our industry participants and strengthening the capacity for Seafood CRC industry to commercialise and utilise research outcomes. Ultimately the program will assist collaboration and knowledge across the Seafood CRC , support industry access to and understanding of international research and development and enhance knowledge transfer and communication relating to learnings from attending a variety of seafood related activities. The bursaries approved during this reporting period include:

Name	Organisation	Activity	Objectives	Benefit to the CRC and/or Industry
Morten Deichmann	Clean Seas Tuna	2008/783Study tour to NIWA, New Zealand	• Implementation commercially ready techniques, e.g. early weaning, used at NIWA directly into CST larval rearing operating procedures from 2009, potentially leading to direct improvements in larval survival and quality: • Testing of new concepts and ideas; e.g. artificial light regimes, currently being developed at NIWA • Immediate adoption of commercially feasible broodstock development methodologies and tools within CST operations, leading to improved egg quality, improved broodstock traceability or reduced levels of inbreeding. • Identification of some areas for potential future collaboration either in terms of broodstock research or cost effective implementation of genetic improvement with large family numbers but with benefits shared (initially) industry wide.	The visit to NIWA will assist development of the hatchery manager's apacity to interface with research providers, to facilitate the change process and encourage knowledge transfer in areas on mutual benefit to CST and NIWA.
Tom Spykers	Shellfish Culture	National Shellfish Assoc Conference, Visit to Whiskey Creek Hatchery, Hatfield Marine Science Centre and Aqua Technics	• Attend the National Shellfisheries Association Conference and participate in the session specifically on the threat of human and shellfish vibrios. • Visit to US oyster hatcheries and farms to discuss preventative and control methods • Visit two research centres to learn about the latest technologies and methods to combat the disease	In Australia, hatcheries are also prone to outbreaks of vibriosis and at times this has limited the supply of seed to industry with significant flow on impacts. It is important for the oyster industry to learn how the US oyster industry is managing this disease to ensure preventative measures are in place to minimise the impact on the Australian industry.
Brett Hogan	Focus Fisheries	Travel to Spain and Portugal visiting major regional areas in order to conduct a review of traditional prawn usage by species	• Generate a map of prawn consumption by species/type of regional Spain in order to focus offers of suitable prawns from Australia • Obtain a greater level of understanding of prawn consumption habits in Spain and Portugal.	Focus Fisheries is one of Australia's largest exporters of prawns to Europe and hence, this bursary will benefit the company by gaining a greater awareness of Spanish/Portugese regional markets that they arecurrently not exporting to leading to increased sales volumes and the introduction of different species.
Nathan Maxwell-McGinn	Craig Mostyn Group	Travel to Korea to develop a new market for live deep Sea King Crab (Pseudocarinus gigas) and Southern Rock Lobster (*Jasus Edwardsii*) caught in Western Australia, South Australia and Tasmania	• Identify the major importers of Live Seafood in Seoul • Conduct one on one meetings o explore the potential for both Live King Crab and Live Southern Rock Lobster, • Visit relevant facilities and holding tanks. • Visit the Noryangjin Seafood Market in Noryangjin-dong to gain greater understanding of market potential and current consumer trends.	Currently the major market for both Live King Crab and Southern Rock lobster is China. For Live King Crab in particular the focus is even narrower with the major market being Beijing. The supply pressure of only one volume market causes large shifts in demand and the ability for Beijing importers to dictate pricing levels. By developing a new market for both products, the company can achieve higher prices for the industry and have greater control of fluctuations in demand. Exporting to multiple markets gives the industry greater protection against risk.

Greg Carton	Broadway Oysters	Establish a business that co-ordinates the marketing efforts and resources of oyster producers within the Bega Valley Shire, NSW	• Form a working group of Bega Valley participants and develop a website • Develop a business model for a series of new products with a food technologist • Incorporate the new entity • Initiate a pilot trial of the new products	This bursary will develop a Bega Valley marketing and distribution group as well as identifying and activating new markets for existing and new products.

The NOFIMA training and exchange program

An education and training exchange program with NOFIMA, a world leading aquaculture research institute has been set up to provide access to Norwegian expertise and exposure to international best practice in the implementation of breeding programs for our Australian researchers and industry representatives that are engaged with genetic improvement of our cultured stocks. The benefit to this program is that it will give industry members a broader understanding of the long term requirements, benefits and knowledge of applying selective breeding and will actively engage them with the implementation of breeding programs whilst upgrading their skills and their understanding of the technical aspects of breeding program implementation. Researchers will gain access to the latest approaches and technologies in selective breeding including the integration of next generation genetic marker and genomics technologies into the activities of core breeding programs.

This project will also support the placement of key researchers and industry representative with Norwegian research institutions and breeding companies to gain direct exposure to expertise and technology and to learn about the business of selective breeding and the commercial implementation of genetic programs.

Future Leader Projects

National Seafood Industry Leadership Program

The CRC is all about capacity building within the CRC participants and the FRDC Seafood Leadership Program enables the opportunity to invest in people who are keen to show their leadership potential. Investing in Leadership, and the associated networks and cross stakeholder understanding is seen as vitally important for all sectors to be able to contribute to debate, drive change and address challenges in order to enable the Seafood CRC and the industry to reach its potential. Three CRC participants - Nick Danenberg (University of South Australia), Annie Conn (Australian Prawn Farmers Association) and Joey McKibben (Australian Abalone Growers Association) were supported to participate in the 2009 program.

Helping emerging leaders to develop networks and make more effective use of scientific and community resources, knowledge and skills

This project focuses on the networking opportunities for future wild catch abalone leaders that will enhance their ability to deal with issues that the industry constantly faces and to be confident when new and emerging issues arise. As such, this project has engaged as many of the current and future industry leaders, from across a broad section of the industry to provide them with opportunities to mix with other industry members from the seafood sector.

Master Classes

Trends in Seafood Packaging

Recent innovations in modified atmosphere packaging, vacuum packaging and vacuum cooking have opened up new opportunities in seafood packaging for both processors and retailers and hence, the opportunity arose for the Seafood CRC and the South Australian Food Centre to run a series of Master Classes in Viictoria, New South Wales, South Australia and Western Australia. Around 150 seafood processors, exporters and retailers attended the workshops to understand how the developments in packaging technology for seafood can help extend its shelf- life, retain freshness, texture and flavour.

The classes were facilitated by Bernard Leveau from the French arm of packaging solutions company, Emeritus Professor Harry Lovell from the Australian Institute of Packaging, Mark Beecham from Alto Packaging and Mark Ellis from Sensory Solutions. At the conclusion of the class, teachers were available for one-on-one appointments with individuals. A DVD was also produced for distrubution to CRC participants and available for sale to non-CRC participants.

Seafood Marketing

As the Seafood CRC seeks to advance fundamental knowledge in seafood marketing, solve practical marketing problems and get this knowledge right through the supply chain this master class was developed to give an overview of key marketing topics as well as implementing those concepts. During this reporting period two sessions were run in Brisbane (with classes in Sydney, Melbourne, Cairns, Hobart, Port Lincoln and Perth occuring in 2009-2010). 47 retailers, researchers, processors and industry groups attended.

Seafood CRC Professional Diploma (Entrepreneurship)

Our "Seafood Success" entrepreneur's program is designed to support and teach individuals to take their own innovative business concepts (e.g. add value to seafood or reduce waste product, open a new market for Australian seafood products, improve the consumer experience with seafood, reduce processing and distribution costs or create a new seafood product or business) through a set of interactive modules that encompasses the whole business planning model.

The program has been developed with the Seafood CRC by the University of the Sunshine Coast and with input from the University of Adelaide, the University of South Australia and the University of Queensland. In addition to providing a solid business plan for their innovative ideas the CRC's Professional Diploma credits participants towards a MBA and other courses.

This reporting period has seen 13 industry personnel take part with a graduation date in October 2009. The CRC also plans to run this course in 2010.

Seafood CRC Seafood Careers and Case Study Project

ALife - Promoting the Australian Seafood Industry as a Career Path for Generation X and Y

The Alife project aims to revolutionise the manner in which school leavers get information about future careers. The CRC has seen this as an important initiative and invested in a trial career case study based on Oyster farming. during 2007-2008. The ALife project aims to replace the Careers Guide - a heavy, cumbersome printed book that is given to all school leavers in Australia to assist them in choosing a potential career and deciding whether further study is required after high school to pursue a chosen career path. The CRC has invested in 5 more profiles that highlight careers in the Australian seafood industry. These profiles focus on aquaculture research scientist, aquaculture diver, wild catch fisherman, wholesaler, importer/exporter and retailer.

Education and Training Milestones and Outputs

Output/ Milestone No.	Description	Contracted Date	Achieved (Y/N)	Reasons why not achieved (if applicable)	Strategies to achieve unmet milestones
Output 3.1	Graduation of about 25 PhD students	20 by June 2012; another 5 by June 2014	N	Not yet due	_
MS 3.1.1	Education and training committee established and work plan and operating processes developed	February 2008	Y	_	_
MS 3.1.2	Initial students recruited, inducted and paired with appropriate industry mentors	February 2008	Y	_	_
MS 3.1.3	Initial students gain PhD and selected students embark on career pathways in seafood	December 2011	N	Not yet due	_
Output 3.2	Research education and training through Research Program 1	June 2014	N	Not yet due	_
MS 3.2.1	Research into the processes of knowledge transfer in the Australian seafood industry completed to determine the factors affecting skill supply, deployment and development	December 2008	Y		
MS 3.2.2	Outputs from Research program 1 customised to develop education and training tools and processes, training conducted and suitability of tools and processes evaluated	June 2009 and ongoing	Y	(in progress and on-going)	_
MS 3.2.3	Two case studies illustrating industry application of outputs from Research Program 1 completed	One by June 2011; the other by June 2013	N	_	_
MS 3.2.4	CRC induction program for participants developed and implemented	December 2007	Y	_	_
Output 3.3	Postgraduate qualifications available	June 2010	N	Not yet due	_
MS 3.3.1	Demand for postgraduate qualifications with seafood specialisations relevant to Program 1 identified and at least one postgraduate course developed and offered	February 2010	N	Not yet due	_
MS 3.3.2	Vocation and education training level skills set and new competencies relating to the outputs of Research Program 1 identified and submitted for inclusion in the National Seafood Industry Training Package	June 2009	N	Outputs from Program 1 projects have not yet created suitable material for VET training packages	The creation of the Aquaculture Production Hub will be the vehicle to identify outputs suitable for inclusion in the National Seafood Industry Training Package. Plans are underway to update the finfish farm and shellfish farm attendant's manuals using research findings. Initial meetings have been held with AMC to develop VET accredited courses in relevant aquculture topics.
Output 3.4	Incorporation of external expertise into Research Program 1	June 2014	N	Not yet due	_
MS 3.4.1	Two international researcher exchanges completed	One by June 2010; the other by June 2013	Y	_	_
MS 3.4.2	Program of CRC training and education opportunities (national and international) developed and at least two bursaries or scholarship opportunities for Program 1 disbursed each year	June 2008	Y	_	_

MS 3.4.3	Annual program of professional development training seminars, workshops and forums relevant to Research Program 1 outputs completed	December 2008	Y	The three theme business plans related to Program 1 and the education and training business plan are complete	_
Output 3.5	Establishment of recruitment pathways for the seafood industry and research providers	June 2014	N	Not yet due	_
MS 3.5.1	Case studies on engagement in CRC activitities of young people involved in VET at two rural high schools documented and reviewed and expansion of activity evaluated	March 2008	N	Partially achieved through A-Life Seafood Careers Project but essentially is a timing issue	The Seafood CRC will develop VET activities as significant packages of research outputs come to fruition
Output 3.6	Graduation of about 15 PhD students	10 by June 2012; another 5 by June 2014	N	Not yet due	_
MS 3.6.1	Initial students recruited, inducted and paired with appropriate industry mentors	February 2008	Y	_	_
MS 3.6.2	Initial students gain PhD and selected students embark on career pathways in seafood	December 2011	N	Not yet due	_
Output 3.7	Knowledge from Research Program 2 converted into educational and training tools	June 2014	N	Not yet due	_
MS 3.7.1	Knowledge from Research Program 2 customised to develop education and training tools and processes, training conducted and suitability of tools and processes evaluated	June 2009	Y	(in progress and on-going)	_
MS 3.8	Postgraduate qualifications available	June 2010	N	Not yet due	_
MS 3.8.1	Demand for postgraduate qualifications with seafood specialisations relevant to Research Program 2 identified and at least one postgraduate course developed and offered	February 2010	N	Not yet due	_
MS 3.8.2	Vocation and education training level skills set and new competencies relating to the outputs of Research Program 2 identified and submitted for inclusion in the National Seafood Industry Training Package	June 2009	N	Program 2 projects that will have specific training outputs suitable for the VET sector have only just begun or have not yet been implemented due to lack of capacity	Project 2008/720 (A community intervention approach to increasing seafood consumption) will create specific training package outputs as will the suite of retail transformation projects. Initial meetings have begun with TAFE SA to implement a seafood package for chefs and with AMC to develop VET accredited courses on seafood quality topics.
Output 3.9	Successful incorporation of external expertise into Research Program 2 activities	June 2014	N	Not yet due	_
MS 3.9.1	Two international researcher exchanges completed	One by June 2010; the other by June 2013	Y		_
MS 3.9.2	Program of CRC training and education opportunities (national and international) developed and at least two bursaries or scholarship opportunities for Research Program 2 disbursed each year	June 2008	Y	_	_
MS 3.9.3	Annual program of professional development training seminars, workshops and forums relevant to Research Program 1 outputs completed	December 2008	Y	The two theme business plans related to Program 2 and the education and training business plan are complete	_

and.....
Southland Fish Supplies
South Australian Marine Scale Sardine Industry Association

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