

Reports and Workshops

PROJECT AND GRANT REPORTS

- ['Namgis Land-Based Atlantic Salmon Recirculating Aquaculture System Pilot Project – Update for October 1, 2015 to June 30, 2016](#)
'Namgis First Nation
- [Kuterra Land Based Atlantic Salmon RAS Project – Final Milestone Report \(Presentation at AIW 2015\)](#)
Eric Hobson and Garry Ulstrom, Kuterra Limited Partnership
- ['Namgis First Nation's Land Based Atlantic Salmon Recirculating Aquaculture System Project - Final Performance Metrics Report](#)
'Namgis First Nation
- ['Namgis First Nation's Land Based Atlantic Salmon Recirculating Aquaculture System Project - Cohort #4 Addendum](#)
'Namgis First Nation
- ['Namgis/Kuterra Closed Containment Project - Independent Environmental Monitor \(IEM\) Final Report for Tides Canada](#)
Pacific Salmon Foundation
- [Capital Cost Retrospective on Development Costs of Two Operating Facilities Employing RAS](#)
'Namgis First Nation
- [Optimizing Water Quality through Ozonation and Waste Stream Optimization through Harvest of Waste Solids](#)
Taste of BC Aquafarms

RESEARCH PAPERS

- [White Paper on Feed Ingredients and the Reduction of Dependence on Marine Harvested Products for Aquaculture Feeds](#)
Fredric T. Barrows, USDA Agriculture Research Service and Wendy B. Sealey, U.S.D.I., Fish and Wildlife Service
- [White Paper: A Review of Factors Influencing Maturation of Atlantic Salmon In RAS Environments](#)
Christopher Good and John Davidson, TCFFI
- [Optimizing Hydraulic Retention Times in Denitrifying Woodchip Bioreactors Treating Recirculating Aquaculture System Wastewater](#)

Christine Lepine,* Laura Christianson, Kata Sharrer, and Steven Summerfelt

- Modeling and Mitigation of Denitrification 'Woodchip' Bioreactor Phosphorus Releases During Treatment of Aquaculture Wastewater
Christine Lepine, Laura Christianson, Kata Sharrer, and Steven Summerfelt

WORKSHOPS

In collaboration with the Freshwater Institute, the Gordon and Betty Moore Foundation, and the Atlantic Salmon Federation, Tides Canada supported a series of annual aquaculture innovation workshops.

Aquaculture Innovation Workshop No. 7
West Virginia, USA
October 14-15, 2015

Program and Attendee List

- [Aquaculture Innovation Workshop – Program](#)
- [Aquaculture Innovation Workshop – Attendees List](#)

Selected Presentations

- [Kuterra Land Based Atlantic Salmon RAS Project – Final Milestone Report](#)
Eric Hobson and Garry Ulstrom, Kuterra Limited Partnership
- [UBC InSEAS Research Program to Determine Optimal Salinity Conditions for Atlantic and Coho Salmon Growth in RAS](#)
Jeff Richards, UBC
- [White Paper: A Review of Factors Influencing Maturation of Atlantic Salmon In RAS Environments](#)
Christopher Good and John Davidson, TCFFI
- [More AIW 2015 presentations on Freshwater Institute website](#)



Aquaculture Innovation Workshop No. 6
Vancouver, British Columbia
October 27-28, 2014

Program and Attendee List

- [Aquaculture Innovation Workshop – Program](#)
- [Aquaculture Innovation Workshop – Attendees List](#)

Presentations

- [RAS 101: An Introductory Overview of the Basic Technical, Biological and Economic Elements of a Land Based Recirculating Aquaculture System and Presentation of an Economic Model Comparing Open Net and Land Based Aquaculture](#)
Steven Summerfelt and Brian Vinci
- [Aquaculture's Role in Sustainable and Healthy Food Systems: Public Health, Environment and Policy Considerations](#)
Dr. Jillian P. Fry
- [Independent Aquaculture Regulatory Review for Nova Scotia: The Process, Conclusions and Recommendations of the Doelle-Lahey Panel](#)
Bill Lahey
- ['Namgis First Nation's "Kuterra" Project: Report on Performance](#)
Hereditary Chief Bill Cranmer and Garry Ullstrom
- [The Diversified RAS Farm](#)
Justin Henry
- [AgriMarine's Floating Semi-closed Containment Systems: Update on the Lois Lake Steelhead Farm and Other Projects](#)
Robert Walker and Stephen Robinson
- [The Business Of Aquaculture – Vertical Integration, Optimizing Value from the Fish Product and Creating Value from the Waste Stream](#)
Norman McCowan
- [Developments in Recirculating Aquaculture Systems for Salmon Grow-out in Europe and Asia](#)
Bjarne Hald Olsen
- [Financing Aquaculture](#)
Panel Discussion
- [White Paper on Feed Ingredients and the Reduction of Dependence on Marine Harvested Products for Aquaculture Feeds & Presentation](#) | [Paper](#)
Wendy Sealey

- [Enterra Feed: Commercializing a Natural Insect-Based Process that Imitates Nature to Grow Renewable Food for Animals and Plants: Natural Protein, Oils And Organic Fertilizer](#)
Brad Marchant
- [Land Based RAS and Open Pen Salmon Aquaculture: Comparative Environmental Assessment](#)
Brian Vinci
- [Off-flavors in Recirculated Aquaculture Systems: Status on Current Knowledge on Organisms Producing Off-flavors and a Recent Example of Mitigation of Off-flavor Problems in a Recirculated, Experimental System](#)
Niels Jorgensen
- [Nofima Atlantic Salmon in Closed-Containment Systems Research Update](#)
Bendik Fyhn Terjesen
- [Freshwater Institute RAS Grow-out and Depuration Research Update](#)
Steven Summerfelt
- [Taste of BC Aquafarm Report on Ozonation and Enhanced Waste Treatment](#)
Steve Atkinson
- [Taste of BC Aquafarm Report on Ozonation and Enhanced Waste Treatment](#)
Steven Summerfelt
- [Biosecurity Considerations in Water Recirculating Aquaculture Systems Design](#)
Brian Vinci
- ["Wasted" Waste: Exploring the Potential of Utilizing Kuterra's Effluent Stream in a De-Coupled Aquaponics System](#)
Andrew Riseman, W. Vandrsteen and Erin Latham
- [Design and Engineering Panel Discussion](#)

- [CO2 Removal](#)
KC Hosler
- [CO2 Removal and Stripping Column Ventilation at Bell Aquaculture](#) Steven Summerfelt, Jacob Bartlett, Jamie Thompson, Brian Vinci, and Norman McCowan
- [Improving Water Quality and Reducing Water Discharge in RAS using AquaPonic and Membrane Technology](#)
Thomas M. Losordo
- [Large-Scale Biosolids Dewatering](#)
Bjarne Hald Olsen
- [AIW 6 Wrap Up Presentation](#)
Eric Patel

Aquaculture Innovation Workshop No. 5
Shepherdstown, West Virginia
September 4-6, 2013

Summary Notes, Program and Attendees List

- [Aquaculture Innovation Workshop – Summary Notes](#)
- [Aquaculture Innovation Workshop – Program](#)
- [Aquaculture Innovation Workshop – Attendees List](#)

Presentations

- [Effects of Water Salinity and Exercise on Atlantic Salmon Performance as Post-Smolts in Land-Based Closed-Containment Systems](#)
Bendik Fyhn Terjesen
- [UBC InSEAS Research Program to Determine Optimal Rearing Conditions for Salmon Growth in RAS](#)
Jeffrey Richards
- [Effects of Water Exchange Rate and Biofiltration on Circulating Hormones in Water Recirculation Aquaculture Systems Containing Sexually Maturing Atlantic Salmon](#)
Chris Good
- [Atlantic Salmon Growout Trials in Freshwater Closed-Containment Systems at the Conservation Fund Freshwater Institute](#)
Steven Summerfelt
- [Occurrence of Off-Flavors in Water and Fish \(Rainbow Trout\) in RAS in Denmark and Procedures for Reduction of the Off-Flavors](#)
Niels Jorgensen
- [Effects of H₂O₂ Disinfection and Aeration Column Packing on Off-Flavor Depuration Kinetics of 4 kg Atlantic Salmon Purged in Replicated Partial Reuse Systems](#)
John Davidson
- [Microbial Water Quality in RAS – Concepts and Examples](#)
Lars-Flemming Pedersen
- [Denitrification Woodchip Bioreactors for Treatment of Nitrate](#)
Laura Christianson
- [Water Quality Control in RAS: The Importance of an Anaerobic Treatment Stage for Removing Nitrate, Phosphate, and Off-Flavor Compounds](#)
Jaap van Rijn
- [Land Based RAS and Open Pen Salmon Aquaculture: Comparative Economic and Environmental Assessment](#)
Trond Rosten and Brian Vinci

- [Assessment of Atlantic Salmon Farming in Floating Closed-Containment Systems](#)
Svein Martinsen
- [Update on Government Aquaculture Strategies, Including RAS](#)
Jeff Silverstein
- [Report on the Standing Committee of Fisheries and Oceans – Closed Containment Salmon Aquaculture](#)
Rodney Weston
- [Updates on Land-Based Closed-Containment Systems For Salmon](#)
Steven Summerfelt
- [Coho Salmon Production Systems at Aquaseed's SweetSpring Salmon in Washington State](#)
Jim Terry
- [Nanaimo Land Based Steelhead Model Aquafarm](#)
Steve Atkinson
- ['Namgis First Nation Land Based Atlantic Salmon RAS Project](#)
Chief Bill Cranmer, Eric Hobson and Jackie Hildering
- [Trends for Atlantic Salmon Production in Land Based Systems in Chile](#)
German Merino
- [Developing Yellow Tail King Fish Farming In Land-Based Closed-Containment Systems](#)
Andries Kamstra
- [Challenges in Construction and Operation at Extremely Remote RAS Locations – Case Study, Finmark, Norway](#)
Ivar Warrer-Hansen
- [Retrospective Assessment of Construction Costs for the First 400 tonne/yr Atlantic Salmon Growout Module at the Namgis' First Nations](#)
Gary Robinson and Andrew Wright
- [RAS Design Innovations and Opportunities for New Technologies](#)
Marius Haegh
- [Update on Atlantic Sapphire – Langsand Laks and RAS Design Innovations and Opportunities for New Technologies](#)
Bjarne Hald Olsen
- [Opportunities in Aquaponics](#)
Dave Haider, Tom Losordo and Huy Tran

RAS Producers Workshop
Richmond, British Columbia
April 22 and 23, 2013

Program and Attendees List

- [RAS Producers Workshop – Program](#)
- [RAS Producers Workshop – Attendees List](#)

Presentations

- [Atlantic Salmon Growout Trials in Freshwater Closed-Containment Systems at the Conservation Fund Freshwater institute](#)
Steven Summerfelt and Thomas Waldrop
- [The 'Namgis First Nation Land Based Recirculating Aquaculture System Atlantic Salmon Demonstration Project Update](#)
Garry Ullstrom
- [Taste of BC Nanaimo Land Based Steelhead Model Aquafarm Update](#)
Steve Atkinson
- [Tastee Choice Rebrand](#)
Blake Hoss
- [Niman Ranch Compassionate Family Farmers Raising Animals with Respect for the Land](#)
Jeff Tripician
- [The 2012 Survey of Consumer Trust in the Food Supply](#)
Charlie Arnot
- [Depuration and Slaughter Techniques to Optimize Atlantic Salmon Product Quality from Land-based Closed Containment Systems Study](#)
John Davidson



Aquaculture Innovation Workshop No. 4
Comox, British Columbia
November 5 and 6, 2012

Program and Attendees List

- [Aquaculture Innovation Workshop – Program](#)
- [Aquaculture Innovation Workshop – Attendees List](#)

Presentations

- [Progress Update on Two Atlantic Salmon Grow-out Trials in Freshwater Closed Containment Systems](#)
Steven Summerfelt, TCFFI
- [Depuration and Slaughter Techniques to Optimize Atlantic Salmon Product Quality from Land-Based Closed Containment Systems Study](#)
John Davidson, TCFFI
- [Studies on Long-Term Carbon Dioxide Exposure During Salmonid Grow-Out in Water Recirculation Aquaculture Systems](#)
Christopher Good, TCFFI
- [UBC InSEAS Research Program to Determine Optimal Conditions for Fish Rearing](#)
Colin Brauner, UBC
- ['Namgis First Nation's Land Based Atlantic Salmon RAS Project](#)
Garry Ullstrom, K'udas Limited Partnership
- [Sustainable Blue](#)
Jeremy Lee, Sustainable Blue
- [Coho Salmon Production Systems at Aquaseed's SweetSpring Salmon in Washington](#)
Jim Terry, SweetSpring Salmon
- [Atlantic Sapphire – Langsand Laks, Denmark, and Virginia, USA](#)
Thue Holm, Atlantic Sapphire
- [Atlantic Salmon in RAS in Norway](#)
Frode Mathisen, Greig Seafood Ltd.
- [Environmental Performance of a 3,300 mt Land Based Salmon Farm](#)
Brian Vinci, TCFFI
- [Use of Single-Sex and Triploid Stocks to Eliminate Early Maturation of Atlantic Salmon](#)
Tillmann Benfey, University of New Brunswick

- [Breeding Atlantic Salmon for Rapid Growth and Late Maturation and the Potential to Produce all Female Salmon Eggs](#)
Thoralf Solberg, SalmoBreed AS
- [Strategies for Significant Heat Loss Reduction in RAS systems Using Modern Energy Recovery Equipment](#)
Andrew Wright, SOS Marine Conservation Foundation
- [Process Modelling and Energy Optimization in RAS Design](#)
Karl Williaume, WorleyParsons
- [Creating Value from the Waste Stream – Sustainable Aquaculture and Bioproducts Production](#)
David Brune, University of Missouri
- [Developments in Sustainable Ingredients for Aquaculture Feed](#)
Jason Mann, Ewos
- [Canada's Organic Standards](#)
Justin Henry, Target Marine



Aquaculture Innovation Workshop No. 3
Seattle, Washington
May 15 and 16, 2012

Program and Attendees List

- [Aquaculture Innovation Workshop – Program](#)
- [Aquaculture Innovation Workshop – Attendees List](#)

Presentations

- [Progress Update on Two Atlantic Salmon Grow-out Trials in Freshwater Closed Containment Systems](#)
Steven Summerfelt, Director, Aquaculture Systems Research, TCFFI and Thomas Waldrop
- [Depuration and Slaughter Techniques to Optimize Atlantic Salmon Product Quality from Land-Based Closed Containment Systems Study](#)
John Davidson, Senior Research Associate, Aquaculture Systems Research, TCFFI, Thomas Waldrop, Kevin Schrader, Brett Kenney, Gary Burr, William Wolters, and Steven Summerfelt
- [‘Namgis First Nation – K’udas Land Based Atlantic Salmon Recirculating Aquaculture System Project](#)
Eric Hobson, President, SOS; Gary Ullstrom, Senior Financial Officer, ‘Namgis First Nation and Cathal Dinneen, Operations Manager, K’udas Project
- [Atlantic Sapphire – 1000 ton Salmon Production in Denmark – Langsand Laks](#)
Thue Holm, CEO
- [Aquaseed’s SweetSpring Salmon](#)
Greg Hudson, VP, Operations; Jim Terry, Technical Service Manager, Jeff Hudson, Food Fish Manager, and Per Heggelund
- Sustainable Blue
Jeremy Lee, President
- [Global Update](#)
Steven Summerfelt, Aquaculture Systems Research, TCFFI
- [The Branding Revolution of Commodity Products – Strategies for Creating and Optimizing your Brand](#)
Katherine Bryar, Senior Consultant, Pacific Marketing Consulting
- [Market Panel Discussion](#)
Tobias Aguirre, Executive Director, FishWise; Dane Chauvel, President and Founder, Organic Ocean; Guy Dean, Vice President and Chief Sustainability Officer, Albion Fisheries Ltd.; Don Sollows, Director Seafood, Sysco and Mike McDermid, Partner Relations Manager, Vancouver Aquarium’s Ocean Wise Program

- [Benchmarking: How, Why, and What Does it Mean?](#)
John Volpe, Associate Professor, University of Victoria
- [Seafood Watch 2.0: Navigating New Waters – An Introduction to the Revised Seafood Watch Aquaculture Criteria](#)
Scott Wallace, Sustainable Fisheries Analyst, David Suzuki Foundation
- [The SAD: Aquaculture Stewardship Council and Closed Containment Farmed Salmon](#) (NOTE: This session will also include a brief update on the status of Canada's National Organic Standard)
Jay Ritchlin, Director, Marine and Freshwater Conservation, David Suzuki Foundation
- [Strategic Use of Nutritional Labelling](#)
Myron Roth, Industry Specialist, Aquaculture and Seafood, BC Ministry of Agriculture
- [Producers' Panel Discussion](#)
Josh Goldman, Founder/CEO, Australis Aquaculture (Barrumundi); Per Heggelund, President, Aquaseed (SweetSpring Coho Salmon); Thue Holm, CEO, Atlantic Sapphire (Atlantic Salmon) and Norman McCowan, President, Bell Aquaculture (Yellow Perch)



Aquaculture Innovation Workshop No. 2
Campbell River, British Columbia
September 26 and 27, 2011

Program and Attendees List

- [Aquaculture Innovation Workshop – Program](#)
- [Aquaculture Innovation Workshop – Attendees List](#)

Presentations

- [Recent Research on the Effects of NO3-N, CO2, O2 x Swimming Speed, and Strain x Photoperiod on Salmonid Performance, Health, and Welfare](#)
By Christopher Good, TCFFI, Aquaculture Veterinary Researcher
- [Research on Atlantic Salmon Welfare and Performance in RAS at Nofima Centre for Recirculation in Aquaculture](#)
By Jelena Kolarevic, NOFIMA MARINE, Researcher
- [Salmon Aquaculture GHG Emissions – A Preliminary Comparison of Land-Based Closed Containment and Open Ocean Net-Pen Aquaculture](#)
By Andrew Wright, SOS Solutions Advisory Committee, Technology Advisor
- [Advances in Feed Formulations and Feed Specifics for Closed Containment Systems](#)
By Brad Hicks, Taplow Feeds, Executive Vice President; and Gavin Shaw, Skretting North America Product Manager
- [Status of Floating Closed-Containment Systems](#)
By Sean Wilton, Agrimarine Holdings
- ['Namgis First Nation – Land Based Salmon Recirculating Aquaculture System Project](#)
By Garry Ullstrom, Namgis First Nation; KC Hosler, PR Aqua; and Steven Summerfelt, Technical Advisory Committee, Tides Canada Salmon Aquaculture Innovation Fund
- [Marine Harvest Canada – Land-based Atlantic Salmon Grow-out Employing Recirculating Aquaculture System](#)
By Clare Backman, Marine Harvest Canada; David Jackson, WorleyParsons Canada; and Linda Coady, Chair, Tides Canada Project Review Board
- [Aquaseed's Sweetspring Salmon](#)
By Per Heggelund, Aquaseed Sweetspring Salmon
- [Atlantic Sapphire – 1000 ton Salmon production in Denmark – Langsand Laks](#)
By Thue Holm, CEO Atlantic Sapphire
- [From the Vision to the Market: The Target Marine Story of White Sturgeon and Sunshine Coast Caviar](#)
By Justin Henry, Target Marine Hatcheries, General Manager

- [Progress Update on Two Atlantic Salmon Growout Trials in Freshwater Closed-Containment Systems at the Freshwater Institute \(Granny Painter Room\)](#)
By Steven Summerfelt and Thomas Waldrop, TCFFI
- [Presentation on behalf of AquaOptima: Design and Economics of a RAS Farm for Atlantic Salmon in China](#)
By Steven Summerfelt, TCFFI
- [University of British Columbia's InSEAS Research Facility](#)
By Colin Brauner, University of British Columbia, Department of Zoology
- [Trends in Retailing from a Supplier Perspective: Increasing Demand, Retailer Requests, and Consumer Trend](#)
By Guy Dean, Albion Fisheries Ltd.
- [The Sustainable Seafood Policy Era: Understanding the North American Major Buyers' Sustainability Commitments, Shifting Needs and Seafood Buying Policies](#)
By Kelly Roebuck, Living Ocean's Society, Sustainable Seafoods Campaign Manager
- [The History of Salmon Aquaculture](#)
By Brad Hicks, Taplow Feeds, Executive Vice President
- [The Canadian Model Farm Initiative](#)
By Daniel Stechey, Canadian Aquaculture Systems
- [Department of Fisheries and Oceans National Strategic Planning Initiative Update on Emerging Technologies & the New Federal Regulatory Regime for Aquaculture in the Pacific Region](#)
By Alistair Struthers, Fisheries and Oceans Canada, Aquaculture Management Directorate, Sector Strategies Team Leader
- [Update on Emerging Marine Aquaculture Technologies in the US and the new NOAA Aquaculture Policy](#)
By John Colt, National Oceanic and Atmospheric Administration, Research Biologist



Aquaculture Innovation Workshop No. 1
Shepherdstown, West Virginia
January 2011

Summary Notes, Program, and Attendees List

- [Aquaculture Innovation Workshop – Summary Notes](#)
- [Aquaculture Innovation Workshop – Program](#)
- [Aquaculture Innovation Workshop – Attendees List](#)

Presentations

- [Biotechnology: Extending the Green Revolution](#)
By Elliot Entis
- [Innovation and Emerging Technologies](#)
By Michael Rubino
- [Innovation and Emerging Technologies: A Major Pillar of the New National Aquaculture Strategic Action Plan Initiative in Canada](#)
By Eric Gilbert
- [Aquaculture Production Systems – Advances in Water, Genetics, Health, and Nutrition](#)
By Jeff Silverstein
- [Advances in Closed-Containment Systems for Salmonids](#)
By Steven Summerfelt
- [Fish Health and Welfare in Closed-Containment Systems](#)
By Christopher Good
- [Atlantic Salmon Breeding Program and Research on Harvest Quality](#)
By William Wolters
- [Sustainable Feed](#)
By Frederic Barrows
- [Status, Challenges, and Opportunities of Floating Closed-Containment Systems](#)
By Sean Wilton
- [Aquaculture Innovation – A Producer’s Perspective](#)
By Per Heggelund