Australian Government
Fisheries Research and Development Corporation

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Committee Secretary
Senate Standing Committees on Environment and Communications
PO Box 6100
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Canberra ACT 2600

The Fisheries Research and Development Corporation Submission to the Senate Standing Committee on Environment and Communications Inquiry into Regulation of the Finfish Aquaculture Industry in Tasmania

Executive Summary

The Fisheries Research and Development Corporation (FRDC) welcomes the opportunity to provide a submission to the senate inquiry into regulation of the finfish aquaculture industry in Tasmania.

The FRDC is a co-funded partnership between the Australian Government and the fishing industry. It was formed as a statutory corporation on 2 July 1991, under the provisions of the *Primary Industries and Energy Research and Development Act 1989 (PIERD Act)* and is responsible to the Minister for Agriculture.

The FRDC undertakes research, development, extension and marketing activities along the whole supply chain – from producer to consumer. In 2013/14 the FRDC invested $22.9 million in project funds for the development of the Australian seafood industry.

Tasmanian aquaculture, including finfish, represents one of the key growth areas of Australian seafood production during the past decade. In 2012/13 Tasmanian finfish aquaculture production was valued at $489 million and was the largest single contributor to the state's agriculture, fisheries and forestry sectors.

Through the FRDC, the Australian Government in partnership with industry has invested significantly in the development of the Tasmanian finfish aquaculture industry. From 1991 – 2015, 96 research projects valued in excess of $25 million have been undertaken in support of the sustainable development of the finfish aquaculture industry.

The FRDC has 20 active research projects across the Tasmanian finfish aquaculture sector and a further four approved projects that are currently awaiting commencement.

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Summary Terms of Reference

Regulation of the finfish aquaculture industry in Tasmania, with particular regard to:

a. the adequacy and availability of data on waterway health
b. the impact on waterway health, including to threatened and endangered species
c. the adequacy of current environmental planning and regulatory mechanisms
d. the interaction of state and federal laws and regulation
e. the economic impacts and employment profile of the industry
f. any other relevant matters.

Comments on the Specific Terms of Reference

The FRDC provide the following responses to the terms of reference.

a. the adequacy and availability of data on waterway health

The FRDC does not have a specific comment to make on the adequacy and availability of data on waterway health with regard to the Tasmanian finfish aquaculture industry.

However, the FRDC has funded 19 research projects related to the adequacy and availability of Tasmanian waterway health. Each research project is labelled 'A' in *Annex 1. The Fisheries Research and Development Corporation – Finfish (and related) Research Projects 1991 – 2015.*

b. the impact on waterway health, including to threatened and endangered species

The FRDC does not have a specific comment to make on the impact on waterway health, including to threatened and endangered species with regard to the Tasmanian finfish aquaculture industry.

However, the FRDC has funded 22 research projects related to the impact on Tasmanian waterway health, including to threatened and endangered species. Each research project is labelled 'B' in *Annex 1. The Fisheries Research and Development Corporation – Finfish (and related) Research Projects 1991 – 2015.*

c. the adequacy of current environmental planning and regulatory mechanisms

The FRDC does not have a specific comment to make on the adequacy of current environmental planning and regulatory mechanisms with regard to the Tasmanian finfish aquaculture industry.

d. the interaction of state and federal laws and regulation

The FRDC does not have a specific comment to make on the interaction of state and federal laws and regulation with regard to the Tasmanian finfish aquaculture industry.

e. the economic impacts and employment profile of the industry

Tasmanian Commercial Fisheries

In 2012/13 the gross value of Tasmanian commercial fisheries production was $696 million or 29 per cent of the total value of Australian fisheries production.[1] Tasmanian aquaculture accounted for 75 per cent or $520 million of total Tasmanian fisheries production.

Tasmanian aquaculture, including finfish, represents one of the major growth areas of Australian seafood production during the past decade. From 2003/04 to 2012/13 the gross value of Tasmanian aquaculture production rose from $133 million to $520 million.

In 2012/13 Tasmanian finfish (salmon and trout) production was valued at $489 million, or 94 per cent of Tasmanian aquaculture production.

Contribution of Fin-fish Aquaculture to the Tasmanian Agriculture, Fisheries and Forestry Sector.

In 2012/13 the gross value of all Tasmanian agriculture production was $1.2 billion, commercial fisheries and aquaculture $696 million and forestry $593 million.[2]

Tasmanian finfish aquaculture production was the largest single contributor to the agriculture, fisheries and forestry sectors, outperforming milk $305 million, vegetables $237 million, paper and paper products $336 million, wood products $257 million and cattle $183 million.

Employment

In 2011 the Australian Bureau of Statistics estimated that 2,265 persons were employed in the Tasmanian commercial and aquaculture fishing sector, including the capture, processing and wholesaling sectors[3].

f. any other relevant matters.

Fisheries Research and Development Corporation

The FRDC invests in Research, Development and Extension (RD&E) that supports aquaculture, commercial fishing, Indigenous fishing and recreational fishing.

The FRDC contributes to a strategic national approach to fishing and aquaculture RD&E that aims to share knowledge, build cohesion and establish common goals between sectors. Partnerships and previous RD&E are considered in planning and investment processes, to maximise leverage and reduce duplication. The FRDC sets its strategic directions for RD&E by facilitating and consolidating

[1] Australian Fisheries and Aquaculture Statistics 2013. Australian Government Department of Agriculture. Published November 2014.
[2] Agriculture, Fisheries and Forestry in Tasmania 2015. ABARES. Published April 2015.
[3] Based on ABS Census data. Australian Bureau of Statistics

the views and priorities of all its key stakeholders. Chief among them are government investors and the Corporation's industry representative organisations.

Stakeholders in the FRDC include:

- the fishing and aquaculture industry
- the federal, state and territory governments (including their fisheries managers and other natural resource managers)
- research partners (including universities, fisheries research organisations, industry and private sector research providers, and investors)
- Australian citizens.

The FRDC does not undertake RD&E itself. Rather, it partners with other organisations that have the necessary capabilities to undertake the varied specialised activities. With a focus on end users of RD&E and markets, the FRDC facilitates the extension, adoption and commercialisation of research and development and evaluates the benefits.

To undertake its RD&E planning activities, the FRDC maintains formal structures and processes. They include Commonwealth, state and territory Fisheries Research Advisory Bodies (FRABs) that undertake RD&E planning relating to their respective jurisdictions; and subprograms (such as the aquatic animal health subprogram) and coordination programs (such as the social sciences and economic research coordination programs) that undertake RD&E planning on a national scale.

In addition, to provide more certainty for planning, investing in and managing RD&E, the Corporation enters into partnership agreements with major industry sectors. The specific RD&E is identified through sector-specific strategic plans that cover ways in which the partners will collectively invest in the RD&E activities.

As a quality-certified organisation, the FRDC's RD&E investment is underpinned by a quality-management system, which includes mechanisms for reviewing performance and implementing changes, to ensure continuous improvement.

Individual research project proposals are initially evaluated by the FRDC before being assessed for approval by an independent multi-disciplined FRDC board of directors. Once a final report is received the FRDC ensures the quality of its outputs by implementing a peer review of the science to ensure that it meets the independence required by stakeholders.

As stipulated by the PIERD Act, the FRDC's primary revenue source is based on the:

- Commonwealth Government providing unmatched funds equivalent to 0.5 per cent of the average gross value of Australian fisheries production for the three preceding years (AGVP)
- State, territory and Commonwealth fishers and aquaculturalists providing contributions of at least 0.25 percent of AGVP;
- The Commonwealth Government matching contributions by state, territory and Commonwealth fishers and aquaculturalists up to a maximum of 0.25 per cent of AGVP.

FRDC Research and Development Investment in the Tasmanian Finfish Sector

Through the FRDC, the Australian Government in its partnership with industry has invested significantly in the development of the Tasmanian finfish aquaculture sector. From 1991 – 2015, 96 research projects valued at in excess of $25 million were undertaken in support of the development of the sector.

Principal areas of investment have included:

- environmental management

- industry development
- farm management, animal health and disease mitigation
- threatened and endangered species.

A list of relevant projects funded through the FRDC is included in Annex 1.

The FRDC makes research and development investment decisions in the Tasmanian finfish aquaculture sector in consultation with:

- the Tasmanian Fisheries Research Advisory Body (TasFRAB)
- the Tasmanian Salmonid Growers Association Ltd – under the Industry Partnership Agreement (TSGA-IPA).

Current FRDC Investment in the Tasmanian Finfish Aquaculture Sector

The FRDC has 20 active research projects across the Tasmanian finfish aquaculture sector (See Annex 1. projects highlighted in green).

In addition the FRDC has approved the following four projects that are awaiting commencement in 2015. (See Annex 1. projects highlighted in orange):

- TSGA IPA: Managing ecosystem interactions across differing environments: building flexibility and risk assurance into environmental management strategies
- TSGA IPA: Disease challenge testing at the Centre of Excellence- Scope for estimating the genetics of resistance
- TSGA IPA: Reassessment of intertidal macro algal communities near to and distant from salmon farms and an evaluation of using drones to survey macro algal distribution
- TSGA IPA: DPIPWE Fish Health Unit- Centre for Excellence SOP contractor.

Conclusion

The Tasmanian finfish aquaculture sector makes an important economic contribution to the State's economy. It provides significant employment opportunities throughout rural and regional Tasmania and continues to provide leadership across Australia's broader aquaculture industries.

The development of the Tasmanian finfish aquaculture industry has been strongly supported by the Australian Government and industry through research, development and extension investments made through the FRDC.

Yours sincerely

Patrick Hone

Executive Director

Australian Government
Fisheries Research and Development Corporation

Annex 1. The Fisheries Research and Development Corporation – Finfish (and related) Research Projects 1991 - 2015

Project Number	Terms of Reference Category	Project Title
2015-024	A,B	Managing ecosystem interactions across differing environments: building flexibility and risk assurance into environmental management strategies
2014-712		Disease challenge testing at the Centre of Excellence- Scope for estimating the genetics of resistance
2014-241	A,B	TSGA IPA: reassessment of intertidal macro algal communities near to and distant from salmon farms and an evaluation of using drones to survey macro algal distribution
2014-042	A,B	Atlantic Salmon Aquaculture IPA: understanding broad scale impacts of salmonid farming on rocky reef communities.
2014-038	A,B	TSGA IPA: Understanding Dorvilleid ecology in Macquarie Harbour and their response to organic enrichment
2014-037		TSGA IPA: DPIPWE Fish Health Unit- Centre for Excellence SOP contractor
2014-031	A	Atlantic Salmon Subprogram: Predicting marine currents, nutrients and plankton in the coastal waters of south eastern Tasmania in response to changing weather patterns
2013-241		RD&E strategy workshop for Tasmanian Salmonid Growers Association Industry Partnership Agreement
2013-222	B	Atlantic Salmon Aquaculture Subprogram: Innovative Seal Exclusion Technology
2013-051		The Australian Aquatic Animal Health and Vaccine Centre: First Phase to Establish Atlantic Salmon Biosecure Fish Facility Capabilities and Develop Strategy for an Australian Centre of Excellence
2013-048		Atlantic Salmon Aquaculture Subprogram: Amoeba Lifecycle Biology: Development and application of molecular tools for detection of parasite in host and environment
2013-033		Atlantic Salmon Aquaculture Subprogram: Establishing viral diagnostics for salmonid aquaculture in Tasmania: characterisation and identification of Salmon Orthomyxo-like virus (SOMV) and associated pathology in Atlantic Salmon
2013-008	A,B	Movement, habitat utilisation and population status of the endangered Maugean skate and implications for fishing and aquaculture operations in Macquarie Harbour
2012-228		Atlantic Salmon Aquaculture Subprogram: UTAS Experimental Aquaculture Facility: Obtaining expert international governance, design and operational advice for the Atlantic salmon partners.

2012-217		Atlantic Salmon Aquaculture Subprogram: trial of a stock protection system for flexible oceanic fish pens
2012-207		Adding value to seafood processing waste through the recovery of bioactive molecules
2012-053		Atlantic Salmon Aquaculture Subprogram: assessment of Orthomyxo-like virus pathogenicity in Atlantic salmon
2012-048		Atlantic Salmon Aquaculture Subprogram: Culture and cryopreservation of Neoparamoeba perurans (AGD)
2012-047	A,B	Atlantic Salmon Aquaculture Subprogram: characterising benthic pelagic interactions in Macquarie Harbour - organic matter processing in sediments and the importance for nutrient dynamics
2011-771		Seafood CRC: genetic selection for Amoebic Gill Disease (AGD) resilience in the Tasmanian Atlantic salmon (Salmo salar) breeding program
2011-735	A,B	Seafood CRC: an evaluation of the options for expansion of salmonid aquaculture in Tasmanian waters
2011-235	B	Atlantic Salmon Aquaculture Subprogram: design, testing and assessment of seal exclusion systems for salmon (Salmo salar) farm netpens and leases in Tasmania
2011-224		Atlantic Salmon Aquaculture Subprogram: Aquareovirus (TSRV) vaccine development for the Tasmanian salmonid aquaculture industry
2011-223		Atlantic Salmon Aquaculture Subprogram: development of an RLO vaccine: Proof-of-Concept to commercial application
2011-086	A,B	Atlantic Salmon Aquaculture Subprogram: macro algal monitoring in Macquarie Harbour, Tasmania
2011-071		Atlantic Salmon Aquaculture Subprogram: AGD resistance - learning from other species to bolster the natural Atlantic salmon response
2011-070	B	Atlantic Salmon Aquaculture Subprogram: Comparative susceptibility and host responses of endemic fishes and salmonids affected by amoebic gill disease in Tasmania
2011-069		Atlantic Salmon Aquaculture Subprogram: The effects of AGD on gill function - use of a perfused gill model
2011-042	A,B	Atlantic Salmon Aquaculture Subprogram: clarifying the relationship between salmon farm nutrient loads and changes in macro algal community structure/ distribution (Existing Student Support)
2011-041	A,B	Atlantic Salmon Aquaculture Subprogram: assessment of the environmental impacts & sediment remediation potential associated with copper contamination from antifouling paint and associated recommendations for management
2010-731		Seafood CRC: discovery and manipulation of Neoparamoeba perurans aquaporins as a means to treat amoebic gill disease (AGD)

2010-218		Atlantic Salmon Aquaculture Subprogram: Hydrogen peroxide treatment of Atlantic salmon affected by AGD
2010-217	A	Atlantic Salmon Aquaculture Subprogram: Forecasting ocean temperatures for salmon at the farm site
2010-203		Atlantic Salmon Aquaculture Subprogram: oxygen regulation in Tasmanian Atlantic salmon
2010-063	B	Atlantic Salmon Aquaculture Subprogram: evaluation of approaches to improve sediment remediation (rate & function) under salmonid fish cages
2010-033		Atlantic Salmon Aquaculture Subprogram: characterisation of EST03G12 and elucidation of its role in Amoebic Gill Disease (AGD) severity
2010-032		Atlantic Salmon Aquaculture Subprogram: Tasmanian Aquabirnavirus vaccine development: Towards achieving pan-specific protection of cultured salmonids in Australia using multivalent vaccines
2009-218	A,B	Atlantic Salmon Aquaculture Subprogram: ecological effects due to contamination of sediments with copper-based antifoulants - phase 2
2009-085		Atlantic Salmon Aquaculture Subprogram: Mitigation of climate change effects on salmon broodstock: effects of estrogen therapy
2008-904		Seafood CRC: benefit-cost analysis of marker assisted selection in Australian aquaculture species
2008-794.10		Seafood CRC:retail transformation - identifying opportunities for creating consumer focused Australian salmon value added products
2008-328.16		People development program: 2012 FRDC Visiting Expert Bursaries - Professor Sigbjorn Lien
2008-328.12		People Development Program: 2009 FRDC Visiting fellows program Prof Hugh Ferguson
2008-314.33		People development program: 2013 FRDC international travel bursaries- Mark Hilder
2008-226	A,B	Tactical Response Fund: Salmon Aquaculture Subprogram: ecological effects due to contamination of sediments with copper-based antifoulants
2008-222		Atlantic Salmon Aquaculture Subprogram: Rickettsia-like organism vaccine development for the salmonid aquaculture industry
2008-221		Atlantic Salmon Aquaculture Subprogram: whole genome selection to improve selection efficiency for AGD resistance
2008-218		Atlantic Salmon Aquaculture Subprogram: extension funding application- AGD Vaccine phase III

2008-217		Atlantic Salmon Sub Program: Effect of temperature on reproductive development of maiden and repeat spawning Atlantic salmon: understanding the basis for improved egg survival and quality
2007-246	A,B	Tactical Research Fund: A review of the ecological impacts of selected antibiotics and antifoulants currently used in the Tasmanian salmonid farming industry and development of a research programme to evaluate the environmental impact of selected treatments.
2007-229		Aquafin CRC - Salmon Aquaculture Subprogram: Facilitation and administration
2005-201		Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: environmental control of growth and early maturation in salmonids
2004-236		Aquaculture Nutrition Subprogram: evaluation of value-added grain protein products for Atlantic salmon and black tiger prawns
2004-221		Aquafin CRC - Enhanced hatchery production of Striped Trumpeter, Latris lineata, in Tasmania through system design, microbial control and early weaning
2004-218		Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: molecular assessment of resistance to AGD in Atlantic salmon
2004-217.20		Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: development of an AGD vaccine: phase II
2004-217		Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: development of an AGD vaccine: phase II
2004-215		Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: establishment of challenge for AGD
2004-214		Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: effects of husbandry on AGD
2004-213		Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: commercial AGD and salmon health project
2004-210		Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: use of immunomodulation to improve fish performance in Australian temperate water finfish aquaculture
2004-096	B	The development and production of EMS template documents for the salmonid, oyster and abalone aquaculture sectors in Tasmania
2004-074	A,B	Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: a whole-of-ecosystem assessment of environmental issues for salmonid aquaculture
2003-200		Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: strategic planning, project management and adoption
2002-251		Aquafin CRC - Atlantic Salmon Aquaculture Subprogram - development of a vaccine for amoebic gill disease: genomic and cDNA library screening for antigen discovery

2001-624		Aquatic Animal Health Subprogram: development of diagnostic procedures for the detection and identification of Piscirickettsia salmonis
2001-246		Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: control of precocious sexual maturation in Atlantic salmon
2001-245		Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: model development for epidemiology of Amoebic Gill Disease
2001-244		Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: host-pathogen interactions in Amoebic Gill Disease
2001-205		Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: treatment and pathophysiology of Amoebic Gill Disease
2001-097	A,B	Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: system-wide environmental issues for sustainable salmonid aquaculture
2000-266		Atlantic Salmon Aquaculture Subprogram: effective treatments for the control of amoebic gill disease
2000-224		Atlantic Salmon Aquaculture Subprogram: molecular genetic tools for the Tasmanian Atlantic salmon industry – development and application
2000-223		Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: facilitation, administration and promotion
2000-164	A,B	Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: development of novel methods for the assessment of sediment condition and determination of management protocols for sustainable finfish cage aquaculture operations
1999-201		Aquafin CRC - Atlantic Salmon Aquaculture Subprogram: development of selective enrichment culture-polymerase chain reaction (SEC-PCR) for the detection of bacterial pathogens in covertly infected farmed salmonid fish
1998-322.80		BCA - Aquaculture Diet Development Subprogram: feed development for atlantic salmon (Salmo salar)
1998-322		Aquaculture Diet Development Subprogram: feed development for atlantic salmon (Salmo salar)
1998-209		Detection and abundance of Paramoeba species in the environment
1997-329		Evaluation of novel polyunsaturated fatty acid (PUFA) producing micro-heterotrophs for incorporation into aquaculture feeds
1996-347.80		BCA: identification of a Y-chromosome marker in Atlantic salmon (extension to FRDC 95/80)
1996-347		Identification of a Y-chromosome marker in Atlantic salmon (extension to FRDC 95/80)

1996-284	A,B	Huon estuary study: environmental research for integrated catchment management and aquaculture
1995-080.80		BCA: DNA microsatellite variation in Atlantic salmon
1995-080		DNA microsatellite variation in Atlantic salmon
1995-060.80		BCA: diagnosis and identification of Aeromonas salmonicida and detection of latent infections in carrier fish
1995-060		Diagnosis and identification of (Aeromonas salmonicida) and detection of latent infections in carrier fish
1993-233		Optimisation of feed distribution to salmon in sea-cage culture
1993-130		Development of vaccines and rapid diagnostic monoclonal antibodies against micro-organisms associated with diseases of wild and cultured finfish and shellfish
1993-128.80		BCA: development of molecular probes for use in bacterial disease diagnosis and health monitoring of farmed and wild finfish in Australia
1993-128		Development of molecular probes for use in bacterial disease diagnosis and health monitoring of farmed and wild finfish in Australia
1993-126		Aquaculture diet development subprogram - Development of more cost effective salmon feeds for the Tasmanian atlantic salmon industry
1993-120.05		Aquaculture diet development subprogram: fish meal replacement in aquaculture feeds for Atlantic salmon
1992-153		Mechanical Biofouling
1992-152.80		BCA: genetic Diversity in Tasmanian Atlantic salmon
1992-152		Genetic Diversity in Tasmanian Atlantic salmon