

# Final Report

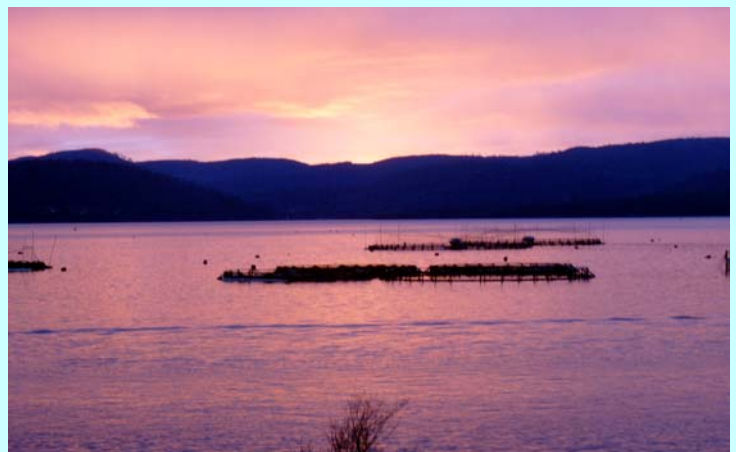


AQUAFIN CRC - FRDC ATLANTIC SALMON  
AQUACULTURE SUBPROGRAM:  
FACILITATION, ADMINISTRATION AND PROMOTION

*Stephen C. Battaglene and Jennifer M. Cobcroft*

*September 2003*

*Aquafin CRC Project 5.B.2  
(FRDC Project No. 2000/223)*



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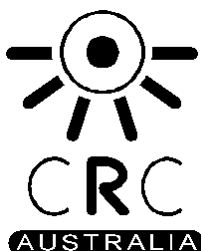
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Tasmanian Aquaculture  
& Fisheries Institute  
*University of Tasmania*



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## 2 NON TECHNICAL SUMMARY

2000/223

### **Aquafin CRC - FRDC Atlantic Salmon Aquaculture Subprogram: facilitation, administration and promotion**

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#### **OUTCOMES ACHIEVED TO DATE**

The Atlantic Salmon Aquaculture Subprogram (ASAS) has achieved several important outcomes:

1. It has established an excellent vehicle for providing greater certainty in relation to the planning, funding and management of research and development for the Atlantic salmon farming industry in Australia.
2. It has played a pivotal role in bringing industry and other stakeholders together to determine a mutually acceptable strategic direction, which resulted in the commissioning and management of a large and well-focused research portfolio.
3. It has played an important role in the establishment of the Aquafin CRC which in turn provided a significant increase in the size and number of projects, while at the same time increasing the focus in a number of key areas including health and the environment.
4. It has helped to empower industry to become more actively responsible for its own research and development.

#### **OBJECTIVES:**

1. Co-ordinate the FRDC Atlantic Salmon Aquaculture Subprogram (applications, workshops and communication).
2. Conduct an annual research workshop for the presentation of results from the Subprogram and the definition of research objectives for subsequent years.
3. Facilitate travel of Subprogram project principal investigators, a nominated industry representative and the Subprogram Leader to biannual Scientific Committee meetings.
4. Facilitate travel of industry representatives and the Subprogram Leader to quarterly Steering and Management Committee meetings.
5. Co-ordinate the preparation of and delivery a Subprogram newsletter, media releases, and workshop publications.
6. Integrate with other FRDC and externally funded Atlantic salmon programs.

#### **NON TECHNICAL SUMMARY:**

The salmon industry is one of Australia's largest aquaculture industries and produced approximately 16,000 tonnes of farmed Atlantic salmon, *Salmo salar*, in 2001/02 at an

estimated farm gate value of \$170 million. The industry is a major regional and youth employer and is based in Tasmania with a fledgling industry in South Australia. Fish are farmed towards the upper thermal limit and growth rates are extremely fast, with production taking around 30 months.

World production of salmon is now over one million tonnes. The Australian market for Atlantic salmon has been affected by world events including a global oversupply. As a consequence the majority of Australian salmon is sold on the domestic market, with only a small portion exported overseas. Tasmanian growers estimate that production costs over the past four years have risen by as much as 50%, exacerbated by significant increases in feed prices and poor growing conditions, caused by low rainfall and high water temperatures.

The rapid growth of the salmon industry during the latter half of the 1990's and the poor growing conditions have resulted in a series of challenges that currently threaten the sustainability and profitability of the industry. These challenges include the cost, control and management of disease, particularly AGD, jellyfish and algal blooms in some seasons; the high cost of providing year-round supply of fish to the markets; the interaction of cage aquaculture on the environment and the cost of monitoring and compliance of managing seal predation; the increasing cost of salmon food; and global changes in sea water temperatures. The industry meets these challenges by combining together through the Tasmanian Salmonid Growers Association (TSGA). The TSGA has an MOU with FRDC that provides a greater certainty of intent in relation to the planning, funding and managing of R&D and the adoption and commercialisation of results.

In 2000 the FRDC established a managed Atlantic Salmon Aquaculture Subprogram (ASAS) as a vehicle for the MOU. The objectives were to address risks, improve technology transfer and improve industry communication, all integral to Industry achieving its full potential. The ASAS has provided a high level of research service and has been able to address key production issues in support of industry's strategic plans. The ASAS provides a service to the Atlantic Salmon Industry both in Tasmania and the other mainland states. It represents a focal point for a range of other salmonid research projects and programs in all states. Programs currently run by the FRDC outside the Aquafin CRC (e.g., Aquaculture Nutrition Subprogram and Aquatic Animal Health Subprogram), Aquafin CRC, CSIRO, TAFI and DPIWE are all linked through the Subprogram.

In 2001, the leverage of industry research funding was enhanced through the CRC for Sustainable Aquaculture of Finfish (Aquafin CRC). The Aquafin CRC, will contribute an additional \$17million in support of the salmon and tuna aquaculture sectors in Australia over 7 years. The FRDC is a major participant in the Aquafin CRC. Overall the ASAS has achieved a leverage of approximately 1:4 TSGA funds to externally funded research funds over the life of the Subprogram. When the in-kind component of all projects is included, the leverage is approximately 1:12 with a total of around \$4 million being spent annually on research and development.

The ASAS received direction from a Steering Committee of predominantly industry leaders and managed business through the Salmon Aquaculture Implementation Committee (SAIC), comprised of key industry representatives, government and researchers. The committees met regularly and identified development opportunities, research priorities and funding strategies. The Aquafin CRC incorporates the existing

ASAS management structure with that of the Southern Blue-fin Tuna Aquaculture Subprogram, through the CEO and occasional meetings of a Joint Management Advisory Committee (JMAC).

The ASAS produced a draft five-year Strategic Plan for the research and development needs of the industry in 2001. Research was broadly categorised into six key areas: Health, Production, Nutrition, Reproduction, Genetics, and Environment. The objectives and performance indicators were listed within these areas over the short, medium and long term. In 2002, the ASAS also contributed to a Strategic Value Management Workshop run by the Department of Economic Development. In general, the promotion and development of projects has followed the Strategic Plan. However, the Australian salmon industry is the only region without a genetic selective breeding program and feasibility studies are currently being undertaken to support establishment of a cost-effective program.

Allocation of funds to the six key research areas was a function of the projects adopted into the ASAS from the FRDC and allocations originally determined by industry for the Aquafin CRC. Health has received approximately 50% of all grant funding, Environment 25% and Production 10%. There are currently ten projects approved within the ASAS portfolio. The Aquafin CRC jointly funds all but the genetics project. Four current Aquafin CRC projects are within the Health Program, three in the Environment Program and one in Production. During the first ASAS six projects have been completed and final reports processed including four adopted projects.

Of particular importance is the coordinated approach being taken to solving and managing the problems of AGD. Ultimately, the solution to AGD may be the development of a vaccine. While this is not currently a separate FRDC project it is a project within the Aquafin CRC Health Program and may be funded by the FRDC when it can be demonstrated that we understand AGD better and new research tools have been developed.

The ASAS ran effectively because it developed a good operating framework, including a sound communication strategy and well-facilitated meetings, and milestone reporting standards. Key elements of the communication and technology transfer strategy were the Annual Operating Plan, Annual Scientific Conference and Newsletter. The identity and promotion of the Subprogram was further improved through the establishment of a website and adoption of an ASAS logo. Three issues of the ASAS newsletter, *Salmon Snippets*, and detailed annual handbooks were produced and three highly successful Scientific Conferences and a range of specialist workshops and seminars were held. A publication and communication committee was established with the function of reviewing over 38 publications, press releases and other media.

The stakeholders involved in the ASAS agreed that it met its objectives and delivered positive outcomes for industry and needed to continue. A new more streamlined ASAS was proposed and approved to incorporate changes following the creation of the Aquafin CRC. In particular, the next ASAS aims to be more cost-effective and avoid duplication of tasks.

**KEYWORDS:** Atlantic salmon, aquaculture, cage culture, Tasmania, Subprogram, Aquafin CRC, FRDC, R&D.

### **3 ACKNOWLEDGMENTS**

The ASAS was a large and complex Subprogram and relied strongly on the support of a large number of organisations and individuals. We gratefully acknowledge the following organisations for making major contributions, providing guidance, and collaboration:

Aquafin CRC  
CSIRO Marine Research  
Tasmanian Aquaculture and Fisheries Institute  
Tasmanian Department of Primary Industries, Water and Environment  
Tasmanian Salmonid Growers Association

We thank all the past and present members of the Steering Committee, Scientific Implementation Committee, Salmon Aquaculture Implementation Committee and Joint Management Advisory Committee for their support and assistance. In particular, we thank Dr Peter Montague, Chief Executive Officer of the Aquafin CRC; Dr Patrick Hone, FRDC Programs Manager, and the Aquafin CRC Program Leaders, Mr Steven Clarke (Production), Dr Barbara Nowak (Health), and Dr John Volkman (Environment) for their assistance with project development and management. Our special thanks go to all the industry members who provided invaluable advice and insights into the salmon industry. In particular, we thank Dr Dom O'Brien, Mr Pheroze Jungalwalla and Dr Vicki Wadley for serving on the ASAS Publication Committee. We also thank the Project Leaders and scientists who contributed to the ASAS for their dedication and understanding, particularly during the establishment of the Aquafin CRC.

Finally, our thanks to our colleagues at TAFI for their support and to Professor Colin Buxton for encouraging us to take on the management of the Subprogram, and for providing advice and infrastructure support.



## 4 BACKGROUND

### 4.1 INTRODUCTION TO SALMON INDUSTRY

The salmon industry is one of Australia's largest aquaculture industries and produced approximately 16,000 tonnes of farmed Atlantic salmon, *Salmo salar*, in 2001/02 at an estimated value of \$170 million (Fig. 1). Market surveys predict that salmon production should reach 23,600 tonnes by 2005 with a long-term target of 50-60,000 tonnes. The latter value is based on 5% of the "animal protein" consumed in Australia, and is less than 5% of the current world production of salmon (Deloitte Touche Tohmatsu, 2000). The industry is a major regional and youth employer, with over 1000 direct employees and 3000 indirectly employed through service and processing industries. It is based on over 30 marine farms in Tasmania and a small but growing industry in South Australia. There are or have also been minor exploratory ventures in Victoria, and Western Australia. Sea cage culture of Atlantic salmon started in Tasmania in 1985 as a joint venture between government and industry. It developed quickly due to the establishment of a large hatchery, the use of proven European hatchery technology, a high level of government involvement, excellent cage culture sites, and good water quality (Jungalwalla 1989; Treadwell et al. 1991). Salmon fry are hatched and ongrown in freshwater hatcheries to around 70g and the smolt are transported to sea cages for ongrowing to a market size of 3.5-4.5 kg. Growth rates under Tasmanian conditions are extremely fast, the whole process taking around 30 months. The majority of salmon is sold on the domestic market, with a small portion exported overseas (Buxton 1999).

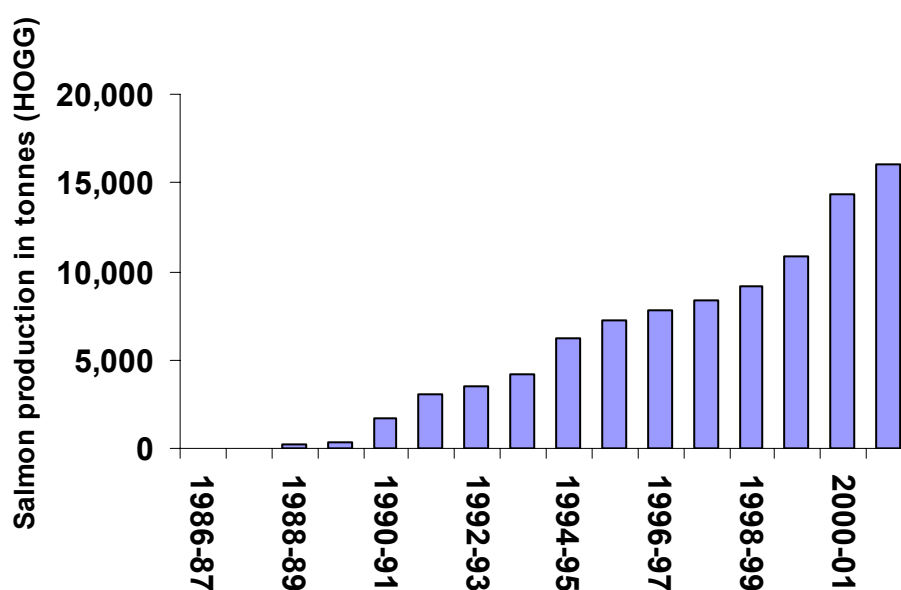


Figure 1. Salmon production in Tasmania from 1986 to 2001 (Data provided by the TSGA)

## 4.2 HISTORY OF RESEARCH AND DEVELOPMENT

The main salmon industry organisation is the Tasmanian Salmonid Growers Association (TSGA). During the past 15 years the salmon industry has overcome a number of technical and market constraints through an active program of research and development. Research and development into salmon farming has been funded from five primary sources: i) Salmon Enterprises of Tasmania (SALTAS), ii) Tasmanian Government through the Department Primary Industries Water and Environment (DPIWE) and Tasmanian Aquaculture and Fisheries Institute (TAFI), iii) Fisheries Research and Development Corporation (FRDC), iv) Aquaculture CRC and v) Aquafin CRC.

SALTAS, is a co-operative company set up by the Tasmanian government under the Salt-water Salmonid Culture Act 1985. It remains 25 % owned by Government with the major salmon producing companies as shareholders. SALTAS had a monopoly on the production of smolt for the first ten years of the industry. It also funded research and development during this period through a 25% levy on the sale of smolt and the operation of a model sea farm at Dover (Jungalwalla 1989). Research funding exceeded \$0.5 million p.a. and was directed at improving productivity of marine farms in four key areas: i) propagation, ii) health, iii) nutrition, and iv) production systems. Shareholders decided to terminate marine research and development in 1995 because of an inability to resolve concerns about equitable payment arrangements arising from the production of smolts by other companies. SALTAS has continued to research and develop its freshwater production interests. Industry support for research has been through provision of capital and in-kind contributions. In many cases individual companies have funded internal research and contracted research providers outside the main granting agencies.

DPIWE and TAFI have traditionally funded research into the monitoring and assessment of the environmental impact of sea cages on the environment. They have also provided diagnostic and technical services for the identification and control of diseases. Up until 1999, FRDC had funded at least 19 research projects into various aspects of Atlantic salmon farming at a cost of over \$5.8 million. The research was broken down into four broad categories: Disease identification and control (48%), Diet development (31%), Genetic assessment (16%), Miscellaneous projects (5%). The Aquaculture CRC started in 1994 and operated for seven years. It came on line about the time saltwater research was terminated by SALTAS and was a major research provider to the salmon industry investing over \$1.8 million in this industry sector. The CRC supported research projects in five categories: Disease identification and control (44%), bio-fouling (28%), product quality and post handling technology (18%), hatchery (7%) and diet development (3%). In-kind industry contributions to the CRC exceeded \$200,000 in total.

Research and development was coordinated during the first ten years of the industry by SALTAS who ran regular scientific and industry meetings and provided a facilitation role beyond their own research program. The Aquaculture CRC provided a similar role in latter years from a narrower research base (CRC 1999).

In 2000, the TSGA appointed a full time executive officer and strengthened its position as the peak representative body for the industry and currently represents all of the growers of salmon and trout in the State. Through an MOU with the FRDC this industry is one of the few aquaculture or wild fishery industries in Australia that commits its full 0.25% GVP contribution to research. The MOU aims to provide a greater certainty of

intent in relation to the planning, funding and managing of R&D and the adoption and commercialisation of results. In 2000 the FRDC established a managed Atlantic Salmon Aquaculture Subprogram (ASAS) as a vehicle for the MOU. The objectives were to address risks, improve technology transfer and improve industry communication, all integral to Industry meeting its full potential. The ASAS has provided a high level of research service and has been able to address key production issues in support of industry's strategic plans.

In 2001 the leverage of industry research funding was enhanced through the CRC for Sustainable Aquaculture of Finfish (Aquafin CRC). The Aquafin CRC, will contribute an additional \$17million in support of the salmon and tuna aquaculture sectors in Australia over 7 years. The FRDC is a major participant in the Aquafin CRC, which has fully integrated both ASAS and the Southern Bluefin Tuna Sub-Program as key management vehicles.

The ASAS provides a service to the Atlantic Salmon Industry both in Tasmania and the other mainland states. It represents a focal point for a range of other salmonid research projects and programs in all states. Programs currently running by the FRDC outside the Aquafin CRC (e.g., Aquaculture Nutrition Subprogram and Aquatic Animal Health Subprogram), Aquafin CRC, CSIRO, TAFI and DPIWE are all linked through the Subprogram.

## **5 NEED**

The rapid growth of the salmon industry during the latter half of the 1990's brought with it a series of challenges that threatened the sustainability and profitability of the industry. These included:

1. The cost, control and management of disease and predation, particularly AGD, seal predation and jellyfish swarms in some seasons (concepts: AGD and disease diagnostics).
2. The high cost of providing year-round supply of fish to the markets (concept: precocious maturity).
3. The interaction of cage aquaculture with the environment and the cost of monitoring and compliance (concepts: multiple users and carrying capacity).
4. The increasing cost of salmon food (concepts: pigments and animal protein replacement).
5. Management of urban and industrial development (concepts: multiple users and total catchment management).
6. Global changes in sea water temperatures (concepts: declining fertility, genetic improvement, and determination of optimal salmon sites).

The Atlantic salmon industry needed to address these constraints and socio-economic issues through a coordinated research effort to ensure sustainability, profitability and to develop to its full potential. In particular, research was required that addressed issues of immediate concern while acknowledging that some projects require long-term timeframes. There was therefore a need to promote a strategic plan and to develop collaborative research projects that addressed industry bottlenecks and avoided duplication and unnecessary expenditure of a finite research fund. The ASAS was established in 2000 to deliver a mechanism for the required collaboration while efficiently addressing strategic research priorities identified by industry and other stakeholders. It should be noted that the Subprogram was restricted to Atlantic salmon and was not a salmonid Subprogram.

## **6 OBJECTIVES**

1. Co-ordinate the FRDC Atlantic Salmon Aquaculture Subprogram (applications, workshops and communication).
2. Conduct an annual research workshop for the presentation of results from the Subprogram and the definition of research objectives for subsequent years.
3. Facilitate travel of Subprogram project principal investigators, a nominated industry representative and the Subprogram Leader to biannual Scientific Committee meetings.
4. Facilitate travel of industry representatives and the Subprogram Leader to quarterly Steering and Management Committee meetings.
5. Co-ordinate the preparation of and delivery a Subprogram newsletter, media releases, and workshop publications.
6. Integrate with other FRDC and externally funded Atlantic salmon programs.

## 7 METHODS

### 7.1 SUBPROGRAM MISSION, VISION, AND GOALS

**Mission:**

To research, promote and further develop a sustainable Atlantic salmon industry in Australia.

**Vision:**

To provide timely research and development outcomes that help to secure rapid and sustainable growth of the Atlantic salmon industry in Australia

**Goals:**

1. Involve industry in all facets of research and development to ensure adoption of the outcomes.
2. Develop research outcomes that result in increased profitability and reduced risk for the Atlantic salmon aquaculture industry.
3. To empower industry to be actively responsible for its own research and development.
4. To develop a communication strategy that delivers results in a timely and readily useable form.

### 7.2 SUBPROGRAM COMPONENTS

The research strategy was formulated with the direct assistance of the salmon industry using as a guide the five-year strategic research plan for the Tasmanian Aquaculture and Fisheries sector that was completed in 1998 (Buxton 1999). It included four existing FRDC projects related to salmon and two proposals approved by the Tasmanian Fisheries Research Advisory Board (TasFRAB) and submitted to FRDC at the same time as the ASAS application (Table 1). Research and management was divided into 6 key areas:

1. Strategic management
2. Reproduction
3. Genetics
4. Health
5. Nutrition And Product Quality
6. Environment

The project structure was constrained by the need to incorporate existing and endorsed FRDC projects. However, there was a good mix of disciplines, researchers and organisations involved in the research base at that time. Under represented areas included post harvest handling, the effects of climate change, year-round production of smolt and economic analysis of production models.

### 7.3 MANAGEMENT STRUCTURE

The ASAS received direction from a Steering Committee of predominantly industry leaders and managed business through the Salmon Aquaculture Implementation Committee (SAIC) comprised of key industry representatives and researchers. The committees met regularly and identified development opportunities, research priorities and funding strategies. The Aquafin

CRC incorporates the existing ASAS management structure with that of the Southern Blue-fin Tuna Aquaculture Subprogram through a Joint Management Advisory Committee (JMAC).

### **7.3.1 Subprogram Leader**

The role of the Subprogram Leader was to manage the Atlantic Salmon Aquaculture Subprogram to ensure that:

1. Milestone objectives are met on time
2. Projects are coordinated and integrated with the Subprogram
3. Meetings and workshops are organised efficiently
4. Subprogram reports and newsletters are coordinated and delivered
5. Advice is provided to both Steering and Implementation Committees
6. Subprogram outcomes are promoted through effective and efficient extension

### **7.3.2 Steering Committee**

The Steering Committee provided overall management direction for the Subprogram. Its role was to:

1. Identify development opportunities
2. Develop research priorities
3. Develop funding strategies
4. Initiate independent scientific reviews
5. Ensure no duplication of efforts
6. Assess the Subprogram's outcomes in terms of objectives and benefits to industry.

### **7.3.3 Salmon Aquaculture Implementation Committee**

The SAIC role was predominantly in project management and to implement the decisions of the Steering Committee and the Aquafin CRC. It aimed to:

1. Review existing research directions within the guidelines of the FRDC contractual agreement.
2. Prioritise new research proposals and develop a priority list that can be used by other funding agencies.
3. Develop and regularly review a Strategic Plan with key performance indicators.
4. Ensure that research outcomes are commercially focused and outcome driven.
5. Review industry financial and in-kind contributions.
6. Coordinate industry and research provider involvement so as to maximise usage of available resources and leverage from other research and development investment sources.
7. Provide research direction to the relevant Fisheries Research Advisory Bodies (FRABs).
8. Facilitate industry extension and technology transfer.
9. Advise on flexible components of budget expenditure.
10. Develop an appropriate and approved media policy.
11. Ensure efficient and effective reporting structures.
12. Promote the Subprogram and its achievements so that it can become the focus for all research on Atlantic salmon.
13. Develop an Annual Operating Plan (AOP) for key stakeholders including the FRDC Board.

## **7.4 KEY MANAGEMENT PROCESSES**

### **7.4.1 *Meetings, workshops and conferences***

Meetings of the Steering Committee were originally planned to take place twice a year and the Implementation Committee every 4 months. However, meeting frequency was greater during the development phase and changed in response to the incorporation of Aquafin CRC business.

An annual research conference was run each year to ensure that research results and project progress was disseminated to as wide an audience as possible so that all members of the Atlantic salmon industry and stakeholders could benefit from the research.

Specialist workshops and reviews were conducted as required.

### **7.4.2 *Reporting***

Project milestone reports were forwarded to the Subprogram Leader who circulated them to the SAIC for comment and endorsement. Six monthly compilation milestone reports for the ASAS were then sent to FRDC and committee participants. Each project was responsible for its own financial reporting.

A comprehensive handbook was produced prior to the Annual Scientific Conference. The handbook took the form of compiled project summaries in each of the key research areas. The Subprogram Leader produced an Annual Operating Plan (AOP) in December each year outlining the current project mix, new proposals and financial details and research priorities for the coming year. Detailed minutes from the management meetings were kept and circulated.

## **8 RESULTS/DISCUSSION**

### **8.1 INDUSTRY DEVELOPMENT**

Salmon production in Tasmania has more than doubled since 1996 (Fig. 1). Latest production figures from industry indicate 16,000 tonnes (HOGG) were produced in 2001/02 worth an estimated \$170 million. This was an increase of some 10% on the previous year (Fig. 1). The market for Atlantic salmon has been affected by world events including a global oversupply. World production of Atlantic salmon is now over one million tonnes. Tasmanian growers estimate that production costs over the past four years have risen 50% with significant increases in feed prices and poor growing conditions, particularly from 1999 through 2001, caused by low rainfall and high water temperatures. In 2002 and 2003 Tasmania experienced mixed growing conditions. There was good spring rainfall and cooler water temperatures followed by less favourable conditions. Drought, high water temperatures and increased jellyfish and algal blooms have been experienced at some grow-out sites. The industry continues to have high costs associated with the control of AGD. A series of protocols are being developed through the Seal Forum to better manage seal aggression and predation. Overall there has been concern over the slow growth of fish, the so-called “slow growth syndrome”, although the extent of the problem and the causes remain unclear.

The salmonid industry in Tasmania underwent a major restructuring during the last few years in response to the rapid growth of the industry and the stress of increasing production costs. This resulted in the amalgamation and sale of two of the largest companies. The industry was reviewed by the Department of Economic Development (DED) with a focus on providing solutions to industry problems. The review report remains confidential but resulted in further study in three areas. A market report was undertaken, with a government-industry proposal for increased marketing being considered. A feasibility study on genetic selective breeding is being conducted by the TSGA. Australia is the only major producer of Atlantic salmon without a selective breeding program. A proposal for a review of grading to retain the best fish is still in the development phase.

### **8.2 RESEARCH FUNDING**

The MOU between FRDC and the TSGA has provided greater certainty of intent in relation to the planning, funding and managing of research and development and the adoption and commercialisation of results. The leverage of industry funds has been further enhanced through the CRC for Sustainable Aquaculture of Finfish (Aquafin CRC) and a minimum contribution from industry has been set at \$280,000 p.a. The result has been a leverage of approximately 1:4 TSGA funds to externally funded research funds over the past three years (Table 1). When the in-kind component of all projects is included, the leverage is approximately 1:12 with a total of around \$4 million being spent annually. Research organisations provide around 40% of the total funding which is matched by the two funding agencies with the remainder being individual industry and other stakeholder contributions (Fig. 2).



Table 1. Research leverage from the MOU between FRDC and TSGA, including the Aquafin CRC (not including in-kind support from Research providers nor industry)

	2001-2	2002-3	2003-4 <sup>a</sup>
Total FRDC funds	\$847,468	\$861,510	\$621,220
Total Aquafin CRC funds	\$581,425	\$710,298	\$737,877
Total research funding	\$1,428,893	\$1,571,808	\$1,359,096
Contribution from TSGA	\$280,000	\$280,000	\$280,000
Multiplier	4.1	4.6	3.9

<sup>a</sup> Funding likely to increase

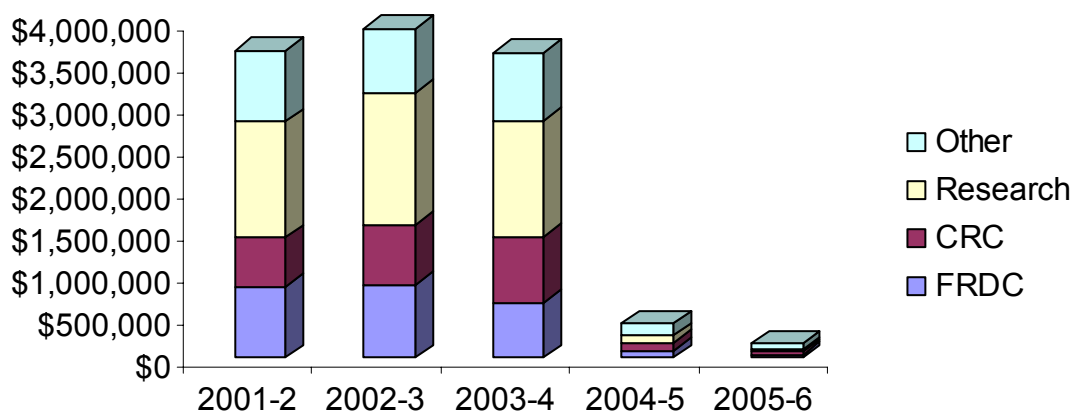


Figure 2. Total research and development funding including in-kind support from research providers and industry for the period 2001 to 2005. Note the amount will increase in 2004 to 2006 if new projects are initiated

Allocation of funds to the six key research areas was a function of the projects adopted into the ASAS from the FRDC and allocations originally determined by industry for the Aquafin CRC. Health has received approximately 50% of all grant funding, Environment 25% and Production 10%. The current division of funding is provided in Fig. 3.

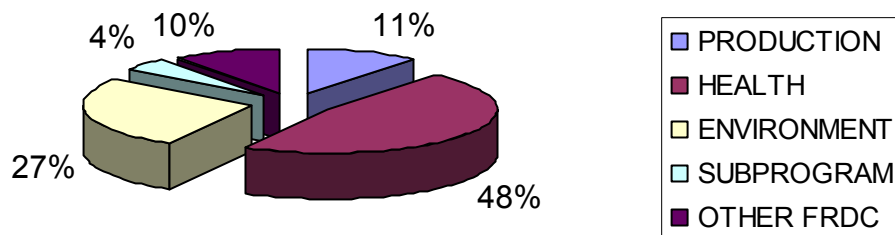


Figure 3. Pie diagram of research funding in key categories, including the three Aquafin CRC Programs, Production, Health and Environment.. “Subprogram” is funding for the ASAS and the “Other” category refers to genetic and nutrition research

### 8.3 PROJECTS

Six projects were completed during the first ASAS term, including four adopted projects (Table 2). There are currently ten projects approved within the ASAS stable, including the new ASAS management project lead by Professor Buxton (Table 3). All current projects, except the genetics project lead by Dr Nicholas Elliott, are within and funded by the Aquafin CRC. An environment project led by Dr Christine Crawford, which is part of the Aquafin CRC program, is however totally funded by TAFI and CSIRO Marine Research.

Four current Aquafin CRC projects are within the Health Program, three in the Environment Program and one in Production (Table 3). Of particular importance is the coordinated approach being taken to solving and managing the problems of AGD. Ultimately, the solution to AGD may be the development of a vaccine. While this is not currently a separate FRDC project it is a project within the Aquafin CRC Health Program and may be funded by the FRDC when it can be demonstrated that we understand AGD better and new research tools have been developed.

Table 2. Completed ASAS projects

<b>Project Number</b>	<b>Full Project Title</b>	<b>Project Duration</b>		<b>Principal Investigator</b>
<b>Outside Aquafin CRC</b>				
FRDC 1998/209	Detection and abundance of Paramoeba species in the environment.	Jul-98	Dec-00	Dr Nick Elliott, CSIRO  03 6232 5263
FRDC 1998/322	Aquaculture feed development for Atlantic salmon ( <i>Salmo salar</i> ).	Aug-98	Jan-02	Dr Chris Carter, TAFI  03 6324 3823
FRDC 1999/361	Anti-predator stock protection research project.	Jul-99	Jul-00	Dr David Pemberton, Tasmania Museum
FRDC 2000/266	Effective treatments for the control of Amoebic Gill Disease.	Sep-00	Sep-01	Dr Mark Powell, TAFI  03 6324 3813
<b>In Aquafin CRC</b>				
FRDC 1999/201	Aquafin CRC – FRDC ASAS: Development of selective enrichment culture-polymerase chain reaction (SEC-PCR) for the detection of bacterial pathogens in covertly infected farmed salmonid fish.	Feb-99	Jan-02	Dr Jeremy Carson, TAFI  03 6336 5207
FRDC 2000/223	Aquafin CRC – FRDC ASAS: Facilitation, administration and promotion of the FRDC Atlantic Salmon Aquaculture Subprogram.	Jul-00	Jun-03	Dr Stephen Battaglione, TAFI  03 6227 7268

Table 3. Current ASAS projects

Project Number	Full Project Title	Project Duration		Principal Investigator
<b>Outside Aquafin CRC</b>				
FRDC 2000/224	ASAS: Molecular genetic tools for the Tasmanian Atlantic salmon industry – development and application.	Jul-00	Jan-04	Dr Nick Elliott, CSIRO 03 6232 5263
<b>In Aquafin CRC</b>				
FRDC 2000/164	Aquafin CRC – FRDC ASAS: Development of novel methods for the assessment of sediment condition and determination of management protocols for sustainable finfish cage aquaculture operations.	Jan-01	Dec-03	Ms Catriona Macleod, TAFI 03 6227 7237
FRDC 2001/097	Aquafin CRC – ASAS: System-wide environmental issues for sustainable salmonid aquaculture.	Oct-01	Sep-04	Dr John Volkman, CSIRO 03 6232 5281
FRDC 2001/205	Aquafin CRC – FRDC ASAS: treatment and pathophysiology of Amoebic Gill Disease.	Oct-01	Sep-04	Dr Mark Powell, TAFI 03 6324 3813
FRDC 2001/244	Aquafin CRC – FRDC ASAS: host-pathogen interactions in Amoebic Gill Disease.	Oct-01	Sep-04	Dr Barbara Nowak, TAFI 03 6324 3814
FRDC 2001/245	Aquafin CRC – FRDC ASAS: model development for epidemiology of Amoebic Gill Disease AGD.	Oct-01	Sep-04	Dr Barbara Nowak, TAFI 03 6324 3814
FRDC 2001/246	Aquafin CRC – FRDC ASAS: Control of precocious sexual maturation in Atlantic salmon ( <i>Salmo salar</i> ).	Oct-01	Mar-05	Professor Ned Pankhurst, TAFI 03 6324 3801
Aquafin CRC 3.4.4	Aquafin CRC – Salmon Subprogram – Development of a vaccine for amoebic gill disease : Genomic and cDNA library screening for antigen discovery.	Jul-02	Jun-04	Dr Chris Prideaux, CSIRO Livestock Industries 03 5227 5791
Aquafin CRC 4.4	Aquafin CRC – Development of broad scale environmental monitoring and baseline surveys in relation to sustainable salmon aquaculture in the D'Entrecasteaux Channel region.	Jan-02	Mar-04	Dr Christine Crawford, TAFI 03 6227 7224
FRDC 2003/200	Aquafin CRC – FRDC ASAS Atlantic Salmon Aquaculture Subprogram: strategic planning, project management and adoption.	Jul-03	Jun-06	Prof. Colin Buxton, TAFI 03 6227 7277

## 8.4 STRATEGIC PLANNING

The ASAS produced a draft five-year Strategic Plan for the research and development needs of the industry in 2001. Research was broadly categorised into six key areas: Health, Production, Nutrition, Reproduction, Genetics, and Environment. The objectives and performance indicators were listed within these areas over the short, medium and long term. Table 4 provides a brief summary of the plan. The plan was not finalised because industry wanted to await the outcome of the current restructure. In general, the promotion and development of projects has followed the Strategic Plan. One of the tasks of the new ASAS will be to finalise the plan with the input of all stakeholders including industry, processors and suppliers, government regulators, researchers and the general public. The plan will then be integrated with the salmon component for the Tasmanian Aquaculture and Fisheries Plan 2004-2009.

Table 4. A summary of strategic planning needs by research discipline giving current funding status

Issue	Short term 1 to 2 years	Medium term 2 to 5 years	Long term 5 years plus	Current funding
<b>1. Health</b>				
AGD	Improve bathing Improve detection Better understanding pathology	Alternative treatments Immunological reaction Preventative measures Epidemiology	Vaccine development (subject to ASAS review) Genetic improvement	Ongoing support from FRDC and Aquafin
Diagnostics	See AGD	See AQUAPLAN	See AQUAPLAN	Supported through FRDC Health Subprogram
Disease control	Registration of Yersinia vaccine			Supported by industry
<b>2. Production</b>				
Seal predation	Cage and net design Stiffening nets			Completed FRDC project
Post harvest technology		Effect of harvest practice on flesh quality Effect of nutrition on flesh quality		Supported subject to \$ from other sources than FRDC
Control of biofouling	Industry trials of CRC and other anti-fouling products			Supported by development companies
<b>3. Nutrition</b>				
Feed and feeding efficiency	Evaluation of high energy feeds	Australian feed ingredient evaluation		Supported through FRDC diet development Subprogram

<b>4. Reproduction</b>				
Control over maturation	Reconditioning mature fish	Delay reproductive development Develop out of season spawning Inhibit early maturation in sea water	Autoimmune sterilisation Genetic improvement	Ongoing support from FRDC and Aquafin
Egg quality	Better management of abiotic factors	Broodstock management Egg quality assessment tools		Supported from other sources including industry
Failed smolt syndrome	Better management of abiotic factors in fresh and saltwater			Supported from other sources including industry
<b>5. Genetics</b>				
Stock improvement	Select model from scoping study	Development of genetic tools	Family selection program	Ongoing support from FRDC
<b>6. Environment</b>				
Environment management:  On farm effects	Evaluation of limiting abiotic factors on fish performance (eg O <sub>2</sub> ) and responses to changes in husbandry practices	Novel tool development for benthic health Identification of key physical, biological and chemical processes controlling local environmental conditions in the water column		Ongoing support from FRDC and Aquafin
Environment management:  System wide effects	Review CSIRO model for predicting environmental impacts	Development of key sustainability indicators Improved technology for the management of effluent from land based systems	An ability to predict the environmental impact of cage aquaculture at the system-wide scale	Ongoing support from FRDC and Aquafin
Jellyfish	Understanding the biology of jellyfish and ways to ameliorate harmful effects			Supported subject to \$ from other sources ARC project
Algal blooms		Understanding the dynamics of algae blooms and their effects on gill health		Supported subject to \$ from other sources

## 8.5 MANAGEMENT

### 8.5.1 Steering Committee

Three Steering Committee meetings were held during the life of the first ASAS, two in 2002 and one in 2003. The TSGA's Dr Vicki Wadley chaired the meetings and membership and attendance are detailed in Table 5. The main focus of the first meeting was the direction of the ASAS and its relationship and operation with the then proposed Aquafin CRC. The second meeting ratified changes to the Implementation Committee to include broader stakeholder representation in the SAIC and the development of project charters and reporting for the Aquafin CRC. The major restructuring of industry that occurred during the latter part of the ASAS made it difficult to schedule meeting with the Principals of major salmon producing companies. The third meeting resulted in changes to the structure, staffing and operation of the next ASAS.

Table 5. Attendance of ASAS Steering Committee meetings, July 2000 – June 2003

	<b>Meeting Date</b>	<b>04-May-01</b>	<b>06-Sep-01</b>	<b>02-Sep-02</b>
	<b>Meeting Number</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>Role</b>	<b>Committee Member</b>			
ASAS	Stephen Battaglone	Y	Y	Y
FRDC	Patrick Hone	Y	Y	
FRDC	Peter Dundas-Smith			Y
Aquafin CRC	Peter Montague			Y*
TSGA	Vicki Wadley	Y	Y	Y
TSGA	Owen Carington Smith			Y
Industry (HAC)	Peter Bender	Y	Y	Y
Industry (Nortas)	Richard Doedens	Y	Y	Y
Industry (Saltas)	Graham Martin	Y	Y	Y
Industry (Sevrup)	Paul Lupo			Y
Industry (Tassal)	Michael Ginnivan	Y	Y	
Industry (Tassal)	Pheroze Jungalwalla			Y
Independent Scientist	Peter Rothlisberg	Y	Y	Y*
	Number attendees	8	8	10
	Total number on committee	8	8	10

\* Via telephone link; Y = present

### 8.5.2 Implementation Committee

The Implementation Committee (IC) and the expanded SAIC met a total of 11 times in three years, more frequently in the beginning as new projects and operational procedures developed. The membership on the committee ranged from 8 to 19 representatives from industry, research providers, government and FRDC (Table 6). The third IC meeting on the 25 and 26 th September 2001 was a two day workshop devoted to Strategic Planning. The processing of milestone reports was a major task of the committee and ensured that research remained on track and delivered industry outcomes.

Details of milestone reports are:

Battaglone, S.C, and Cobcroft, J.M., (Eds) 2001. Milestone report of the Atlantic Salmon Aquaculture Subprogram, FRDC. March 2001, 28pp.

Battaglone, S.C, and Cobcroft, J.M., (Eds) 2001. Milestone report of the Atlantic Salmon Aquaculture Subprogram, FRDC. September 2001, 30pp.

Battaglione, S.C, and Cobcroft, J.M., (Eds) 2002. Milestone report of the Atlantic Salmon Aquaculture Subprogram, FRDC. March 2002, 39pp.

Battaglione, S.C, and Cobcroft, J.M., (Eds) 2002. Milestone report of the Atlantic Salmon Aquaculture Subprogram, FRDC. September 2002, 58pp.

Battaglione, S.C, and Cobcroft, J.M., (Eds) 2003. Milestone report of the Atlantic Salmon Aquaculture Subprogram, FRDC. March 2003, 141pp.



Table 6. Attendance of ASAS Implementation Committee meetings, July 2000 – June 2003

Role	Meeting Date	12-Jul-00	20-Jul-00	24-Aug-00	*25-26 Sept-00	01-Dec-00	16-Jan-01	01-May-01	20-Jul-01	21-Nov-01	02-May-02	13-Nov-02	31-Mar-03
	Meeting Number	IC 1	IC 2	IC 3		IC 4	IC 5	IC 6	IC 7	SAIC 1	SAIC 2	SAIC 3	SAIC 4
	Committee Member												
ASAS	Stephen Battaglione	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
FRDC	Peter Dundas-Smith	Y									Y	Y	
FRDC	Patrick Hone			Y	Y					Y			Y
FRDC	John Wilson								Y				
TSGA	Vicki Wadley							Y	Y	Y	Y	Y	Y
Industry (Aquatlas)	Steve Percival	Y	Y	Y	Y	R	R	R	R	Y		Y	Y
Industry (Aquatlas)	Craig Selkirk										Y		
Industry (HAC)	David Mitchell									Y	Y	Y	
Industry (HAC)	Dom O'Brien			Y	Y		Y	Y	Y	Y	Y	Y	
Industry (Nortas)	Guy Westbrook	Y	Y	Y	Y	Y	Y	Y	Y			Y	R
Industry (Nortas)	Jo Sadler									Y	Y		
Industry (Saltas)	Harry King	Y	Y	Y	Y		Y	Y	Y		Y	Y	Y
Industry (Skretting)	Craig Foster	Y	Y		Y	Y	Y	Y		Y	Y		Y
Industry (Tassal)	Pheroze Jungalwalla	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
DPIWE	Gwen Fenton										Y	Y	R
DPIWE	Darby Ross						Y	Y	Y	Y	Y	Y	Y
DPIWE	Colin Shepherd												
Independent Scientist	Peter Rothlisberg								Y		Y	Y	R
Aquafin CRC	Peter Montague									Y	Y	Y	
Aquafin CRC (Education)	Chris Carter											Y	Y
Aquafin CRC (Education)	Ned Pankhurst												
Aquafin CRC (Environment)	John Volkman									Y	Y	Y	Y
Aquafin CRC (Health)	Barbara Nowak									Y		Y	Y
Aquafin CRC (Health)	Jeremy Carson										Y		
Aquafin CRC (Production)	Steven Clarke									Y		Y	
ASAS (Minutes)	David Morehead	Y	Y	Y									
ASAS (Minutes)	Jennifer Cobcroft					Y	Y	Y	Y	Y		Y	Y
	Number attendees	8	7	8	8	5	8	9	10	15	16	18	12
	Total number on committee	9	9	9	8	8	9	10	11	18	19	19	17

\* Strategic Planning Meeting  
Y = present; R = resigned

### 8.5.3 Workshops, meetings and seminars

An important component of the ASAS was the facilitation of specialist workshops, scientific reviews, industry and researcher meetings and seminars. A list of the most important meetings and their outcomes is provided in Table 7. These included participation by the ASAS Leader in regular events like the annual FRDC FRAB/Subprogram workshop, Tasmanian RAG, and Aquafin JMAC meetings. The ASAS either directly or through its projects also invited overseas scientists to visit Australia and to address the industry and researchers. These forums provided an important network for the establishment of collaborations between industry and research both locally, nationally and at an international level.

Table 7. ASAS attended or facilitated specialist workshops, scientific reviews, industry and researcher meetings and seminars

Date	Title/Topic	Attendees	Outcome
17 May 2000 Hobart	ASAS presentation to TSGA Board	TSGA representatives ASAS Leader	TSGA Board Endorsed ASAS Operations
29-30 May 200 Canberra	FRDC Subprogram/ FRAB Meeting	FRAB and Subprogram members	Subprogram operation improved
25 Aug 2000 MRL, Hobart	AGD Research and Industry Workshop	Organised Nowak & Battaglione industry/research	Proceedings distributed to attendees
13 Sept 2000 Hobart	CRC Planning Meeting	ASAS Leader and some IC members	Contribution to establishment of Aquafin CRC
25-26 Sept 2000 Country retreat	ASAS Strategic Planning Meeting	IC members	Draft ASAS Strategic Plan
8 Nov 2000 Hobart Museum	FRDC 99/361 "Anti-predator stock protection research project".	ASAS Leader and industry and research members	Final report improved and endorsed
21 Mar 2001 MRL/Hobart	Smolt Transport Seminar	Presented by Saltas (Harry King)	Industry better able to transport smolt
30 Mar 2001 & 7 May 2001 Hobart	Aquafin CRC Meeting	ASAS Leader and representatives from industry	Development of salmon research
21 May 2001 Melbourne	Aquafin CRC Board Review	Aquafin CRC Board, ASAS Leader	Review of projects, Salmon projects endorsed
29 May 2001 Launceston	Tasmanian Aquaculture Review and RAG	RAG members ASAS Leader	Priority setting for Tasmanian Aquaculture
28-29 June 2001 Canberra	FRDC Subprogram/ FRAB Meeting	FRAB and Subprogram members	Subprogram operation improved
18-19 July 2001 CSIRO, Hobart	First ASAS Scientific Conference	109 people, over 50% from industry	Proceedings distributed, better Communication
22-23 Aug 2001 Hobart	Aquafin CRC JMAC Meeting	ASAS Leader IC members	Education/ training program support
5-7 Nov 2001 MRL, Hobart	Introduction to Epidemiology. Workshop	Chris Baldock, 15 people attended, 11 from industry	Development of draft causal web for AGD
8 Nov 2001 Hobart	Farm managers Meeting – AGD	Industry Barbara Nowak, Chris Baldock, ASAS Coordinator	In principle support for database of environmental & health parameters

14 November Port Lincoln	Tuna Subprogram Meeting	Tuna SC Aquafin CRC ASAS Leader	Subprogram exchange
Dec 2001 New Zealand	Visit to NIWA (note not primarily an ASAS trip)	Subprogram Leader Peter Nichols Wayne Hutchinson	Established linkages to the NZ salmonid industry
29 Jan 2002 MRL, Hobart	Meeting to establish farm record Database	Chris Baldock AusVet Industry	Pilot scale trail of farm record database
29 Jan 2002 MRL, Hobart	SAIC Working Group	Aquafin CRC, AGD researchers , industry & SAIC	Fine tuning the scope of AGD research
5 Feb 2002 MRL, Hobart	Seminar "Far Field Effects of Salmon Mariculture: A Canadian Research Project"	David Wildish (Biological Station, Fisheries & Oceans Canada)	Stakeholders informed of developments in Canada
25-26 Feb 2002 MRL, Hobart	Review of the AGD Subprogram	Scott LaPatra (USA) and Simon Jones (Canada), SAIC, researchers	Endorsement of AGD projects and overall direction towards vaccine
5 Mar 2002 Adelaide	Aquafin CRC	ASAS Some SAIC	Project review
6 Mar 2002 Adelaide	Aquafin CRC first year review,	Aquafin CRC Program Leaders ASAS Leader	Aquafin review passed
12-13 Mar 2002 Hobart	Tasmanian Department of Economic Development industry review Strategic Value Management Workshop	ASAS Leader Industry Government TAFI	Determination of issues and challenges impacting on industry
4-5 Apr 2002 Hobart	First Scientific Meeting of the Aquafin CRC Environment Program	Environment Program Leader and researchers ASAS Leader Industry	Better communication between SA and TAS fractions
17-18 Apr 2002 Canberra	FRDC Subprogram/ FRAB Meeting	FRAB and Subprogram members	Better understanding of project processing
9-10 May 2002 Adelaide	Aquafin CRC JMAC Meeting	ASAS Leader and other members of the SAIC,	Education/ training program support Conference planning
21 June 2002 MRL, Hobart	Tasmanian Aquaculture Review and RAG	RAG members ASAS Leader	Priority setting for Tasmanian Aquaculture
8 July 2002 CSIRO, Hobart	Second ASAS Scientific Conference	125 people with around 38% from industry	Proceedings distributed, better Communication
9 July 2002 MRL, Hobart	Salmon maturation Meeting	Industry David Rowe (NIWA) Mark Porter	Collaborative links with NZ research on precocious salmon
2 Aug 2002 MRL, Hobart	Deformities and AGD in salmon	Industry, Fish Health Unit staff, AGD researchers, ASAS Coordinator	Formation of a group to develop a method for assessing jaw/gill deformities in hatcheries

20-25 August Hobart	Aquafest Conference and Aquafin Conference	Aquafin CRC members Industry Researchers	Better communication to all stakeholders
2 Sept 2002 MRL, Hobart	Seminar "Jellyfish: Once and future kings?"	Barbara Sullivan School of Oceanography, University of Rhode Island USA	Introduction to jellyfishes and current ecological issues, including reports of worldwide increase
27 Sept 2002 MRL, Hobart	Meeting on Industry Option Paper "Improved Use of Farm Records"	Angus Cameron (AusVet), AGD Researchers, Industry	Need for greater industry acceptance
3 Oct 2002	Aquafin CRC JMAC Meeting by teleconference	JMAC ASAS Leader	Education/ training program support
14-15 October Hobart	Meeting FRDC Board	FRDC Board ASAS Leader	FRDC Board better informed of ASAS
6 Nov 2002 Hobart	Meeting on feasibility study on genetic selective breeding	Industry (TSGA) and ASAS Leader	DED endorsed study and reviewers
11 Nov 2002 MRL, Hobart	Seminar "Docosahexaenoic Acid – My Magic Molecule"	John Sargent Institute of Aquaculture, University of Stirling, Scotland	Stakeholders informed of latest lipid research on salmon diets
25 Nov 2002 MRL, Hobart	Seminar "Agents of AGD in turbot and their eukaryotic endosymbionts"	Iva Dyková Institute of Parasitology Academy of Sciences of the Czech Republic	Stakeholders informed of latest parasitology research on salmon
4 April 2003 Hobart	Tasmanian Aquaculture Strategic Plan Review	Industry TSGA ASAS Leader Researchers	New 5 year strategic plan for Tasmanian Aquaculture
21 May 2003 CSIRO, Hobart	Third ASAS Scientific Conference	102 people with around 36% from industry	Proceedings distributed, better Communication
20 June 2003 Launceston, Hobart	Tasmanian Aquaculture Review and RAG	RAG members ASAS Leader	Priority setting for Tasmanian Aquaculture

## 8.6 COMMUNICATION

The ASAS Communication Strategy was developed in 2001. The strategy dovetails in with the Aquafin CRC communication strategy and will be further refined in the next ASAS term. Key elements of the communication and technology transfer strategy of the ASAS are the Annual Operating Plan, Annual Scientific Conference and Newsletter. The identity and promotion of the Subprogram was further improved through the establishment of a website with links to the FRDC homepage at <http://www.frdc.com.au/research/programs/asa/> and adoption of an ASAS logo.

### **8.6.1 Annual Operating Plan**

An Annual Operating Plan was produced for each of the three years. Each plan outlined sector progress, major research outputs, project status, communication, technology transfer status and a workplan and calendar for the coming year. The AOPs are provided in the attached CD and publication details are:

Battaglione, S.C. 2000. Annual Operating Plan – 2001. Atlantic Salmon Aquaculture Subprogram. December 2000, 7 pp.

Battaglione, S.C, and Cobcroft, J.M. 2002. Atlantic Salmon Aquaculture Subprogram Annual Operating Plan – 2002. January 2002, 15 pp.

Battaglione, S.C, and Cobcroft, J.M. 2002. Atlantic Salmon Aquaculture Subprogram Annual Operating Plan – 2003. December 2002, 20 pp.

### **8.6.2 Annual Scientific Conferences**

Three highly successful annual scientific conferences were held in the CSIRO auditorium in Hobart. The format changed slightly between years but each conference was free to registered attendees and lunch and a reception were provided to encourage participation and allow a wider representation of stakeholders.

The first conference was held on the 18 and 19 th July 2001. It was a great success and was attended by 109 people with over 50% from industry. The conference provided a forum for all industry workers to participate in strategic planning with valuable inputs from farm workers, managers and senior executives. Over 30 scientific presentations were given and two general discussion sessions held. The conference engendered a high level of co-operation and endorsement in general for the ASAS. A detailed 87 page handbook was distributed on the day to all those who attended and was available on CD to other interested parties. A questionnaire was distributed at the conference seeking ways to improve the ASAS and to assist in strategic planning.

The second annual workshop and scientific conference was held on 8 July 2002. It was attended by 125 people with around 38% from industry. There was an increased focus on industry presentations with 22 oral presentations by researchers and industry representatives and three posters. A detailed 84 page handbook including 24 contributed summaries was distributed to all those who attended and was available on CD to other interested parties. The conference concluded with a general discussion session involving interaction with an expert panel. Positive feedback from the conference included an improved level of co-operation and communication between industry, researchers and government. There was continued endorsement in general for ASAS and the strategic direction of research.

The third annual scientific conference was held on the 21 st May 2003. It was attended by 102 people with around 36% from industry. Nineteen oral presentations were given by researchers and industry representatives and four posters were contributed. A 74 page handbook including 25 contributed summaries was distributed to all those who attended and was available on CD to other interested parties. The conference concluded with a general discussion session involving interaction with an expert panel and discussion about the new ASAS structure and operation.

Handbooks are provided in the attached CD and publication details are:

Battaglione, S.C., and Cobcroft, J.M. (Eds.), 2001. The First Scientific Conference of the Atlantic Salmon Aquaculture Subprogram Handbook, 18-19th July, 2001, CSIRO Marine Laboratories, Hobart. 87pp.

Battaglione, S.C. and Cobcroft, J.M., (Eds) 2002. Second Scientific Conference of the Atlantic Salmon Aquaculture Subprogram – Handbook. 8 July, 2002, Hobart, Tasmania. 84 pp.

Battaglione, S.C. and Cobcroft, J.M., (Eds) 2003. Third Scientific Conference of the Atlantic Salmon Aquaculture Subprogram – Handbook. 21 May, 2003, Hobart, Tasmania. 74 pp.

### **8.6.3 Newsletters**

Three issues of the ASAS newsletter, *Salmon Snippets*, were produced in October 2001, March and December 2002. These were distributed to industry members, researchers and interested groups via email, as a printed copy, and on the FRDC Website. A special *Salmon Snippets - Newsflash* was released on 27 March 2002 to rapidly communicate results from AGD research which identified viable *Neoparamoeba pemaquidensis* in sediments on fallowed lease sites.

Newsletters are provided in the attached CD and publication details are:

Battaglione, S.C. and Cobcroft, J.M., (Eds) 2001. *Salmon Snippets*. Atlantic Salmon Aquaculture Subprogram Newsletter, October 2001, 1(1):1-8.

Battaglione, S.C. and Cobcroft, J.M., (Eds) 2002. *Salmon Snippets*. Atlantic Salmon Aquaculture Subprogram Newsletter, March 2002, 2(1):1-16.

Battaglione, S.C. and Cobcroft, J.M., (Eds) 2002. *Salmon Snippets*. Atlantic Salmon Aquaculture Subprogram Newsletter, December 2002, (2):1-12.

Battaglione, S.C (Ed) 2002. *Salmon Snippets – Newsflash*. Atlantic Salmon Aquaculture Subprogram Rapid Communication, 27 March 2002. 1pp.

### **8.6.4 Publication and communication committee**

A publication and communication committee was established with the function of reviewing all publications, press releases and other media. The committee comprised:

Dr S. Battaglione Subprogram, Leader (Chair)  
Dr P. Hone, FRDC Programs Manager  
Dr P. Montague, Aquafin CRC Executive Director  
Mr S. Clarke, Dr J. Volkman, Dr B. Nowak, CRC Program Leaders,  
Dr V. Wadley, TSGA Executive Officer  
Mr P. Jungalwalla, Dr D. O'Brien, Industry representatives

The committee processed 38 publications between April 2002 and June 2003.

## 9 BENEFITS AND ADOPTION

Major benefits of the ASAS have been the increase in funding and support from industry and other granting bodies for research and development with some \$4.3 million invested over three years. In particular, the ASAS played an important role in the establishment and management of the new Aquafin CRC.

Other key benefits included:

1. The provision of a forum for strategic planning and greater coordination and selection of projects by all stakeholders.
2. Greater participation by all levels of industry in the determination of research and development priorities.
3. A forum for government and other stakeholders to be better informed of activities within the Aquafin CRC and FRDC.
4. Increased research activity and demonstrably better communication among researchers.
5. Better management and scrutiny of existing projects to ensure they are industry focused.
6. Successful running of an annual scientific conference and timely production of comprehensive conference proceedings in an industry friendly form.
7. Timely delivery of reports from Steering and SAIC meetings to FRDC and Aquafin CRC.
8. Cost-effective production and delivery of an AOP and newsletter.

## 10 FURTHER DEVELOPMENT

The ASAS completed its first 3-year term in June 2003. The stakeholders involved in the current ASAS agreed that it met its objectives and delivered positive outcomes for industry and needs to continue. A new more streamlined ASAS was proposed and approved to incorporate changes following the creation of the Aquafin CRC. In particular, the next ASAS will be more cost-effective and avoid duplication of tasks. It will continue to operate from TAFI and the new Principal Investigator will be Professor Colin Buxton, with the TSGA taking a greater role with Co-Investigator status.

The specific objectives of the new ASAS will be:

1. To administer and coordinate the activities of the ASAS.
2. To review project proposals, milestone reports and final reports to ensure stakeholder relevance.
3. To facilitate and chair meetings of the Salmon Aquaculture Implementation Committee.
4. To ensure appropriate liaison between beneficiaries and research providers in the Salmon Sector and to integrate with other finfish sectors.
5. To communicate findings of the ASAS through:
  - an annual conference held in conjunction with the Aquafin CRC
  - specialist workshops on topics identified through the course of the program
  - relevant articles in the CRC newsletter – *Aquasplash*

Most of the current projects are due to be completed by the end of 2004, requiring the planning and development of funding applications in 2003 for research areas being

pursued in 2004/05. The ASAS needs to continue to develop its linkages with industry and other stakeholders in the planning process. It is important that new projects continue to have the strong support of a wide cross section of industry and that they are focused on delivering outcomes that will benefit the whole industry. The annual conference has an important role to play in keeping industry and researchers informed and in providing a forum for open and robust debate on future direction.

## **11 PLANNED OUTCOMES**

The Atlantic Salmon Aquaculture Subprogram (ASAS) has been an excellent vehicle for providing greater certainty in relation to the planning, funding and managing of research and development for the Atlantic salmon farming industry in Australia. The ASAS played a pivotal role in bringing industry and other stakeholders together to determine a mutually acceptable strategic direction, which resulted in the commissioning and management of a large and well-focused research portfolio. The ASAS also played an important role in the establishment of the Aquafin CRC which in turn provided a significant increase in the size and number of projects, while at the same time increasing the focus in a number of key areas including health and the environment. The ASAS helped to empower industry to be actively responsible for its own research and development. The original planned outcomes of the ASAS have all been achieved and there has been increased:

1. Research and development on production of Atlantic salmon with large improvements in the number of scientists and projects.
2. Production of Atlantic salmon and economic benefits to the Australian economy.
3. Product volume and continuity of supply to domestic and international markets.
4. Level of cooperation among research providers and better use of national and international research.
5. Awareness of the benefits of research and cooperation among Atlantic salmon producers reflected in the attendance at conferences and requests for the newsletters.
6. Developments in technology for salmon and related aquaculture industries.

## **12 CONCLUSION**

The salmon industry in Australia is facing a number of significant challenges to its long-term viability. These include increased international competition, rapidly rising feed costs, management of AGD, climate variability and environmental concerns over farming. Never has the need for research and development been more apparent.

The ASAS has been successful in achieving a more integrated and industry driven research and development program. The stakeholders involved in the current ASAS agreed that it met its objectives and delivered positive outcomes for industry and needs to continue. The SAIC provided the major management focus through the hard work of a dedicated committee comprising key industry, government, research and administrative representatives.

The ASAS ran effectively because it developed a good operating framework, including a sound communication strategy and well-facilitated meetings, and milestone reporting



standards. The annual ASAS Scientific Conference ensured all stakeholders, in particular all levels of industry, were aware of research and development and ensured adoption of the project outcomes. Ultimately, it will be the research outcomes that result in increased profitability and reduced risk for the Atlantic salmon aquaculture industry.

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- Treadwell, R., McKelvie, L. and Maguire G.B., 1999. Profitability of selected aquacultural species. Australia Bureau of Agricultural and Resources Economics, research Report 92.2, Canberra, ACT, 85 pp.
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**14 APPENDIX 1: INTELLECTUAL PROPERTY**

None

**15 APPENDIX 2: STAFF LIST**

Staff engaged on the project:

2000-2003	Dr Stephen Battaglione	Subprogram Leader Marine Research Laboratories Tasmanian Aquaculture and Fisheries Institute University of Tasmania	30%
2000-2003	Dr Jennifer Cobcroft	Subprogram Coordinator Marine Research Laboratories Tasmanian Aquaculture and Fisheries Institute University of Tasmania	50%

## 16 APPENDIX 3: PUBLICATIONS FROM ASAS

### Publications from the ASAS included in the accompanying CD

#### ASAS Annual Operating Plans

Battaglione, S.C. 2000. Annual Operating Plan – 2001. Atlantic Salmon Aquaculture Subprogram. December 2000, 6 pp.

Battaglione, S.C, and Cobcroft, J.M. 2002. Atlantic Salmon Aquaculture Subprogram Annual Operating Plan – 2002. January 2002, 15 pp.

Battaglione, S.C, and Cobcroft, J.M. 2002. Atlantic Salmon Aquaculture Subprogram Annual Operating Plan – 2003. December 2002, 20 pp.

#### ASAS Annual Scientific Conference Handbooks

Battaglione, S.C., and Cobcroft, J.M. (Eds.), 2001. The First Scientific Conference of the Atlantic Salmon Aquaculture Subprogram Handbook, 18-19th July, 2001, CSIRO Marine Laboratories, Hobart. 87pp.

Battaglione, S.C, and Cobcroft, J.M., (Eds) 2002. Second Scientific Conference of the Atlantic Salmon Aquaculture Subprogram – Handbook. 8 July, 2002, Hobart, Tasmania. 84 pp.

Battaglione, S.C, and Cobcroft, J.M., (Eds) 2003. Third Scientific Conference of the Atlantic Salmon Aquaculture Subprogram – Handbook. 21 May, 2003, Hobart, Tasmania. 74 pp.

#### ASAS Newsletters

Battaglione, S.C., and Cobcroft, J.M., (Eds) 2001. *Salmon Snippets*. Atlantic Salmon Aquaculture Subprogram Newsletter, October 2001, 1(1):1-8.

Battaglione, S.C., and Cobcroft, J.M., (Eds) 2002. *Salmon Snippets*. Atlantic Salmon Aquaculture Subprogram Newsletter, March 2002, 2(1):1-16.

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Battaglione, S.C., 2001. Atlantic Salmon Aquaculture Subprogram. Fisheries Research and Development Corporation R & D News 9(4): 14-15.

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#### Conference abstracts and presentations

Battaglione, S.C. 2001. Atlantic Salmon Aquaculture Subprogram. In: Battaglione, S.C., and Cobcroft, J.M. (Eds.), 2001. The First Scientific Conference of the Atlantic Salmon Aquaculture Subprogram Handbook, 18-19th July, 2001, CSIRO Marine Laboratories, Hobart. p. 7-12.

Battaglione, S.C. 2002. Atlantic Salmon Aquaculture Subprogram. In: Battaglione, S.C, and Cobcroft, J.M., (Eds) 2002. Second Scientific Conference of the Atlantic Salmon Aquaculture Subprogram – Handbook. 8 July, 2002, Hobart, Tasmania. p. 7-13.

Battaglione, S.C. and Buxton, C. 2003. In: Battaglione, S.C, and Cobcroft, J.M., (Eds) 2003. Third Scientific Conference of the Atlantic Salmon Aquaculture Subprogram – Handbook. 21 May, 2003, Hobart, Tasmania. p. 7-13.

**Combined ASAS project milestone reports**

Battaglione, S.C, and Cobcroft, J.M., (Eds) 2001. Milestone report of the Atlantic Salmon Aquaculture Subprogram, FRDC. March 2001, 28pp.

Battaglione, S.C, and Cobcroft, J.M., (Eds) 2001. Milestone report of the Atlantic Salmon Aquaculture Subprogram, FRDC. September 2001, 30pp.

Battaglione, S.C, and Cobcroft, J.M., (Eds) 2002. Milestone report of the Atlantic Salmon Aquaculture Subprogram, FRDC. March 2002, 39pp.

Battaglione, S.C, and Cobcroft, J.M., (Eds) 2002. Milestone report of the Atlantic Salmon Aquaculture Subprogram, FRDC. September 2002, 58pp.

Battaglione, S.C, and Cobcroft, J.M., (Eds) 2003. Milestone report of the Atlantic Salmon Aquaculture Subprogram, FRDC. March 2003, 141pp.