



AQUAFIN CRC – FRDC SOUTHERN BLUEFIN
TUNA AQUACULTURE SUBPROGRAM:
COORDINATION, FACILITATION AND
ADMINISTRATION

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January 2005

Aquafin CRC Project 5B.1

(FRDC Project No. 2001/250 and 1997/361)



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Title: Aquafin CRC – FRDC Southern Bluefin Tuna Aquaculture Subprogram: coordination, facilitation and administration.

Front cover photographs provided by: (left) Mr Rohan Daw, SBT Aquaculture Subprogram, South Australian Research and Development Institute, PIRSA; (top right) Joe Puglisi Jnr c/o Tuna Boat Owners Association of South Australia; (bottom right) SBT Aquaculture Subprogram, South Australian Research and Development Institute, PIRSA.

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ISBN No. 0 7308 5320 9

Printed in January 2005 by:
PIRSA
Customer Services
101 Grenfell St
Adelaide
SA 5001

Authors: Steven Clarke, Jane Ham and James Bushell
Reviewers: John Carragher and Martin Kumar
Approved by: John Carragher



Date: January 2005
Distribution: FRDC, FRAB representatives, libraries, scientific and industry contributors.
Circulation: Public domain



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1 *Non-technical summary*

1997/361 and 2001/250 Aquafin CRC – FRDC Southern Bluefin Tuna Aquaculture Subprogram: coordination, facilitation and administration

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OBJECTIVES

1. Coordinate the use of resources of the Tuna Research Farm, Boston Bay, Port Lincoln and any other core facilities required.
2. Provide a coordinated research program addressing the focus areas of the R&D plan for the SBT Aquaculture Industry.
3. Communicate, where appropriate, the research outcomes to all relevant sectors of the SBT Aquaculture Industry to facilitate the commercialisation of research outcomes directed at ensuring the sustainability and profitability of the industry.
4. Coordinate administration and meetings of the SBT Aquaculture Subprogram ensuring effective communication throughout members of committees and industry.

NON-TECHNICAL SUMMARY

OUTCOMES ACHIEVED TO DATE:

The Southern Bluefin Tuna Aquaculture Subprogram has provided:

1. An orderly and structured approach to research and development (R&D) associated with southern bluefin tuna (SBT) aquaculture, with a high level of industry involvement in developing priorities, including the production of the SBT Aquaculture Strategic Plan 2001-2006. Successfully submitted 33 new project proposals, 12 past projects and 21 current projects (of the current projects 7 were in the 2004/05 FRDC round). Assisted in the success of two AusIndustry Start Graduate Employee Grants received by two commercial companies: Ajka Pty Ltd and DI Fishing Co Pty Ltd, in 2004.
2. A means to provide efficient and coordinated use of the limited resources available for SBT aquaculture related to R&D. Following reviews, core SBT research has progressed from a Tuna Research Farm using small experimental pontoons and small numbers of SBT operated by SARDI on a calm water R&D site, to one using a wave exposed commercial size pontoons and larger numbers of SBT, operated by industry on a commercial site.

3. Overall management, coordination and delivery of outcomes for all projects within the Subprogram, including milestone reports, media releases, final reports and dissemination of research results to industry through production of regular Tuna-briefs and Industry Handbooks as well as the organisation of regular meetings and workshops.

The major client, the Tuna Boat Owners Association of South Australia (TBOASA), the CRC for Sustainable Aquaculture of Finfish (Aquafin CRC) and Fisheries Research and Development Corporation (FRDC) have participated in all aspects of the Subprogram and have advised of their satisfaction with its achievements.

The Southern Bluefin Tuna (SBT), *Thunnus maccoyii*, Aquaculture Industry has undergone rapid expansion since it commenced in 1990. In 2002/03 the industry was Australia's third largest export fishing industry (ABARE, 2002) with most of its value coming from aquaculture. In this year the industry produced about 9,100 tonnes (whole weight) worth approximately \$267 million (Knight *et al*, 2004), employing over 2000 people directly and indirectly, particularly in the Eyre Region of South Australia.

In recent years, however, production has levelled off, with nearly the entire available quota going into aquaculture. The value of the industry has also been affected by increasing competition on the Japanese market (the largest importer of Australian SBT) from overseas supplies of northern bluefin tuna (NBT), the fluctuating Japanese and Australian currency exchange rate and world health and terrorism events. More than ever there is a need for well prioritised and coordinated R&D to address key issues that will maintain or enhance the industry's competitiveness.

In 1997 the coordination of the Subprogram commenced as part of 'Project 1: Implementation and coordination of research experiments conducted with caged SBT, to access manufactured diets, feeding regimes and harvesting techniques (FRDC No: 1997/361)'. In 2001 this role was formalised in the current, more focused project (FRDC No: 2001/250). The objectives of this project were to provide a cohesive approach to R&D aimed at meeting the priority needs of the industry; to provide a management structure to oversee the active research projects and ensure that they achieved their desired outcomes; to manage and coordinate the infrastructure and activities associated with SBT research in Port Lincoln, and to provide a focused strategy for disseminating research results to industry, obtain feedback and set research priorities. The Subprogram has also been successful in providing a focus for all SBT research projects in Australia, in particular with the Aquafin CRC Programs: Production; Value Adding; Health; Environment and Education and Training, which have all been run through the Subprogram.

The SBT Industry sector, represented by the TBOASA, has been committed to R&D since the start of SBT farming. The TBOASA has and continues to voluntarily pay 0.25% of its gross value of production (GVP) to the FRDC each year based on a Memorandum of Understanding (MOU) that has ensured that the capacity existed to leverage funding to address industry priority R&D issues on a competitive national basis.

In 2001, the establishment of the Aquafin CRC further enhanced the leverage obtained from industry funds. The Aquafin CRC program represents a total investment of \$70 million (cash and in-kind) over 7 years, with approximately 60% of this investment allocated to SBT research. Overall the Subprogram has achieved a leverage of approximately 1:5 TBOASA FRDC levy funds to FRDC/Aquafin CRC funded research from 1997/98 to 2003/04 and 1:21 TBOASA FRDC levy to total research funds from all sources.

The Subprogram was managed by the Steering Committee with scientific and technical advice coming from the Aquafin CRC Program Leaders and independent scientists, where required. Representatives on the committee were sector and expertise based, and included key representatives from industry, government, funding bodies and research organisations. A core group of Aquafin CRC Program Leaders, Principal Investigators, project scientists, SBT farm company science and technical people and TBOASA science and technical people attended Scientific meetings. Steering Committee and Scientific meetings were held regularly, primarily aimed at coordinating the overall management of the Subprogram and providing advice to enhance existing projects and new proposals. The Subprogram ensured that research results were disseminated to the SBT Industry through the coordination of Final Reports; production of regular Tuna-briefs, industry handbooks and the SBT Aquaculture Subprogram web site as well as regular meetings and workshops. All material produced through the Subprogram was approved by the Communications Subcommittee prior to publication.

In 2001, the SBT Subprogram produced a 5-year R&D Plan 'Southern Bluefin Tuna Aquaculture Strategic Plan 2001-2006: Sustainability and Innovation for the Future', based on the needs and directions of the industry. Nine focus areas were broadly defined in the plan: Feeds and Nutrition; Environment; Farm Husbandry and Management; Health; Product Diversification; Quality and Marketing; Propagation; Communication; People Development and Support; and the Work Environment. The Aquafin CRC SBT Propagation Program was terminated in 2002 in accord with the revised SBT Industry research priorities.

It was a function of the Subprogram to provide direction on industry R&D priorities in line with the R&D Plan and coordinate FRDC grant applications in association with state-based Fisheries Research Advisory Board (FRAB)'s and the FRDC. FRDC research funds from 1997/98 to 2003/04 were allocated across seven of the focus areas, with 6% allocated to Administration and Coordination; 19% to Environment; 22% to Farm Husbandry and Management; 27% to Feeds and Nutrition; 19% to Product Diversification and Management 7% to Health and 0% to Propagation. Currently there are 21 projects within the Subprogram portfolio, 7 of which were successful applications from the 2004/05 FRDC round, including the new administration, coordination and facilitation of the Subprogram project. The Subprogram has also been involved in two successful applications for AusIndustry Start Graduate Employee Grants by two commercial companies this year: DI Fishing Co Pty Ltd and Ajka Pty Ltd.

The Subprogram through the current project has been successful in achieving coordinated R&D that is industry focused and involves all relevant stakeholders. The management structure of the Subprogram: the Subprogram Leader, Steering Committee, Scientific group and Communication Subcommittee, as well as strong SBT Industry support, has contributed to the success of the Subprogram, including increases in funding, improved dissemination of research results and communications, regular hosting of well-facilitated meetings and workshops, and increased involvement of all levels of industry and relevant stakeholders in both current and future projects.

The major client, the TBOASA, Aquafin CRC and FRDC have advised of their satisfaction with the Subprogram. They believe it has met with its objectives and delivered positive outcomes for the SBT Industry to date and has provided strong support for the continuation of the SBT Aquaculture Subprogram through the upcoming project.

KEYWORDS: Southern Bluefin Tuna, SBT, Aquaculture, Subprogram, Aquafin CRC, Research and Development, R&D, South Australia, Aquafin CRC, FRDC.

2 Acknowledgments

We wish to gratefully acknowledge all of the people who have contributed to the success of the SBT Aquaculture Subprogram. In particular:

Steering Committee: Brian Jeffriess, Peter Montague, Patrick Hone, Richard Stevens, David Ellis, Daryl Evans, Ian Nightingale (proxy Carina Cartwright), Rob Lewis (proxy Anthony Cheshire), Glen Hurry, Marcus Stehr, John Gunn, Barbara Nowak, John Isle, Chris Carter, John Volkman, Stephan Schilling, Peter Rothlisberg, John Isle and Michael van Doorn.

Scientific participants (including from the TBOASA): Tom Bayly, Geoff Bayly, Jeff Buchanan, Robert van Barneveld, Mark Crane, Philip Thomas, Quinn Fitzgibbon, Andrew Pointon, Kathy Opel-Keller, David Padula, Ib Svane, John Carragher, Maylene Loo, Milena Fernandes, Richard Musgrove, Peter Lauer, Kirsten Rough, Rachael Lawrie, Craig Hayward, Rebecca Paterson and Hamish Aiken;

and the SBT Farming Companies and their employees: Ajka Pty Ltd, Australian Fishing Enterprises Pty Ltd, Blaslov Fishing Pty Ltd, DI Fishing Co Pty Ltd, Dinko Tuna Farmers Pty Ltd, Marnikol Fisheries Pty Ltd, MG Kallis Seafood Pty Ltd, Sarin Marine Farm Pty Ltd, Sekol, Stehr Group Pty Ltd, Stolt Sea Farm Pty Ltd, Tony's Tuna International Pty Ltd, Kinkakwooka, Australian Bluefin, T&S Tuna and Sarunic and Sons.

We also wish to thank Stephen Battaglone, Aquafin CRC Salmon Subprogram Leader, TAFI whose excellent final FRDC report structure we have used as the basis for this report.

3 Background

3.1 INTRODUCTION TO THE SOUTHERN BLUEFIN TUNA AQUACULTURE INDUSTRY

The aquaculture of Southern Bluefin Tuna (SBT) has been a major success story in the expansion of the Australian aquaculture industry, although it has not been without its challenges. SBT aquaculture was initiated in Australia in 1990 through a collaborative research and development (R&D) program involving the Tuna Boat Owners Association of South Australia (TBOASA), The Japanese Overseas Fishery Cooperation Foundation and the South Australian Government. Preliminary research into the capture and transport of SBT proved successful and led to a two year R&D program, involving additional R&D funding by the Fisheries Research and Development Corporation (FRDC), to assess the potential holding, maintaining and marketing of SBT. The industry underwent rapid growth, and in 2002/03 consisted of 12 commercial farms located in Port Lincoln, SA, utilizing 97% of the Australian SBT quota, producing about 9,100 tonnes (Figure 1) worth approximately \$267 million (Knight *et al*, 2004) and employed directly and indirectly, approximately 2000 people primarily in the Eyre region of South Australia. The industry has a significant economic multiplier effect because of its labour intensiveness, infrastructure requirements and the impetus it has created for the development of other industries and aquaculture sectors (Econsearch, 2004). In economic terms the SBT Industry in 2003/04 was the third largest export fishing industry (including pearls), with most of its value coming from aquaculture (ABARE, 2002).

In recent years, the growth of the SBT Aquaculture Industry has levelled off due to utilisation of almost all of the available quota. Significantly lower market prices are also being experienced due to increased competition from northern bluefin tuna (NBT) farmers overseas. More than ever, there is a need for well prioritised and coordinated R&D to address the key issues that will maintain or enhance the industry's competitiveness, the role of the SBT Aquaculture Subprogram.

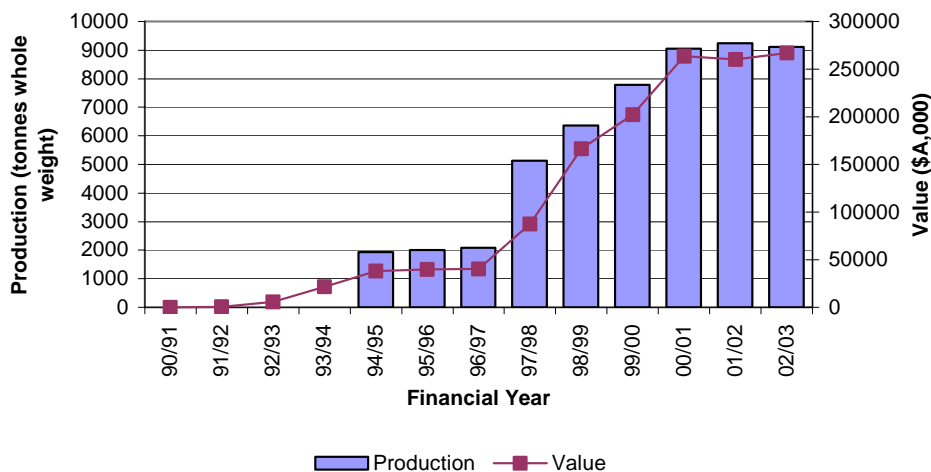


Figure 1 SBT Aquaculture production and value from 1990/91 to 2002/03 (Knight *et al*, 2004).

In the right business climate, opportunities exist for industry growth from the improved survival of SBT and the holding of SBT for longer periods of time thereby increasing the volume for sale; improvements in product quality leading to better market prices and advances in feeds, feeding strategies and farming technology leading to reduced operating costs.

3.2 HISTORY OF RESEARCH AND DEVELOPMENT

R&D has been instrumental in the development of SBT aquaculture since its inception. Key participants in the early years were the TBOASA, the Japanese Overseas Fishery Cooperation Foundation, the South Australian Government's relevant R&D group, SARDI and FRDC.

The SBT Industry sector through the TBOASA has since the start of SBT farming been committed to R&D. Issues of fish health, product quality, feed development and environmental management have all been considered critical to the industry's long-term sustainability.

SARDI in the initial stages provided limited R&D support primarily in the area of environmental research.

The SBT component of the CRC for Aquaculture (1994 to 2001) focussed entirely on the development of a manufactured feed as a risk management strategy to the use of baitfish. A path towards commercialisation was instigated by involving Gibson/Pivot Ltd, 5th major commercial aquafeed manufacturer. To achieve this a formal Memorandum of Understanding (MOU) was developed that provided in kind and financial returns to the project. Research achieved a semi-moist pellet, which gave similar performance to baitfish fed SBT in experimental cages.

In 2001 the Aquafin Cooperative Research Centre for Sustainable Aquaculture of Finfish (Aquafin CRC) commenced. The Aquafin CRC program represents a total investment of \$70 million (cash and in-kind) in research support to finfish aquaculture sectors in Australia over 7 years, with approximately 60% of this investment dedicated to SBT research. The initiation of the Aquafin CRC broadened the scope of SBT R&D, not only through financial support, but also through the expertise of its participants. Aquafin CRC participants involved in SBT research include SARDI; University of Tasmania (School of Aquaculture and Tasmanian Aquaculture and Fisheries Institute (TAFI)); Flinders University; University of Queensland; and the Commonwealth Scientific And Industrial Research Organisation (CSIRO). FRDC is a major participant of the Aquafin CRC and has supported both the development of the SBT industry and the coordination of research through the SBT Aquaculture Subprogram, which they initiated.

4 Need

The SBT Aquaculture Subprogram and this project were essential for the development of a cohesive R&D approach, aimed at meeting the priority needs of the highly successful SBT Aquaculture Industry. The industry has developed rapidly since its initiation in 1990 and has the opportunity to continue to do so; however targeted R&D is needed to underpin this development to assure the long-term sustainability of the industry.

This project provided the basis for the SBT Aquaculture Subprogram (and the leadership of the Aquafin CRC Production Program and Value Adding Program), which included a management structure to oversee the active research projects and ensure they achieved the desired outcomes; manage and coordinate the infrastructure and activities associated with tuna aquaculture research in Port Lincoln; and provide a focused strategy for disseminating research results to industry, obtain feedback and set research priorities.

This project ensured that the minimum level of duplication occurred in the provision of research services; provided a focus for SBT aquaculture research and ensured it attracted high quality researchers; addressed industry priorities by establishing a mechanism to empower industry's involvement in their research; established a framework to ensure that SBT aquaculture research is orderly and targeted; and disseminated, in an appropriate manner research information to stakeholders.

The Subprogram has also facilitated successful grant applications targeted at other R&D funding agencies (eg. AusIndustry) and these opportunities continue to exist for the development of further research proposals.

5 Objectives

1. Coordinate the use of resources of the Tuna Research Farm, Boston Bay, Port Lincoln and any other core facilities required.
2. Provide a coordinated research program addressing the focus areas of the R&D plan for the SBT Aquaculture Industry.
3. Communicate, where appropriate, the research outcomes to all relevant sectors of the SBT Aquaculture Industry to facilitate the commercialisation of research outcomes directed at ensuring the sustainability and profitability of the industry.
4. Coordinate administration and meetings of the SBT Aquaculture Subprogram ensuring effective communication throughout members of committees and industry.

6 Methods

This project focused on coordination, facilitation and administration, which were processes essential to the successful operation of the SBT Aquaculture Subprogram and the Aquafin CRC Production and Value Adding Program.

6.1 MANAGEMENT

The Subprogram was managed by the Steering Committee, with scientific and technical advice coming from both the Aquafin CRC Program Leaders and independent scientists where required. Representation on the committee was sector and expertise based, and included membership of the FRDC (Program Manager), Aquafin CRC (Director and Program Leaders), TBOASA (Executive Director and Research Manager), SBT Aquaculture Industry (3 SBT Farm Managers) and Government representatives (General Manager - Aquaculture SA). The Subprogram Leader provided leadership, coordination and administration functions, and was also the Program Leader of the Aquafin CRC Production and Value-Adding Programs. Industry provided input to the Subprogram through committee members,

involvement in industry workshops and direct communication with the Subprogram Leader, the Aquaculture Projects Coordinator and Principal Investigators of operational projects. One of the Subprogram's tasks was to provide direction on industry R&D priorities and coordinate FRDC grant applications in association with the state based Fisheries Research Advisory Board (FRAB) and the FRDC. The Subprogram Leader also liaised with and provided support to researchers seeking alternative funding sources (eg. AusIndustry) to address industry priorities. The structure, policy and operations of the Subprogram are documented as part of the SBT Aquaculture Strategic R&D Plan 2001-2006: Sustainability & Innovation for the Future.

6.2 POLICY DEVELOPMENT

The Subprogram as the key body coordinating SBT aquaculture R&D, continued to develop and document the policies agreed upon by the Steering Committee. At present many aspects (eg. confidentiality, intellectual property agreements, project development, consultancy charging) are addressed through the participating agencies (in particular the Aquafin CRC). A communications procedure exists for the Subprogram and is monitored through a Communications Subcommittee. This is outlined in the SBT Aquaculture Strategic R&D Plan 2001-2006: Sustainability & Innovation for the Future and is also available on the Subprogram web site (www.sardi.sa.gov.au/sbt).

6.3 R&D PRIORITY SETTING AND NEW PROJECT ASSESSMENT

A workshop was organised by the Subprogram around May of each year to link with the South Australian FRAB and FRDC timetables, to review and update the tuna aquaculture industry's R&D priorities. All farm owners and managers were invited. As previously, new project pre-proposals were sourced through the existing FRAB processes (generally in July) with each FRAB being asked to forward relevant applications to the Subprogram. These were reviewed at the Scientific meeting and recommendations provided to the Steering Committee which undertook a similar assessment procedure in conjunction with the relevant 5 year R&D Strategic Plan. Applicants were advised of the outcome and the desirability to proceed with a full application, and relevant FRABs advised of the outcomes. Full applications were received in early November and the same process repeated. The Subprogram assisted in the coordination of proposals and worked in conjunction with the FRAB's and FRDC, by providing them with recommendations as to the priority ranking of new projects in December.

6.4 INFRASTRUCTURE

The field infrastructure initially available in Port Lincoln to the Subprogram included 12 small experimental pontoons and nets, 2 larger holding pontoons and nets, a storage shed and cool room, 2 motor vehicles, a truck and fork lift, two vessels, and offices and laboratories at the Lincoln Marine Sciences Centre. Office space at SARDI Aquatic Sciences was also used by the Subprogram Leader and Aquaculture Projects Coordinator. These facilities were contributed by the South Australian Government through SARDI and Flinders University, South Australia.

Following reviews, in 2004 core SBT research progressed from using these small experimental pontoons, housing small numbers of SBT operated by SARDI on a calm water R&D site, to one using commercial size pontoons and large numbers of SBT operated by industry on a wave exposed commercial site.

Currently (2004) the Subprogram has the use of four small (12m) pontoons and three larger (32m) pontoons. A 12-tank (5000L) outdoor system is also being constructed at SARDI in Adelaide, for suitable surrogate nutritional trials.

Operational and maintenance of research infrastructure was the responsibility of the separate projects (2001/252 and 2002/249) managed by Dr Jeff Buchanan and David Ellis. The Subprogram was actively involved in negotiating the use of infrastructure by each research project.

6.5 REPORTING / OPERATIONAL PLANS

Project Milestone Reports and Milestone Variations were forwarded to the Subprogram Leader who circulated them to the Steering Committee for comment and approval prior to forwarding them to Aquafin CRC. Principal Investigators were sent reminders for any outstanding Milestone Reports.

Briefing papers were distributed to the Steering Committee one week prior to all meetings. Detailed minutes from the Steering Committee meetings were taken and circulated to all members within 10 working days after a meeting.

An industry handbook was produced and disseminated to all industry and scientific members of the Subprogram prior to the annual Industry Workshop. The handbook included an industry update; Subprogram Leaders Report and Progress Reports for all Subprogram Projects.

The Subprogram Leader, with the support of the Aquaculture Projects Coordinator and project Principal Investigators, produced an Annual Operating Plan (AOP) that incorporated information on each individual project that was submitted to FRDC in December of each year since 2000. The AOP included an activity description for the last 12 months; an industry situation statement; summary of strategic plan or directions; communications and technology transfer activities; proposed new research; a workplan for the next 12 months; a budget update; and any other recommendations/variations.

6.6 BUDGET REPORTING

The Principal Investigator's organisation, for each project, continued to receive and be accountable for the income and expenditure associated with the funds received from the Aquafin CRC, the FRDC and funds offered in-kind for that project. Initially the Subprogram requested that the Principal Investigator's organisations provide the Subprogram with a budget statement every quarter (so that expenditure could be better tracked). Each Principal Investigator, following liaison with this project, would report expenditure to the Aquafin CRC and the FRDC as part of their 6 monthly progress report. The Subprogram Leader also collated, summarised and provided data for all projects to Aquafin CRC and the FRDC as part of the 6 monthly progress report for this project. Since costed milestones were introduced by FRDC in 2001, this process no longer occurs, with each projects institution now being responsible for their financial reporting.

Any income received from consultancy trials, royalties, publication and SBT sales, where these resources were developed by the Aquafin CRC and the FRDC, were credited to the

relevant project budget line and reported in 6 monthly progress reports to the Aquafin CRC and the FRDC.

6.7 MEETINGS, WORKSHOP AND CONFERENCES

The Steering Committee met quarterly (two face-to-face meetings and two tele-conferences) and the Scientific group met twice yearly. Additional meetings were held when required.

An annual Industry Workshop was held once a year, which provided an opportunity to outline and discuss research results and future directions with all relevant stakeholders.

6.8 QUOTA ACCESS

Quota access and price is negotiated with the TBOASA each year, following identification of the AOP. The amount utilised has ranged from 6 to 15 tonnes.

7 Results/Discussion

7.1 INDUSTRY DEVELOPMENT

SBT production has increased dramatically since the commencement of the industry in 1990, with up to about 9,100 tonnes (whole weight) produced in 2002/03 (Knight *et al*, 2004). Despite its success, production over the last 3 years has levelled off, with nearly the entire available quota going into aquaculture. The industry however, in the right business climate, still has growth opportunities available: from the improved survival of SBT and the holding of SBT for longer periods of time thereby increasing the volume for sale; improvements in product quality leading to better market prices; and advances in feeds, feeding strategies and farming technologies leading to reduced costs. Focused R&D is required to evaluate and demonstrate these opportunities and make them a commercial reality.

In recent years increasing the value of the SBT Industry has also proved challenging. Japanese imports of SBT increased from 2002 to 2003 (8,223 to 8,600 tonnes respectively) however, the value dropped from 2,641 to 1,850 Yen respectively (Figure 2). The decline in value in 2003 was largely due to increased competition on the Japanese market from overseas supplies of NBT. While Australian production of SBT increased little between 2002 and 2003, NBT suppliers particularly from Mexico, Malta, Turkey, Italy and Tunisia increased by a substantial 10,000 tonnes (72%). The result was a decline in average price for SBT from 2,641 Yen/kg or \$38.83 \$A/kg in 2002 to 1,850 Yen/kg or \$24.36 \$A/kg in 2003 (Brian Jeffriess, SBT Aquaculture Subprogram Industry Workshop, November 2003).

During 2003 world events (terrorism threats and the SARS virus) and a decline in the Australian dollar to Japanese Yen currency exchange rate (from 68.0 to 78.0 Yen/\$A) further affected the value of SBT, although this has not initially impacted the industry as greatly because of their capacity to pre-sell SBT at an pre-agreed exchange rate and price for periods of time on the international money market as well as sell frozen product at fixed prices (Brian Jeffriess, SBT Aquaculture Subprogram Industry Workshop, November 2003). Further increases in competition and related declines in sale price are predicted by some in 2004. The industry currently is largely dependent on the Japanese whole fish sashimi market (currently about 60% fresh and 40% frozen whole – gilled and gutted) and so remains susceptible to the effects of increases in overseas production, fluctuating exchange rates and world events.

The net outcome of this increased global competition has been a strong desire for industry to see R&D targeted at enhancing their competitive status and this in large part led to the closure of the Aquafin CRC SBT Propagation Program and the increased emphasis on SBT biology, health, nutrition, value adding and integration of existing research and industry information.

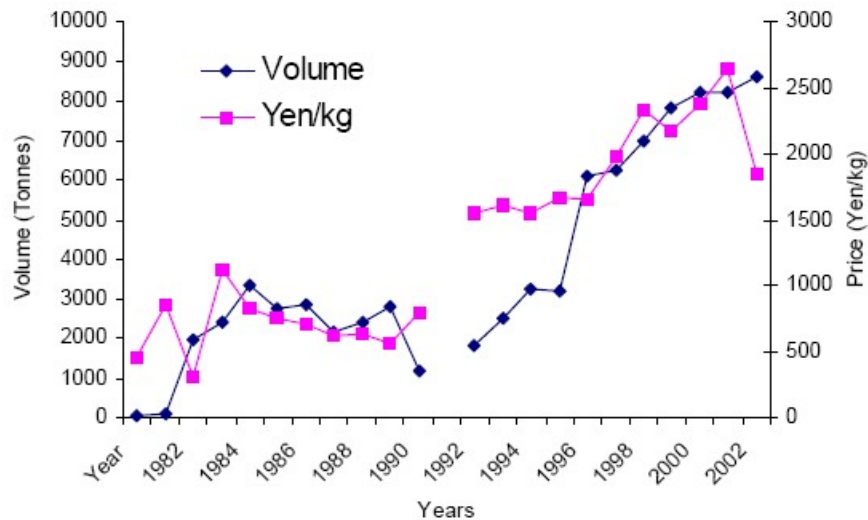


Figure 2 Total volume (tonnes) and price (Yen/kg) of Australian SBT imported into Japan from 1980 to 2003 (Brian Jeffriess, SBT Aquaculture Subprogram Industry Workshop, November 2003). Note: in the early years of commercial SBT farming (eg. 1992) SARDI did not release price and volume figures as they have a policy to only disclose figures when there are more than 5 farmers operating.

7.2 RESEARCH FUNDING

The TBOASA has and continues to voluntarily pay 0.25% of its gross value of production (GVP) to FRDC each year based on a MOU, which has ensured that the capacity existed to leverage funds to address industry priority R&D issues on a competitive national basis. The TBOASA committed a total of \$2.73 million to FRDC over the years 2001-2008. The commencement of the Aquafin CRC in 2001 further enhanced the leverage of industry funds (Figure 3).

The leverage rate of SBT Industry funds to Aquafin CRC and FRDC promised funds was an average rate of 1:5 over the period 1997/98 to 2003/04. Total SBT Industry funds to total research funds, promised from all sources, was an average rate of 1:21 over the same period (Table 1). Total research funds, promised from all sources, allocated to SBT research within the SBT Aquaculture Subprogram over the period 1997/98 to 2003/04 was \$34,372,784.

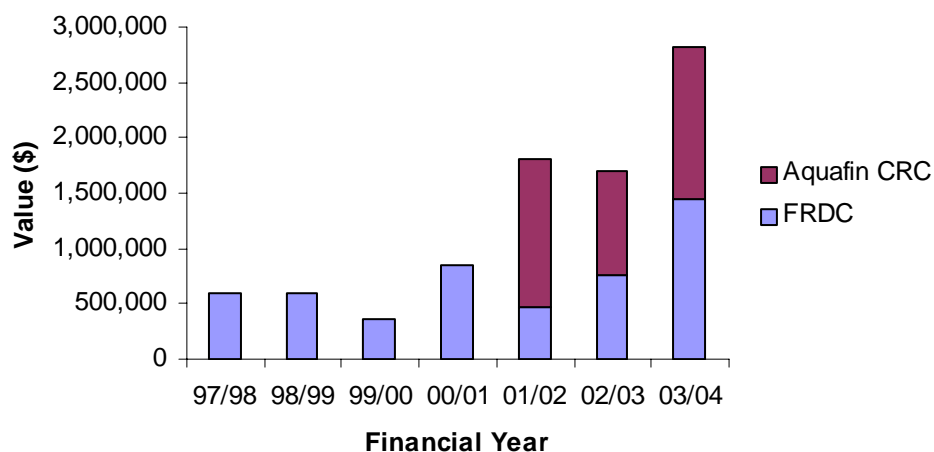


Figure 3 FRDC and Aquafin CRC funds promised for SBT Aquaculture Subprogram projects for the period 1997/98 – 2003/04.

Table 1 Research funds leveraged from the MOU between FRDC and TBOASA, including FRDC and Aquafin CRC funds promised and contributions by the applicant and other sources from 1997/98 to 2003/04. Note the 97/98 TBOASA FRDC levy figure is calculated based on the percentage contribution of SBT to the total SA funds allocated to FRDC in 98/99.

	97/98	98/99	99/00	00/01	01/02	02/03	03/04
FRDC funds (\$)	601,714	604,448	356,481	849,665	473,619	750,093	1,446,954
Aquafin CRC funds (\$)					1,341,045	956,114	1,364,880
Total FRDC and Aquafin CRC funds (\$)	601,714	604,448	356,481	849,665	1,814,664	1,706,207	2,811,834
TBOASA FRDC levy (\$)	65,769	73,324	138,431	191,000	315,089	364,500	464,263
Multiplier (based on FRDC and Aquafin CRC funds only)	9	8	3	4	6	5	6
Applicant contributions (\$)	1,260,502	1,226,202	1,152,077	429,521	2,801,447	2,766,260	4,229,627
Contributions from other sources (\$)	343,379	350,079	322,481	239,807	632,097	459,580	669,658
Total research funds from all sources (\$)	2,807,318	2,785,185	2,152,240	2,368,662	7,062,878	6,638,259	10,522,959
Multiplier (based on total research funds from all sources)	43	38	16	12	22	18	23

Funds received from FRDC and Aquafin CRC from 1997/98 to 2003/04 for SBT aquaculture research (not including proposals or project extensions from the 2004/05 FRDC round) were allocated across the seven focus areas outlined in the Strategic R&D Plan 2001-2006 (Figure 4). The funds allocated are based on assignment of 1 project in the Administration and Coordination area; 4 in the Environment area; 5 in the Farm Husbandry and Management area; 7 in the Feeds and Nutrition area; 4 in the Product Diversification and Marketing area, 3 in SBT Health area and 1 in Propagation area over the period 1997/98 to 2003/04.

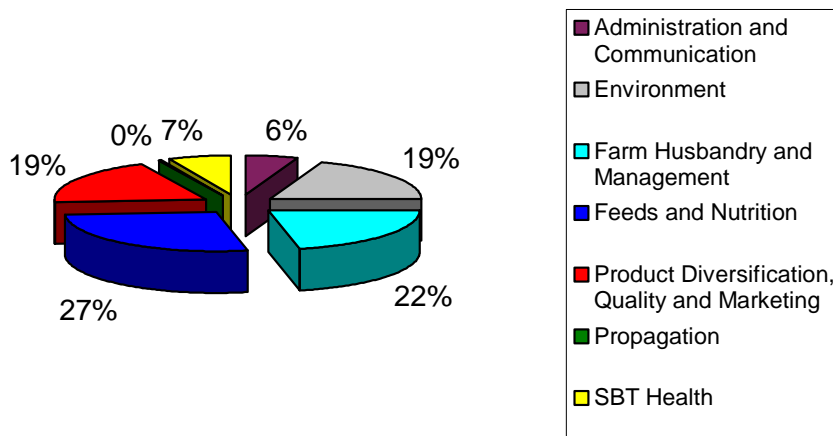


Figure 4 Pie diagram of FRDC and Aquafin CRC funding for SBT aquaculture R&D in key Program areas from 1997/98 – 2003/04 (the administrative component of all projects has been allocated against Administrative and Communications focus area).

The Subprogram was also involved in successful applications for AusIndustry Start Graduate Employee Grants by two commercial companies this year: Ajka Pty Ltd and DI Fishing Co Pty Ltd.

7.3 SOUTHERN BLUEFIN TUNA AQUACULTURE STRATEGIC PLAN

In 2001 the Subprogram developed a 5 year R&D Plan ‘Southern Bluefin Tuna Aquaculture Strategic Plan 2001-2006: Sustainability & Innovation for the Future’, based on the needs and future direction of the industry. Nine focus areas were broadly defined in the plan: Feeds and Nutrition; Environment; Farm Husbandry and Management; Health; Product Diversification, Quality and Marketing; Propagation; Communication; People Development and Support; and Work Environment. A strategy was developed to achieve the desired outcomes within each focus area (Table 2).

The SBT Propagation Program was terminated in 2002 in accord with revised SBT Industry research priorities and therefore the only project that was conducted within this focus area was FRDC No: 1999/376 ‘Southern Bluefin Tuna Aquaculture Subprogram: development of a strategic plan for the propagation of Southern Bluefin Tuna (SBT)’. No formal projects have been conducted within the focus areas ‘People Development and Support’ and ‘Work Environment’, although activity has occurred in these areas, including staff training, which has been pivotal to the success of many SBT research projects.

Table 2 Strategies to achieve the desired outcomes within the 9 focus areas of the SBT Aquaculture Subprogram as outlined in the Strategic R&D Plan 2001-2006.

Focus Area	Strategy to achieve the desired outcomes:
Feeds and Nutrition	<ol style="list-style-type: none"> 1. Develop more cost effective ways of studying tuna nutrition. Research will focus on assessing the use of a dedicated sea-based research farm as compared to collaborative use of commercial farm infrastructure or services, onshore as compared to offshore facilities, the use of surrogate species for some aspects of research, and methods for more accurately measuring diet preference, quantifying feed conversion ratios, automating and controlling feeding and non-destructively measuring the performance of SBT. 2. Develop an optimal manufactured feed for tuna farming. Research will focus on facilitating the commercialisation of an existing, experimental, semi-moist manufactured pellet and the development of a high protein and energy extruded feed with a lower moisture content. Pellet form, attractiveness and palatability are key factors requiring investigation. 3. Develop a rapid analytical method for evaluating feed quality and facilitate the implementation of a feed quality assurance program. 4. Optimise feeding strategies and methodologies to minimise costs associated with the feeding of SBT while maintaining or enhancing production and product quality.
Environment	<ol style="list-style-type: none"> 1. Review, integrate and increase the availability of existing data and knowledge of the effects of aquaculturing SBT and other species in the sea. 2. Develop innovative, rapid and cost-effective techniques for environmental impact assessment, as well as to minimise waste release, dispersal and accumulation. 3. Define for SBT aquaculture areas the spatial extent and intensity of the effects of SBT aquaculture and the rate of seafloor recovery following fallowing, as well as relate these impacts to the aquaculture inputs and key system processes. 4. Develop and validate models describing local aquaculture related benthic impacts and dynamics that allow the evaluation of alternative management scenarios. 5. Design and evaluate a cost-effective and acceptable environmental monitoring program, agreed and scientifically justified environmental quality objectives and standards, and environmental performance indicators. 6. Develop guiding principles for establishing the appropriate spatial and temporal scales, as well as methods for addressing environmental issues. Evaluate system-wide carrying and assimilative capacities for making ecological predictions to assist in the management of the industry. Investigate funding options for the collection of the necessary data to develop a system-wide model. 7. Continue to refine methodology to minimise entanglements of cetaceans, pinnipeds, sharks and birds in SBT aquaculture related infrastructure.
Farm Husbandry and Management	<ol style="list-style-type: none"> 1. Continued research into product quality, in particular developing quantitative methods of characterising what is acceptable to the markets and to consumers, as well as understanding the factors that determine the intrinsic quality of SBT. 2. Using defined measures of product quality and working with SBT aquaculturists to determine and assess husbandry practices that can be enhanced to improve product

	quality, shelf-life and market price.
Health	<ol style="list-style-type: none"> 1. Address the key health areas of husbandry and environmental factors through R&D focused on providing a better knowledge of SBT physiology and requirements. 2. Address SBT health as an integral component of research projects on the environment, feeds and nutrition, and product quality. 3. Develop diagnostic techniques to identify potential latent health problems, for example developing media for virus culture, and incorporating these into an improved tuna health surveillance program made up of bacteriology, virology, parasitology and histopathology components. 4. Disseminate existing baseline health information more widely to ensure a better understanding of SBT health among Australian veterinarians, who might become involved in any contingency situation or can be encouraged to usefully collaborate on R&D. 5. Enhance the linkage of the SBT aquaculturists fish health program to State and Federal emergency disease response programs, a concept promoted by Aquavetplan.
Product Diversification, Quality and Marketing	<ol style="list-style-type: none"> 1. Continue research with interested SBT aquaculturists to perfect the technology (eg. packaging, storage, shelf-life and product quality) associated with increased processing of SBT. 2. Better define present and future market and consumer requirements with regard to existing and potential processed products. 3. Developing a better distribution channels for processed products.
Propagation	<ol style="list-style-type: none"> 1. Investigate a suitable strategy to successfully breed and rear SBT, with consideration of the availability of existing relevant information, key personnel, type of facilities required, geographic location, the cost benefits of the various alternatives identified and an appropriate business structure to obtain the necessary funding and deliver the desired outcomes. 2. Capture, transport, hold and condition SBT broodstock, with an emphasis on risk management, cost effectiveness and the delivery of desired outcomes. Research will focus on methods of anaesthetising, handling and transporting SBT; the development of feeds to condition broodstock; and measuring, understanding and controlling the maturation process. 3. Evaluate and optimise methods for the culture of larvae and early juvenile SBT prior to transfer to sea pontoons. Research will focus on characterising the time of first feed, the most suitable live and manufactured feeds and their sequential use as the digestive physiology of the larvae develop. It will also assess the physical (eg. photoperiod, light intensity, tank colour and shape, water temperature), chemical (eg. water quality and salinity) and biotic (eg. relative larval and feed density) environment most suitable to optimise survival and subsequently growth. The development of appropriate husbandry practices (eg. grading, tank cleaning) will also be important. 4. Evaluate and optimise the transfer to and subsequent rearing of early juvenile SBT to sea pontoons. The development of appropriate manufactured feeds and husbandry techniques will be the key research focus.
Communication	<ol style="list-style-type: none"> 1. Publish at least six newsletters each year, highlighting developments in SBT aquaculture R&D including key meeting outcomes. Distribution of this "Tuna Brief"

	<p>to tuna aquaculturists and other interested stakeholders.</p> <ol style="list-style-type: none"> 2. Present research results at a workshop in Port Lincoln each year to which industry and other interested stakeholders will be invited and encouraged to attend. Proceedings of the workshop will be published and made available to stakeholders. 3. At least twice-yearly meetings between the Subprogram Leader and individual companies involved in SBT aquaculture. This will involve discussion of R&D outcomes and priorities as they relate to their company. Principal Investigators will also participate where appropriate. 4. Develop and maintain a web site to make readily available information on the SBT Aquaculture Subprogram and its activities. 5. Ensure the effective operation of a Communications Subcommittee to facilitate the coordination, dissemination and appropriateness of presentations, publications and media releases relating to the Subprogram. 6. Encourage the dissemination of R&D results in scientific as well as non-scientific publications, the former to ensure peer review of methodology and outcomes, and the latter to disseminate the outcomes as widely as possible. 7. Specifically identifying the time allocated to and costs of communication in future R&D project proposals to ensure that stakeholders recognise the significance of these activities. 8. Build relationships with information providers and the news media to raise the industry's profile and promote an accurate image of its SBT aquaculture activities. 9. Continue to build upon existing information pathways and identify new pathways that are relevant to the needs of stakeholders.
People Development and Support	<ol style="list-style-type: none"> 1. Regular presentation of research results to industry forums and, where appropriate, through short training courses or practical workshops. 2. Ongoing liaison with secondary and tertiary educational institutions to continue to provide work experience to highly motivated students interested in experiencing the R&D activities associated with the Subprogram. 3. Ongoing liaison with tertiary educational institutions based in Port Lincoln, South Australia, interstate and overseas, to provide opportunities for collaborative postgraduate R&D where this provides mutual benefit to the core activities of the Subprogram. 4. Where requested, and on a cost-recovery basis, participate in the development or presentation of educational curriculum targeted at topics such as farm management, nutrition, environmental assessment and monitoring, fish health and product quality. This activity will only be undertaken where it is suited to the expertise of those involved in the Subprogram, unavailable in existing educational institutions and able to be coordinated with primary R&D activities. 5. Presentation of training sessions on the Industry Code of Practice for tuna aquaculture in South Australia.
Work Environment	<ol style="list-style-type: none"> 1. Focused negotiations by the Subprogram with the TBOASA, South Australian Government, the FRDC and others to obtain agreement on a R&D funding policy that achieves the desired outcomes, where these are dependent on: the purchase and maintenance of essential infrastructure and equipment; salaries, employment

continuity and work hours appropriate to attract and retain capable and experienced R&D staff; and the maintenance of high standards of OHS&W in the work environment.

2. The assessment of alternative methods for undertaking the desired research to determine their relative effectiveness, costs and scientific robustness (the level of confidence that can be placed in the results). Examples include: the use of surrogate species where appropriate; evaluating the use of blood chemistry to determine nutritional status of SBT; the use of onshore rather than offshore facilities; the use of commercial farms rather than the existing Tuna Research Farm; and contracting farm operations and maintenance services rather than directly employing the necessary staff and equipment.

7.4 TUNA RESEARCH FARM, BOSTON BAY, PORT LINCOLN AND OTHER CORE FACILITIES

The direction of the research farm was reviewed annually (~September of each year) to learn from the previous years activities and develop strategies to overcome any issues identified.

In the years prior to 2001 core SBT research involved a number of small pontoons and small numbers of SBT on a SARDI site, located in Rotten Bay to undertake research requiring sheltered waters. The 2001 review of the Tuna Research Farm decided that in 2002 research should be moved to a commercial site in Boston Bay that was managed by SARDI. The 2002 review decided that research should be moved off-shore to a more exposed location typical of industry sites and so in 2003 the Tuna Research Farm was located to a commercial off-shore farm but still managed by SARDI. The 2003 review decided that research was to be upgraded to a fully commercial off-shore farm managed by DI Fishing Co Pty Ltd.

In 2003 the Subprogram coordinated the selling of the SARDI research vessel 'Bojangles' and the purchase of the new research vessel 'Breakwater Bay'. The Subprogram has also coordinated the upkeep of these vessels, including a major upgrade to 'Breakwater Bay' after purchase to address a range of OH&S issues, as well coordinating the use of these vessels by various research projects. Since purchasing the new vessel it has been used extensively off Port Lincoln by a number of SBT projects.

The Subprogram has also been heavily involved in the purchase and coordinated use of the SARDI Australasian Experimental Stockfeed Extrusion Centre at Roseworthy, operated by Dr Robert van Barneveld and Geoff Wyatt, which has played an important role in R&D associated with the development and optimisation of pelleted feeds for SBT.

Additional core facilities, including the construction of a 12-tank (5000L) system for future surrogate nutrition studies at SARDI, West Beach have also been successfully managed through the Subprogram.

7.5 PROJECTS

Twelve Subprogram projects have been completed since 1997. Currently within the Subprogram there are 21 active projects, 8 of which are new projects starting in 2004/05, including the new Subprogram coordination, facilitation and administration project and 1 project extension. All current projects are within the Aquafin CRC. Of the current projects 4 are in the Feeds and Nutrition area; 4 in the Environment area; 3 in the SBT Health area; 3 in

the Product Diversification, Quality and Marketing area; 2 in the Administration and Communication area and 5 in the Farm Husbandry and Management area.

7.5.1 Past research Projects

Project Number	Full project title	Principal Investigator
FRDC 1997/361	Project 1: Implementation and coordination of research experiments conducted with caged SBT, to assess manufactured diets, feeding regimes and harvesting techniques.	Mr Steven Clarke – SARDI, Dr Jeffrey Buchanan - SARDI and Dr Brett Glencross – SARDI.
FRDC 1997/362	Project 2: Development and optimisation of manufactured feeds for SBT.	Dr Robert van Barneveld - Barneveld Nutrition.
FRDC 1997/363	Project 3: Experimental analyses of the effects of ration and feeding frequency on the thermodynamics energetics, growth and condition of farmed SBT.	Dr John Gunn - CSIRO and Ms Kirsten Rough – TBOASA.
FRDC 1997/364	Project 4 Effects of husbandry and handling techniques on the post harvest quality of farmed SBT.	Mr Bruce Goodrick and Dr Brian Paterson.
FRDC 1999/056 (previously 1991/056)	Growout of Southern Bluefin Tuna (SBT)	Mr Brian Jeffriess – TBOASA.
1999/376	Southern Bluefin Tuna Aquaculture Subprogram: development of a strategic plan for the propagation of Southern Bluefin Tuna (SBT).	Ms Paula Shoulder- Department of Agriculture, Fisheries and Forestry – Australia.
2000/219 and 2002/219	Southern Bluefin Tuna Aquaculture Subprogram: management, service delivery, infrastructure and technical support	Mr Steven Clarke – SARDI.
FRDC 2000/220	Southern Bluefin Tuna Aquaculture Subprogram: use of steam extrusion and nutritional surrogates to develop a suitable manufactured diet to replace bait fish as the primary source of nutrients for southern bluefin tuna.	Dr Robert van Barneveld - Barneveld Nutrition.
FRDC 2000/221	Southern Bluefin Tuna Aquaculture Subprogram: quality and nutritional evaluation of baitfish used for tuna farming.	Ms Kirsten Rough and Mr David Ellis – TBOASA.
FRDC 2001/252	Aquafin CRC - Southern Bluefin Tuna Aquaculture Subprogram: infrastructure management, service delivery and technical support	Dr Jeff Buchanan – SARDI.
FRDC 2001/253	Aquafin CRC - SBT Aquaculture Subprogram: a risk assessment of factors influencing the health of farmed southern bluefin tuna.	Dr Barbara Nowak - University of Tasmania.
FRDC 2000/247	Southern Bluefin Tuna Aquaculture Subprogram: using contemporary grading technologies to maximise product quality of farmed tuna: Husbandry and seasonal effects on muscle development, fat content and flesh colour.	Dr Philip Thomas - Flinders University.

7.5.2 Current research projects

Project Number	Full project title	Principal Investigator
FRDC 2000/221.20	Aquafin CRC - FRDC Southern Bluefin Tuna Aquaculture Subprogram: quality and nutritional evaluation of baitfish used for tuna farming project 2000/221 (extension).	Dr Jeff Buchanan – SARDI.
FRDC 2001/102	Aquafin CRC - SBT Aquaculture Subprogram: tuna environment subproject 1: development of novel methodologies for cost effective assessment of the	Prof. Anthony Cheshire – SARDI.

	environmental impact of aquaculture.	
FRDC 2001/103	Aquafin CRC - SBT Aquaculture Subprogram: tuna environment subproject 2 - evaluation of waste composition and waste mitigation strategies.	Prof. Anthony Cheshire – SARDI.
FRDC 2001/104	Aquafin CRC - SBT Subprogram: tuna environment subproject 3 - development of regional environmental sustainability assessments for tuna sea-cage aquaculture.	Prof. Anthony Cheshire – SARDI.
FRDC 2001/200	Aquafin CRC: SBT Aquaculture Subprogram: tuna cell line development and their application to tuna aquaculture health surveillance.	Dr Mark Crane – CSIRO.
FRDC 2001/201	Aquafin CRC - SBT Aquaculture Subprogram: commercialisation trials for a manufactured tuna feed.	Mr Hagen Stehr - Stehr Group Pty Ltd.
FRDC 2000/247 and 2001/248	Aquafin CRC - SBT Aquaculture Subprogram: maximising the control of quality in farmed SBT.	Dr Philip Thomas - Flinders University.
2001/249	Aquafin CRC - SBT Aquaculture Subprogram: development and commercial evaluation of manufactured diets.	Dr Robert van Barneveld - Barneveld Nutrition and Craig Foster - Skretting Australia.
FRDC 2001/250	Aquafin CRC - SBT Aquaculture Subprogram: coordination, facilitation and administration.	Mr Steven Clarke – SARDI.
FRDC 2002/249	Aquafin CRC - SBT Aquaculture Subprogram: service delivery and infrastructure management for projects requiring Port Lincoln based R&D support.	Dr Jeff Buchanan - SARDI and Mr David Ellis - Aquaculture Management Consultants Pty Ltd.
FRDC 2003/225	Aquafin CRC - SBT Aquaculture Subprogram: investigation of the relationship between farming practices and southern bluefin tuna health.	Dr Barbara Nowak - University of Tasmania.
FRDC 2003/226	Aquafin CRC - Southern Bluefin Tuna Aquaculture Subprogram: pilot study into the use and efficacy of antifoulants on the nets used for southern bluefin tuna (<i>Thunnus maccoyii</i>) culture, including residue status of tuna and the surrounding environment.	Ms Kirsten Rough – TBOASA.
FRDC 2003/227	Aquafin CRC - SBT Aquaculture Subprogram: development and validation of baitfish sampling methods to address international residue standards for southern bluefin tuna (<i>Thunnus maccoyii</i>).	Mr David Padula – SARDI.
FRDC 2003/228	Aquafin CRC - SBT Aquaculture Subprogram: activity metabolism in live-held southern bluefin tuna (<i>Thunnus maccoyii</i>).	Dr Richard Musgrove – SARDI.
FRDC 2004/085	Detection of SBT pathogens in environmental samples.	Dr Kathy Ophel-Keller – SARDI.
FRDC 2004/205	Aquafin CRC - SBT Aquaculture Subprogram: provision of research platforms for projects requiring Port Lincoln based R&D support.	Mr David Ellis - Aquaculture Management Consultants Pty Ltd.
FRDC 2004/206	Aquafin CRC - SBT Aquaculture Subprogram: management of food safety hazards in farmed southern bluefin tuna to exploit market opportunities.	Mr David Padula – SARDI.
FRDC 2004/207	Aquafin CRC - SBT Aquaculture Subprogram: integrated farm support system (IFSS) for tuna aquaculture.	Dr Chris Jackson – CSIRO.
FRDC 2004/209	Aquafin CRC - SBT Aquaculture Subprogram: dietary supplements for reducing oxidative stress and improving flesh quality attributes in SBT.	Dr Philip Thomas - Flinders University.
FRDC 2004/212	Aquafin CRC - FRDC - SBT Aquaculture Subprogram: assessment of alternative platforms for southern bluefin tuna research.	Mr Wayne Hutchinson – SARDI.
FRDC 2004/216	Aquafin CRC - SBT Aquaculture Subprogram: coordination, facilitation and administration.	Mr Steven Clarke – SARDI.

7.6 COORDINATION AND ADMINISTRATION OF THE SBT AQUACULTURE SUBPROGRAM AND MEETINGS

7.6.1 Management

Subprogram Leader

The Subprogram Leader provided leadership, and with the Aquaculture Projects Coordinator, administrative support and facilitation of communication for the Subprogram. The Subprogram Leader and the Aquaculture Projects Coordinator ensured that:

1. Milestones objectives were met on time.
2. Projects were coordinated and integrated within the Subprogram.
3. Meetings and workshops were organised efficiently, including the occasional overseas delegations.
4. Subprogram reports and Tuna-briefs were coordinated and delivered.
5. Advice was provided to both Steering and Scientific Committees.
6. Subprogram outcomes were promoted through effective and efficient extension.

Steering Committee

Steering Committee meetings were held between 1997/98 – 2003/04, occurring quarterly (two meetings were face-to-face in Port Lincoln and two by teleconference) since 2001. The Agenda and Briefing papers were distributed prior to meetings, followed by detailed Minutes after the meetings. The Steering Committee was originally chaired by the TBOASA Executive Director, Brian Jeffriess and then by an independent Chair, Richard Stevens' since 2001. In 2004 non-active members (2 industry and 1 scientific) stepped down from the Committee to allow new members to be involved. Two new industry members have recently been appointed. Aquafin CRC Program Leaders and Project Principal Investigators attended the face-to-face meetings in Port Lincoln to provide progress reports on Aquafin CRC Programs and Subprogram Projects. External speakers were also invited to attend meetings and presented on specific topics occasionally.

The Steering Committee coordinated the overall management of the Subprogram (operational plans, budgets and communications). The Steering Committee have been dedicated to overseeing research within the Subprogram, ensuring projects were consistent with industry objectives as outlined in the SBT Aquaculture Subprogram R&D Plan and duplication of research was avoided. A key objective of the Steering Committee was to provide advice and enhance existing and new proposals. In doing this, they have contributed to the large number of successful R&D applications that have resulted in a substantial increase in total R&D funds from all sources in recent years (increasing from \$2,807,318 in 1997/98 to \$10,522,959 in 2003/04). The Steering Committee were also involved in the development of the successful bid for a new CRC for Sustainable Aquaculture of Finfish focusing on tuna and salmon, (Aquafin CRC).

Scientific meetings

Scientific group meetings were held twice a year from 1997/98 to 2003/04. A core group of Aquafin CRC Program Leaders, Principal Investigators, project scientists, SBT farm company

scientific and technical people, and TBOASA scientific and technical people, attended these meetings.

The Scientific group ensured that the use of R&D resources was optimised and duplication was avoided. It facilitated R&D project collaboration and coordination by developing optimised operational and budget plans; reviewing project methodology, progress and direction; and optimised and coordinated communication of research results to stakeholders. Meetings provided the opportunity to develop and discuss the direction of new research proposals as well as develop synergies within and between project groups. Industry members were invited to Scientific meetings, providing them with an opportunity to keep up to date with research and comments on current and future projects.

Normally a number of Steering Committee members also attended to provide continuity between meetings.

Communications Subcommittee

The Communications Subcommittee consisted of 5 members including the Subprogram Leader and Executive Director of TBOASA and a representative from FRDC; Aquafin CRC and industry.

The Communications Subcommittee was responsible for ensuring that material produced from the Subprogram (including abstracts, PowerPoint presentations, scientific papers, posters, radio interviews, newspaper (local and state) articles, FRDC newsletter articles and Aquasplash articles) met with contractual obligations, were politically consistent and in line with industry objectives. The scientific content of material produced was checked by the relevant Aquafin CRC Program Leader prior to the material going to the Subprogram Leader and the Subprogram.

7.6.2 Industry Workshops; Scientific and Steering Committee meetings

The Industry Workshop was held annually in Port Lincoln; Scientific meetings were held twice a year in Port Lincoln and the Steering Committee met quarterly (2 face-to-face meetings in Port Lincoln and two tele-conferences).

Date	Title/topic
09/07/98	Steering Committee meeting (SARDI)
13/07/98	Scientific Advisory Committee meeting (Port Lincoln)
14/07/98	Industry Workshop (Port Lincoln)
25/11/98	Industry Workshop (Port Lincoln)
26/11/98	Scientific Advisory Committee meeting (Port Lincoln)
27/11/98	Steering Committee meeting (Port Lincoln)
17/11/98	Scientific Advisory Committee meeting (Port Lincoln)
18/11/98	Industry Workshop (Port Lincoln)
19/11/99	Steering Committee meeting (Port Lincoln)
04/08/00	Steering Committee meeting (Port Lincoln)
17/08/00	Scientific Advisory Committee meeting (Port Lincoln)
18/08/99	Industry Workshop (Port Lincoln)
02/08/00	Scientific Advisory Committee meeting (Port Lincoln)
03/08/00	Industry Workshop (Port Lincoln)
28/11/00	Steering Committee meeting (Port Lincoln)
08/02/01	Scientific Advisory Committee meeting (Port Lincoln)

09/02/01	Steering Committee tele-conference
13/06/01	Steering Committee meeting (Port Lincoln)
04/09/01	Steering Committee tele-conference
12/11/01	Scientific Advisory Committee meeting (Port Lincoln)
13/11/01	Industry Workshop (Port Lincoln)
14/11/01	Steering Committee meeting (Port Lincoln)
19/02/02	Steering Committee tele-conference
30/07/02	Steering Committee meeting (Port Lincoln)
10/09/02	Steering Committee tele-conference
04/11/02	Industry Workshop (Port Lincoln)
05/11/02	Scientific Advisory Committee meeting (Port Lincoln)
06/11/02	Steering Committee (Port Lincoln)
25/11/02	Steering Committee tele-conference
10/02/03	Steering Committee tele-conference
03/06/03	Steering Committee meeting (Port Lincoln)
12/09/03	Steering Committee tele-conference
03/11/03	Industry Workshop (Port Lincoln)
04/11/03	Scientific Advisory Committee meeting (Port Lincoln)
05/11/03	Steering Committee (Port Lincoln)
25/02/04	Scientific Advisory Committee meeting (Port Lincoln)
26/02/04	Steering Committee tele-conference
31/05/04	Scientific Advisory Committee meeting (Port Lincoln)
01/06/04	Steering Committee meeting (Port Lincoln)

Ad-hoc project scientific workshops and annual (March – June) industry R&D priority setting R&D meetings were also facilitated.

7.6.3 Briefing papers

Briefing papers were distributed to all Steering Committee members one week prior to each Steering Committee meeting. Briefing papers contained:

- Minutes from the last Steering Committee meeting.
- Steering Committee Action List.
- Subprogram Leaders Report.
- Project Progress Reports.
- Communications.
- Relevant documents under Other Business.

Electronic copies of the Briefing Papers are available on the attached DVD.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee meeting, July, 1998.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee meeting, November, 1998.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee meeting, November, 1999.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee meeting, August, 2000.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee meeting, November, 2000.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee teleconference, February, 2001.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee meeting, June, 2001.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee teleconference, September, 2001.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee meeting, November, 2001.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee teleconference, February, 2002.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee meeting, July, 2002.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee teleconference, September, 2002.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee meeting, November, 2002.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee teleconference, November, 2002.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee teleconference, February, 2003.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee meeting, June, 2003.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee teleconference, September, 2003.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee meeting, November, 2003.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee teleconference, February, 2004.

Southern Bluefin Tuna Aquaculture Subprogram: briefing papers. Steering Committee meeting, June, 2004.

7.6.4 Annual operating plan

An AOP has been submitted to FRDC each year since 2001. Each plan outlined:

- Activity description for the last 12 months (including sector progress; major research outcomes of the Subprogram; related projects and linkages; role the Subprogram has played in industry development; operational procedures; meetings and workshops and summary of current financial status).
- Summary of strategic plan or directions.
- Communications and technology transfer activities.
- Proposed new research.
- Workplan for the next 12 months.
- Budget.
- Recommendations/variations.

Electronic copies of the AOP are available on the attached DVD.

Clarke, S and Bushell, J (2000). Annual Operating Plan - 2001. Southern Bluefin Tuna Aquaculture Subprogram. December 2000, 16pp.

Clarke, S and Bushell, J (2001). Annual Operating Plan - 2002. Southern Bluefin Tuna Aquaculture Subprogram. December 2001, 14pp.

Clarke, S and Bushell, J (2002). Annual Operating Plan - 2003. Southern Bluefin Tuna Aquaculture Subprogram. December 2002, 25pp.

Clarke, S., Bushell, J and Ham, J (2003). Annual Operating Plan - 2004. Southern Bluefin Tuna Aquaculture Subprogram. December 2003, 34pp.

7.7 COMMUNICATIONS

7.7.1 Tuna-brief newsletters

Tuna-brief newsletters were distributed to industry and researchers to provide updates on various research projects. A minimum of 6 Tuna-briefs per year were published since 2001.

Electronic copies of Tuna-briefs are available on the attached DVD.

1998

Glencross, B and Thomas, P (1998). What's in a pilchard? Tuna-brief, October 1998, 2pp. SBT Aquaculture Subprogram.

Glencross, B and Buchanan, J (1998). Seasonality, growth and condition. Tuna-brief, November 1999, 2pp. SBT Aquaculture Subprogram.

Smart, A and Thomas, P (1998). Development of a non-destructive flesh sampling knife. Tuna-brief, September 1998, 2pp. SBT Aquaculture Subprogram.

1999

Thomas, P., Glencross, B and Buchanan, J (1999). Seasonality, and fat levels. Tuna-brief, December 1999, 2pp. SBT Aquaculture Subprogram.

2000

Buchanan, J (2000). 2000 experimental program – better binding, better performance. Tuna-brief, April 2000, 2pp. SBT Aquaculture Subprogram.

Goodrick, B (2000). Tuna flesh colour measurement. Tuna-brief, January 2000, 2pp. SBT Aquaculture Subprogram.

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Nowak, B. (2004). Update on the SBT Health Subprogram and upcoming events. Tuna-brief, No: 2004-3, 2pp. SBT Aquaculture Subprogram.

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Thomas, P. (2004). Update of the Product Quality Subprogram. Tuna-brief, No:2004-4, 4pp. SBT Aquaculture Subprogram.

7.7.2 Industry Handbooks

An Industry Workshop was held annually by the SBT Aquaculture Subprogram. Workshop Handbooks were distributed at each workshop. Approximately 30-50 people attended each workshop with representatives from approximately three quarters of the SBT companies.

Electronic copies of the Industry Handbooks are available on the attached DVD.

Clarke, S and Bushell, J (Editors) (1999). Industry Workshop, Port Lincoln, 18th August 1999. Southern Bluefin Tuna Aquaculture Subprogram, August 1999, 135pp.

Clarke, S and Bushell, J (Editors) (2000). Industry Workshop, Port Lincoln, 3rd August 2000. Southern Bluefin Tuna Aquaculture Subprogram, August 2000, 235pp.

Clarke, S and Bushell, J (Editors) (2001). Industry Workshop Proceedings, 13th November, 2001. Southern Bluefin Tuna Aquaculture Subprogram, November 2001, 306pp.

Clarke, S and Bushell, J (Editors) (2002). Industry Workshop Handbook, 4th November 2002. Southern Bluefin Tuna Aquaculture Subprogram, November 2002, 93pp.

Clarke, S and Bushell, J (Editors) (2003). Industry Workshop Handbook, 3rd November 2003. Southern Bluefin Tuna Aquaculture Subprogram, November 2003, 84pp.

Clarke, S., Spehr, M and Wright, G (Editors) (1998). Industry Workshop, Port Lincoln, 14th July 1998. Southern Bluefin Tuna Aquaculture Subprogram, July 1998, 209pp.

7.7.3 Final Reports

Six final reports have been completed and distributed to industry.

Electronic copies of the final reports are available on the attached DVD.

Buchanan, J. (2002). Aquafin CRC – Southern Bluefin Tuna Aquaculture Subprogram: infrastructure management, service delivery and technical support. FRDC Project No. 2000/219 and 2001/252, 15pp.

Goodrick, G.B., Thomas, P.T., Paterson, B.D and Smart, A (2002). Southern Bluefin Tuna Aquaculture Subprogram Project 4: Effects of husbandry on the post harvest quality of farmed southern bluefin tuna. Centre of Food Technology, Queensland Department of Primary Industries. FRDC Project No. 97/364, 59pp.

Gunn, J., Patterson, T and Rough, K (2002). Experimental analysis of the effect of feed ration and feeding frequency on the thermodynamics, energetics, growth and condition of farmed Southern Bluefin Tuna. CSIRO Marine Research, FRDC Project No. 37/363, 176pp.

Nowak, B., Rough, K., Ellis, D., Crane, M., Cameron, A and Clarke, S (2003). A risk assessment of factors influencing the health of southern bluefin tuna. FRDC Project No. 2001/253, 137pp.

van Barneveld, R.J., Carter, C.G., Glencross, B.D and Clarke, S.M. (2001). Southern Bluefin Tuna (*Thunnus maccoyii*) Aquaculture Subprogram. Project 2: Development and optimisation of manufactured feeds for farmed Southern Bluefin Tuna. FRDC Project No. 97/362, 119pp.

van Barneveld, R.J., Carter, C.G., Tivey, D.R. and Brooker, J.D. (1998). Development of an *In vitro* assay for the assessment of alternative protein sources for use in artificial diets for farmed southern bluefin tuna (*Thunnus maccoyii*). FRDC Project No. 95/068, 378pp.

7.7.4 Other Reports

The Subprogram assisted in the production of the following reports.

An Electronic copy of the reports are available on the attached DVD.

Buchanan, J (2001). SARDI procedures manual for SBT research operations, Port Lincoln, SA. SBT Aquaculture Subprogram, 23pp.

Haskard, K., Su, S., Buchanan, J., Madigan, S and Clarke, S (2001). Power analysis for SBT aquaculture feed development experiments (Microsoft® PowerPoint® presentation). Biometrics SA, South Australian Research and Development Institute, Aquatic Sciences, 11pp.

Haskard, K., Su, S., Buchanan, J., Madigan, S and Clarke, S (2001). Power tables for southern bluefin tuna (*Thunnus maccoyii*) feed development experiment. Biometrics SA, South Australian Research and Development Institute, Aquatic Sciences, 21pp.

Rough, K (2004). An illustrated guide to the parasite of southern bluefin tuna, *Thunnus maccoyii*. Tuna Boat Owners of South Australia, 2000, 74pp.

7.7.5 SBT Aquaculture Subprogram web site

In 1998 a Subprogram web site was established. In 2003/04 the web site underwent a major upgrade, including the development of its own template and the development of two login protected areas (Tuna Industry area and the Steering Committee area). The use of the limited access sites has enabled the web site to be used much more extensively to provide available information to industry (eg. all previous project final reports) and greatly reduced the amount of information that needed to be e-mailed in the way of briefing papers to Steering Committee members.

Further upgrades of the web site are planned, including the inclusion of a number of databases:

- a) Real-time environmental data coming from the telemetry system located in the Boston Island SBT Farming Zone (and in the future data from another telemetry system in the Rabbit Island Zone); and
- b) Industry historical microalgal data, but with the capacity to add and query past as well as any future microalgal data that companies or researchers may wish to add.

Increasing the amount of general information available on the web site, particularly historical information will be an ongoing process.

8 Benefits and adoption

The primary achievement of the current project has been the increased success of funding for R&D through Aquafin CRC and FRDC, with \$8,745,013 (not including contributions from other sources) of research funds invested between 1997/98 to 2003/04. The contribution of the Subprogram to the establishment and ongoing success of the Aquafin CRC, further enhancing R&D funding, has also been a major benefit of the Subprogram.

Other key benefits included:

1. Providing a framework for an orderly and structured approach to R&D, including the production of the SBT Aquaculture Strategic Plan 2001-2006, involving all relevant stakeholders.
2. Providing the opportunity for all levels of industry and relevant stakeholders to be informed of R&D progress and to participate in the future direction of R&D.
3. Improved management and review of existing projects, ensuring they are in line with the changing priorities of industry.

4. Improved communication of the Subprogram progress through the timely delivery of briefing papers to the Steering Committee, the annual production of the Industry Workshop Handbook, the annual production of an AOP to FRDC and delivery of project reports to Aquafin CRC and FRDC.
5. Successful running of Scientific meetings, increasing the communication between researchers and providing the opportunity to develop and discuss the direction of new research proposals as well as develop synergies within and between project groups.
6. Improved dissemination of research results to all relevant stakeholders through regular Tuna-briefs, the annual Industry Workshop, meetings and smaller focused workshops.

9 Further development

Based on the successes of this current project a new project proposal for the continued administration, coordination and facilitation of the Subprogram to 2007/2008 has recently been submitted and approved in the 2005/06 FRDC round. The project proposal was strongly supported by Aquafin CRC, FRDC and SBT Industry (TBOASA) based on the outcomes of the current project to date.

The objectives of the new project are:

1. Strategic Planning: provide a coordinated R&D program addressing the focus areas of the Strategic R&D Plan: 2001-2006 for the SBT Aquaculture Industry and the specified R&D objectives and outcomes of the Aquafin CRC Commonwealth Agreement. Review and update the R&D Plan on an annual basis.
2. Administration: coordinate and manage project, subprogram and program milestones, variations, budgets, communications and meetings relevant to the SBT Aquaculture Subprogram.
3. Information Technology Transfer: disseminate information to facilitate the uptake and commercialisation of research outcomes via "Tuna-brief" newsletters, an annual industry conference (including published Conference Proceedings), industry workshops, meetings with individual companies and a regularly updated web site.

10 Planned outcomes

The SBT Aquaculture Subprogram successfully achieved the planned outcomes for this project. The Subprogram has provided:

1. An orderly and structured approach to R&D associated with SBT aquaculture, with a high level of industry involvement in developing priorities, including the production of the SBT Aquaculture Strategic Plan 2001-2006. Successfully submitted 33 new project proposals, 12 past projects and 21 current projects (of the current projects 7 were in the 2004/05 FRDC round). Assisted in the success of two AusIndustry Start Graduate Employee Grants received by two commercial companies: Ajka Pty Ltd and DI Fishing Co Pty Ltd, in 2004.

2. A means to provide efficient and coordinated use of the limited resources available for SBT aquaculture related to R&D. Following reviews, core SBT research has progressed from a Tuna Research Farm using small experimental pontoons and small numbers of SBT operated by SARDI on a calm water R&D site, to one using a wave exposed commercial size pontoons and larger numbers of SBT, operated by industry on a commercial site.
3. Overall management, coordination and delivery of outcomes for all projects within the Subprogram, including milestone reports, media releases, final reports and dissemination of research results to industry through production of regular Tuna-briefs and Industry Handbooks as well as the organisation of regular meetings and workshops.

11 Conclusion

The SBT Aquaculture Industry has expanded to become a major success story since it began in 1990. Despite its successes, the industry has, and continues, to face some significant challenges. In recent years increased competition on the Japanese market from overseas suppliers of NBT, fluctuating currency exchange rates and world events such as terrorism and SARS virus have caused a decline in market price. More than ever, there is a need for well prioritised and coordinated R&D to address the key issues that will maintain or enhance the industry's competitiveness, the role of the SBT Aquaculture Subprogram.

The Subprogram, through this project, has been successful in achieving coordinated R&D that is industry focused and involves all relevant stakeholders. The management structure of the Subprogram: the Subprogram Leader, Steering Committee, Scientific group, Communication Subcommittee, as well as the strong industry support, has contributed to the success of the Subprogram, including increasing funding and support over the last 7 years; improving dissemination of research results and communications; regularly hosting well-facilitated meetings and workshops; and increasing involvement of all levels of industry and relevant stakeholders in both current and future projects.

The major client, the TBOASA, and the Aquafin CRC and FRDC have advised of their satisfaction with the Subprogram. It has met its objectives and delivered positive outcomes for the industry as well as provided strong support for the continuation of the Subprogram through the upcoming project.

12 References

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13 Appendix 1: Intellectual Property

None

14 Appendix 2: Accompanying Documents

Electronic copies of the accompanying documents are available on the attached DVD.

1. Briefing Papers (1998 - 2004)
2. Annual Operating Plans (2001 - 2004)
3. SBT Aquaculture Strategic R&D Plan 2001-2006
4. Tuna-briefs (1998 – 2004)
5. Industry Workshop Handbooks (1998 – 2003)
6. Final Reports
7. Other Reports

15 Appendix 3: Staff List

Staff engaged on the project:

1997-2004	Steven Clarke	Subprogram Leader SARDI Aquatic Sciences 2 Hamra Ave West Beach SA 5024	100%
1998-2003	James Bushell	Aquaculture Program Coordinator SARDI Aquatic Sciences 2 Hamra Ave West Beach SA 5024	70%
2003-2004	Jane Ham	Aquaculture Projects Coordinator SARDI Aquatic Sciences 2 Hamra Ave West Beach SA 5024	70%